US-China Economic Relations in The Next Ten Years :
Towards Deeper Engagement and Mutual Benefit

中美经贸关系的未来十年:
迈向更深层次的互惠合作

China-United States Exchange Foundation
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Foreword

The U.S. and China are two very different countries, with different histories and cultures. They are also at different stages of development, one being the largest developed nation in the world, while the other being the largest developing nation in the world. Each is of substantial economic size, and therefore, each in different ways contributes to global economic activities. Working together, they can do more to contribute towards global economic recovery and financial stability, which still eludes us five years after the financial crisis of 2008. Furthermore, the U.S. and China are the two largest trading nations in the world. Working together, they can help to further liberalize the trade of goods and services around the world.

The fact is whether it is in energy security, food sufficiency, protection of the environment, climate change, nuclear weapons proliferation, fighting terrorism, preventing epidemics or drug trafficking, all of these and other transnational challenges that the world faces today require multilateral efforts. But if the U.S. and China work together on any of these issues, the chances of success will be enhanced. It is for all the above reasons that from a global perspective, the U.S.-China relationship is the most important bilateral relationship today.

From a bilateral perspective, the economic relationship between the U.S. and China has developed over the past few decades from virtually nonexistent to becoming a highly interdependent and mutually beneficial one. But where is this economic relationship going in the future?

To answer this question, the China-United States Exchange Foundation engaged a group of eminent scholars, with advice from academic, business and political leaders from both countries, to undertake a study to examine this economic relationship. The study not only reviewed the past, but also examined some of the commercial difficulties that could impede increasing commerce between them. But most importantly, the study looked into the future and concluded that, "Both countries want to establish a pattern of secure, high-quality, sustainable growth and employment for their people, and this study demonstrates that the bilateral relationship, built and adapted well over time, can make a material contribution to that shared goal." Indeed, over the next 10 years, significant economic opportunities and millions of jobs can be created for the peoples of the two countries if the two countries cooperate together closely. The U.S.-China relationship is not only important from a global perspective, but also from a bilateral perspective.

Little wonder that, over the last 42 years, eight presidents of the U.S. and five generations of Chinese leaders have, with enormous foresight, worked hard to build U.S.-China relations. Despite ups and downs, the relationship has been moving forward.

However, it is important to recognize that the relationship is constrained by mistrust and differences over strategic global issues. Also, there are difficulties in the commercial relationship, such as cyber security, intellectual property protection and protectionism on trade and investment. Trust needs to be built, and differences and difficulties need to be managed and addressed. But under no circumstances should they be allowed to stand in the way of deeper engagement between the two countries.

President Obama and President Xi have called for the building of a new relationship between the U.S. and China as major powers. The two leaders have just begun new terms of office. Let us seize the moment now, and begin working towards this goal. After all, this relationship will be good for the two peoples, and for long-term peace and prosperity in the world.

C H Tung
Chairman, China-United States Exchange Foundation
Vice Chairman, Standing Committee of the Chinese People's Political Consultative Conference

As I gave thought to writing the foreword for this study, I became increasingly convinced with the fact that a good economic relationship between the United States and China can never truly realize its full potential without a healthy overall relationship. Where is this relationship today? Where is the relationship going from here? Dr. Henry Kissinger, one of the original architects of the modern day U.S.-China relationship, gave an elegant, logical and insightful answer at a speech he delivered at a China Development Bank gathering on April 24th, 2013 in Beijing. With his kind permission, I am honored to include his speech for your reading.

C H Tung
Chairman, China-United States Exchange Foundation
Vice Chairman, Standing Committee of the Chinese People's Political Consultative Conference
May 21st, 2013

Dr. Henry Kissinger's remarks at China Development Bank's International Advisory Council Meeting 2013
April 24, 2013, Beijing, China

I would like to express, first of all, my appreciation to Chairman Chen Yuan for his decades of friendship, for the leadership he has provided to the bank, and the inspiration he has provided to his friends. For any of us who saw China at the beginning, the transformation we now see would have been beyond our imagination. This resulted, of course, from great technical knowledge, but also from the courage to undertake and to enterprise what most experts would have considered impossible when it was started. So let me thank you—I am sure on behalf of all of us, but especially on my behalf. And let me also wish every success and express every confidence in the new chairman that he will continue the great tradition that he inherits.

My participation in this group does not result from the contribution I can make to economic discussion, so I will confine my remarks to a brief analysis of the international situation. And let me begin with the conclusion. I have been to China over eighty times since my visit in 1971. I have had more conversations than I can count with Chinese leaders. I have never left in a more hopeful conviction than after this visit—and optimism is not my outstanding characteristic. Let me explain why I believe this to be the case.

There is a great deal of appeal to a so-called world community. But there really is no world community, because different regions in the world are following different principles of organization and pursue different aims. Europe is in the process of abandoning the model of the nation state, a model on which the international system for the whole world has been based for two centuries, partly as a result of colonialism. But in the process, it is caught between new institutions that do not yet have a popular base and old institutions that have lost their confidence. European leaders no longer have the same capacity to ask for sacrifices from their people that they did in the past. And unless you are willing to sacrifice, you cannot build. And the objective result is then two-fold: a consumption-oriented economy that does not accumulate enough resources, and a foreign policy of no-risk that does not meet the requirements of the contemporary crisis.

In Asia, foreign policy is conducted the way it used to be in the 19th century in Europe: with strong national states. The challenge in Asia is to bring these national states into a non-confrontational relationship with each other. In the Middle East, there is a challenge to borders, to domestic institutions, and to the international systems; and these challenges are affecting every other region, and drawing in every other region, but without as yet an overall guide.

I have mentioned this because within this framework, there is China and the United States, two great continental nations that have, in their histories, never fully participated in an international system. China believed that it was unique, and because of geography and other reasons, was largely contained within its own reality. America believed that it was also unique, but that it had a missionary obligation, but it did so more on an ideological basis than on the basis of reasons of state. In a way, therefore, the key to an emerging world order is the relationship between China and the United States.

China and the United State cannot solve the problems by themselves, but the problems cannot be solved without cooperation between China and the United States. Without cooperation between China and the

United States, the world will be divided into opposing camps, and the temptation will be huge for every component that I've described to exploit the rivalry of the other countries. So that cooperation is the great opportunity of our age. I have had the good fortune of being present at the beginning of contemporary relations between China and the United States. Not often can a historian experience what he is writing about. At the beginning, we had a common adversary, and therefore we had common goals. For a decade, a great ingenuity was developed in establishing parallel policies. This made a great contribution to the conduct of the Cold War.

When the Cold War was over, two things happened that were somewhat contradictory with each other. On the one hand, in America, eight successive administrations have pursued a policy of friendship or cooperation with China. That's an important achievement. And five Chinese administrations have done the same thing. But the problem has been, again, two-fold: How do you define that cooperation? And secondly, how do you apply it to a period without a Cold War?

So in that period, we have avoided serious confrontation. But now we are facing this issue: In the United States, there are significant elements that consider China as a vestige of the Cold War. But the Soviet Union was almost exclusively a military power; whereas China is closely connected with the world economy. Its impact does not derive primarily or importantly from its military strength, but from its domestic performance—that's a different challenge. By the same token, in China there are important elements that believe the United States is a declining power, that China is a rising power, and that declining powers always try to keep down the rising power, and therefore some conflict is inevitable. And they mention the British-German rivalry as an example.

On the other hand, Britain and Germany clashed due not to the nature of events as much as the short-sightedness of policies. Above all, there is one important fact: the turning point in European history has been World War I. Europe has never recovered from World War I. And yet if any of the leaders who went into World War I had known in 1914 what the world would look like in 1918, they would never have done it.

A conflict between China and the United States would have even greater consequences, and therefore our leaders know that no matter what academic studies say, we should not deal with it as a confrontation. Now some of us in this room have been saying this for twenty years. And we were often criticized as being unduly seduced by Chinese hospitality or by short-term experience. But the crucial aspect of the present situation is that the leaders of both sides seem to have realized that it is essential to find a cooperative pattern. It is not enough, as we have done successfully, to solve the day-to-day problems that arise between our countries. And a lot of day-to-day problems are bound to arise when two major countries interact with each other. From my experience, I can look back to the days of the 1970s when the trade between China and the United States was less than the American trade with Honduras. So in this new world of vast interactions, we have now an unusual opportunity; not because I say so, but because our leaders seem to me to have come to such an understanding.

Now, if we are able to translate a general understanding into concrete policies, the United States and China could begin with a common analysis of where we think the international system is going and should go: a means of developing not identical but parallel policies. We are aided in this because there is a whole set of problems—like energy, environment, non-proliferation, space, cyber—in which there is no possible national solution. And in issues like cyber or space, there is not even an agreed-upon definition as to what the problem is. So we are impelled to this common approach, which a few years ago would have been considered hopelessly idealistic, and which today is the only realistic basis for proceeding.

It is difficult to do this because the basic approach of Americans and Chinese is not always the same—their histories are totally different. The United States has never had a powerful neighbor; China has never been without a powerful enemy on its borders. Americans thinks that every problem has a solution. Chinese think every solution creates a new problem. So how to meld these things together? That is the big challenge of our time.

But again, having been in this city and having had the privilege of knowing its leaders, I believe the enormous reform effort that China is now undertaking, and the transformations that reality imposes on America, have created a basis for the kind of dialogue that hasn't been seen in a long time. And while it will be difficult, and while there will be controversies, I leave with an optimistic prognosis for relations between China and the United States, and the fulfillment of this goal of showing how two great nations that historically would have been rivals, can work as partners in the international order that is emerging.

Thank you again for inviting me, and for the friendship, Mr. Chen Yuan, that you have shown me over the decades.

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Executive Committee

The China-United States Exchange Foundation acknowledges its profound indebtedness to members of the Executive Committee for their dedication and hard work in producing this groundbreaking study.

The Executive Committee is responsible for planning, organizing and researching this study. This report is divided into two parts. Part I forms the main report, while Part II consists of supporting sub-reports for Part I. The Executive Committee takes overall responsibility for Part I. As for Part II, the Executive Committee identified topics of special interest to be researched and invited individual authors to contribute their work independently.

Co-convenors

Victor K. FUNG

Chairman, The Fung Group

Chairman, The Fung Global Institute

Vice-Chairman, China-United States Exchange Foundation

Lawrence J. LAU

Ralph and Claire Landau Professor of Economics, The Chinese University of Hong Kong

Kwoh-Ting Li Professor in Economic Development, Emeritus, Stanford University

Members

Michael J. BOSKIN

Tully M. Friedman Professor of Economics and Senior Fellow at the Hoover Institution, Stanford University

HAI Wen

Vice President, Peking University

Chancellor of Shenzhen Graduate School, Peking University

Founding Dean and Professor of Economics, HSBC Business School, Peking University

FAN Gang

Director, National Institute of Economic Research

Chief Researcher, China Center For International Economic Exchanges

Professor of Economics, Peking University and the Graduate School of Chinese Academy of Social Sciences

Michael SPENCE

Professor of Economics, Leonard N. Stern School of Business at New York University

Senior Fellow at the Hoover Institution and the Philip H. Knight Professor Emeritus of Management in the Graduate School of Business, Stanford University

Recipient of the Nobel Prize in Economic Sciences in 2001

Steering Committee

The China-United States Exchange Foundation wishes to express its sincere gratitude to members of the Steering Committee for their dedication and participation in the study, by providing valuable advice and comment on the project and report drafts. The role of the Steering Committee is advisory in nature and its members are not responsible for the contents of this study.

U.S. Participants

Ajay BANGA

President and CEO, MasterCard Worldwide

Dominic BARTON

Global Managing Director, McKinsey & Company, Inc.

Myron BRILLIANT

Executive Vice President and Head of International Affairs, The US Chamber of Commerce

John CHEN

Senior Advisor, SilverLake Private Equity

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Former U.S. Secretary of Commerce

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Chairman, Kissinger Associates

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President, National Committee on U.S.-China Relations

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Former Chairman and CEO, Caterpillar, Inc.

John PODESTA

Former White House Chief of Staff

Chair, Center for American Progress

John RICE

Vice Chairman, GE

President and CEO, GE Global Growth and Operations

James ROGERS

Chairman, President and CEO, Duke Energy Corporation

David RUBENSTEIN

Co-Founder and Co-Chief Executive Officer, The Carlyle Group

Peter A. SELIGMANN

Chairman of the Board and CEO, Conservation International

Andy STERN

Senior Fellow, Columbia University Richman Center

Former President, Service Employees International Union

Acknowledgements

Steering Committee

Chinese Participants

CHANG Xiaobing

Chairman and CEO, China Unicom

FU Chengyu

Chairman, China Petrochemical Corporation (Sinopec Group)

GAI Zhixin

Chairman of the Board, CITS Group Corporation

HU Maoyuan

Chairman, SAIC MOTOR

JIANG Guangping

Secretary of Secretariat, All-China Federation of Trade Unions

JIANG Jianqing

Chairman, Industrial and Commercial Bank of China

MA Chunyu

Managing Director, Haier America

MA Xiuhong

Vice-Chairwoman, The Foreign Affairs Committee of the Chinese People's Political Consultative Conference (CPPCC) National Committee

Chairwoman, China Foreign Trade Centre

Former Vice Minister of the Ministry of Commerce

NING Gaoning

Chairman, COFCO Corporation

NI Pin

President, WanXiang America

SHI Zhengrong

Founder, Executive Chairman and CSO, Suntech Power

SUN Anmin

Member of the Standing Committee of the National People's Congress

Executive Vice Chairman of All-China Federation of Industry & Commerce

WANG Chunzheng

Executive Vice-Chairman, China Center for International Economic Exchanges

Former Director of the Office of the Economic and Financial Leading Group of the CPC Central Committee

WEI Jiafu

Chairman, COSCO

XIANG Wenbo

President, Sany Heavy Industry Co., Ltd

YAO Qiang

Executive Director, Laboratory of Low Carbon at Tsinghua University

John ZHAO

CEO, Hony Capital

Executive Vice President, Legend Holdings

ZHOU Wenzhong

Former Chinese Ambassador to the United States

Secretary General, Boao Forum for Asia

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Center for Strategic and International Studies

www.csis.org

China Center for International Economic Exchanges

(led by CHEN Wenling)

www.cciee.org.cn

Chinese Academy of International Trade and Economic Cooperation

(led by HUO Jianguo)

www.caitec.org.cn

Hong Kong Research Team

(led by KWOK Kwok Chuen)

EXECUTIVE SUMMARY

The bilateral economic relationship between the U.S. and China has developed over the past 35 years from virtually nonexistent to the most important in the world. Today, the U.S. and China are each other's second largest trading partners. A vast volume of trade in goods and services, integrated supply chains, substantial direct American investment in China, and an even larger Chinese investment in U.S. Treasury securities, speak to the importance of the relationship. Indeed, while there are frequent tensions, this economic relationship is of tremendous mutual benefit.

The purpose of this study is to look back at how this economic relationship has evolved over the past 35 years, so that we can understand how interdependent this relationship has become. More importantly, the study looks forward, to how the two economies are likely to develop over the next decade and how even greater economic benefits can accrue to both countries in the future. Both countries want to establish a pattern of secure, high-quality, sustainable growth and employment for their people, and this study demonstrates that the bilateral relationship, built and adapted well over time, can make a material contribution to that shared goal.

Indeed, the economies of both countries have reached a crucial juncture. For China, it must change the model of development it has followed for more than three decades – from export led to internal-demand led, and from input driven to innovation driven. If China does this successfully in the coming decade, an ever-larger middle class of up to 600 million people will be created. It will transform China from being the 'world's factory' to being increasingly the 'world's market' as well.

In the U.S., the economy will steadily recover over the next decade as structural adjustments are made to lower budget and trade deficits, and to reduce unemployment. Indeed, the U.S. economy should continue to benefit from its strengths in science, technology and innovation, as well as cheaper energy in the form of shale oil and gas. After decades of dependence on energy imports, increased production of oil and natural gas in the U.S., Canada and also possibly Mexico, combined with increased energy efficiency, will be a major game-changer for the U.S.; some even project the U.S. eventually becoming a net energy exporter.

While the economic pictures look promising, one should not understate the challenges that each country faces. China needs to deepen its economic reform and redefine the role of the government and make the economy more responsive to the market; address the issues of income disparity, environmental degradation and uneven access to basic education and healthcare; expand the rule of law; and combat corruption. For the U.S., the challenge is to achieve a consensus in economic policy so that the economy can move forward with some predictability. Internationally, the two countries still face economic uncertainty in Europe and the possibility of rising protectionism. And they must cooperate to maintain global peace in the face of nuclear proliferation, terrorism and territorial disputes. None of the challenges that the two countries face, domestically and internationally, are easy, and none of them can be ignored.

Our path forward begins with an acknowledgement that the development of the overall relationship between the two countries is constrained by mistrust and differences in important global strategic issues. It is therefore imperative that mutual trust be built-up and strategic differences be managed and addressed. Building mutual trust will take time; but the differences should not be allowed to stand in the way of closer economic cooperation between the two countries.

Additionally, the business sectors of both countries have identified difficulties and impediments to increased commerce between them. On the U.S. side, the issues include the role of state-owned enterprises (SOEs) in the Chinese economy (and state banks as providers of finance), all forms of market access into China, protection and enforcement of intellectual property rights and cyber security (and in particular, theft of commercial secrets). Chinese complaints include restrictions on U.S. exports of high-technology products to China and U.S. government actions that often appear arbitrary and protectionist in the areas of both trade and investment.

In a commercial relationship as extensive and dynamic as ours, there will be points of contention and concern. Candor in recognizing them, and a commitment to resolving them, is a sign of the maturing of the relationship. However, it would be impossible for this study to adequately, and in a timely manner, address these issues. Rather, the purpose of this study is to focus on the future potential of an enhanced economic relationship through cooperation. Successful cooperation by the two countries will not only bring economic benefits to the two peoples, it will also help build the trust between them. In that same spirit, we fully recognize that a lack of progress in solving these issues will have an adverse effect on deepening economic engagement.

The stakes are very high. Without question, the benefits of an expanded economic relationship are considerable. The U.S. economy is projected to grow at an average annual rate of just below 3% in the next ten years, whereas the Chinese economy is projected to grow at an average annual rate of 7.5% during the same period. The potential economic opportunities created by increased cooperation are enormous. Some of these opportunities will benefit China more, while others will benefit the U.S. more. But in every case, they can be a win-win for both countries.

The following are examples of economic opportunities that both countries can enjoy through collaboration:

1) Cooperation in science and technology, particularly in the area of energy, can result in more efficient and more environmentally friendly use of energy in both countries. These efforts will eventually lead to a reduction of greenhouse gases and hence the risks of climate change. This is an area in which the two governments began promoting jointly in 2006 and should become an even more urgent task in the future.
2) The U.S. and China, being the two largest trading countries in the world, should take the lead in reinvigorating the Doha Round of world trade negotiations. They should begin early stage discussions of the opportunities and challenges of an eventual bilateral free trade agreement.
3) The U.S. is likely to undertake significant infrastructure building and/or rebuilding programs over the next decade. Chinese investors, with their surplus savings, can provide some funding for this effort, in the form of either debt or equity. This is good for the U.S., and will also be good for China because of the attractive returns.

The following are economic opportunities that the U.S. can enjoy from a broader collaboration with China:

1) U.S. exports to China have grown five-fold between 2000 and 2010. This trend is likely to continue over the coming decade, given the expected growth of the Chinese economy and its middle class during this period. China is likely to overtake Canada and Mexico as America's largest export market. Moreover, the prospects of U.S. direct investment in China are excellent. General Motors is already the market leader in the Chinese automobile market; Wal-Mart is China's largest retailer; and McDonald's and KFC are already household names. The potential for these, and other U.S. businesses yet to invest directly in China, is enormous.
2) In 2012, about 1.5 million Chinese tourists visited the U.S. This number is projected to exceed five million a year by 2022 if visa administration is further streamlined.
3) Chinese firms are interested in entering the U.S. market through the manufacture of final products in the U.S, as Japanese firms did before them,

generating gross domestic product and creating jobs. Companies in the auto parts, high-end steel products and consumer appliances sectors are leading the way.

The following are economic opportunities that China can enjoy through a broader collaboration with the U.S.:

1) Among the major concerns of China and its people are food security and food safety. China is also determined to modernize its agriculture and related industries. The U.S. has the most sophisticated agricultural technology as well as systems to ensure food safety. The abundance of arable land and the high productivity and efficiency of U.S. agriculture can help China ensure food security as well as food safety.
2) While China today relies overwhelmingly on coal as a source of energy, it has also discovered large deposits of shale oil and gas. The investment and technological cooperation of U.S. firms in China's nascent shale oil and gas industry can help China reduce its dependence on coal as a source of energy.
3) China's service sector is relatively immature, while the U.S. has the most sophisticated service sector in the world. China needs to expand its service sector to provide employment opportunities for its people. U.S. firms can help China develop its service sector through exports and direct investments in China.

Each of the examples listed above, if realized, can create enormous economic opportunities for the people of both countries. These opportunities, in turn, translate into jobs. For instance, the increase in exports from the U.S. to China over the next ten years is projected to add 1.81 million new jobs in the U.S. by 2022.

In order to take advantage of these economic opportunities and prospects for job creation, we are making the following recommendations to the governments of the two countries:

1) Drawing on the expertise of government agencies in the U.S. and China, thinktanks from both countries should be engaged to study the feasibility and the benefits of a free trade agreement between the two countries. This study should be completed within one year of commencement. If the results of the study are positive, then a process toward negotiations should be initiated. As the two largest trading nations in the world, China and the U.S. should also take the lead to reinvigorate the Doha Round of world trade negotiations.
2) Discussions for a bilateral investment treaty have been ongoing for some time. In order to help two-way investment flow, we urge both countries to commit to complete treaty negotiations as soon as possible, preferably within one year.
3) The two governments need to encourage even more business-to-business collaboration in science and technology as it relates to energy, in such areas as building and industrial efficiency, renewable energy, shale oil and gas, carbon dioxide capture, utilization and sequestration, electric cars, etc. In addition, as it relates to climate change, the two countries should agree to a common negotiating position for the meeting in December 2013, and rally other nations to ensure a successful outcome of the 2015 United Nations Framework Convention on Climate Change treaty process.
4) Both countries should streamline their visa application process, and extend visa durations to five years to begin with, then ten years, and eventually move to a visa-free regime. A deadline of two years would seem reasonable for five-year visa durations to start.
5) During U.S. Secretary of State John Kerry's visit to Beijing, it was agreed by the two countries that a special working group will be established under the Strategic and Economic Dialogue (S&ED) to begin discussion on the issue of cyber secu-

rity. The group should work toward developing a roadmap on how the two countries can a) enhance and enforce cyber security, and b) collaborate to develop an international convention on cyber space. These need to be dealt with urgently, and therefore it is suggested that the S&ED complete the negotiations within 18 months with interim reports from time to time.

6) There is global and domestic interest for China to vigorously pursue intellectual property rights (IPR) protection. Indeed, it is in China's own interest to do so from the point of view of spurring innovation and economic growth, and also upgrading its industrial base. To achieve this objective, much work still needs to be done. We wish to make the following recommendations to the Chinese government:
   a) The Leading Group for National IPR Protection, the single cross-ministerial organization within the State Council of China that is responsible for IPR protection, should further strengthen enforcement to ensure full compliance and deter intellectual property theft.
   b) China should consider establishing a special national court exclusively for intellectual property disputes. This will greatly facilitate the resolution and settlement of intellectual property disputes in China.
   c) We note S&ED's recent discussion has resulted in an agreement where Chinese central and local government entities will eradicate the use of pirated software by the end of 2013. We suggest the Chinese government should urge all Chinese SOEs and bank systems to do the same as soon as possible.
7) Relaxation of export controls of high-tech products is a longstanding request by China. It is proposed that this issue be reviewed by the U.S. Administration with added urgency, in hope that a mutually beneficial outcome will emerge.
8) Some U.S. government actions in both trade and investment, including actions by the Committee on Foreign Investment in the U.S. (CFIUS), appear to Chinese enterprises to reflect political rather than policy considerations. The operation of CFIUS can be made more transparent and better understood in China. We propose that clearer rules and regulations on investment approval processes be issued by the U.S. government.

Enormous stakes are involved. The most important economic partnership in the world is also hugely important for the world. While a healthy relationship between the U.S. and China is not a guarantee of global prosperity, a fractious and fruitless relationship would certainly endanger it.

If the two economies are able to continue to cooperate successfully, by 2022, the bilateral relationship can be as interdependent as never before. At the same time, a great deal of global public good would have been accomplished, through better environmental protection, reduction of the risks of climate change and the enhancement of the multilateral trading system. Above all, this interdependent relationship can provide the foundation for a healthy overall relationship between the two countries.

The leaders of the two countries are beginning a new term of office. The two countries are setting a new direction in economic development in order to provide sustainable growth and employment for their people. Working together, starting now, we can make this happen. Let us seize the moment.

Part I

Part I

A. Seizing the Moment

The opportunity of a generation

The bilateral economic relationship between the U.S. and China has developed over the past few decades from virtually nonexistent to the most important in the world. Today, the U.S. and China are respectively the largest and second largest economies and the largest and second largest trading nations in the world. They are also each other's second largest trading partners. A vast volume of trade in goods, integrated supply chains, a growing volume of trade in services, substantial direct American investment in China and even larger Chinese investment in U.S. Treasury securities, speak to the importance of the relationship.

Looking forward, basic economics predicts that bilateral trade will grow roughly in proportion to the sizes of the two economies, so it is not surprising that trade in goods and services between China and the U.S. is voluminous, and is predicted to grow along with their economic growth. If the U.S. and China are to continue to reap, indeed enhance, the mutual benefits of that trade, the two nations must work cooperatively to seek out new opportunities.

The purpose of this study is, first, to put the U.S.-China relationship in the current, and naturally evolving, economic context; and second, to suggest potentially fruitful areas and approaches to strengthen it, both by seizing opportunities and ameliorating disputes. Better understanding of the economic context, it is hoped, will contribute to a constructive way forward in the world's most important bilateral economic relationship.

Both countries want to establish a pattern of secure, high-quality, sustainable growth and employment for their people, and this study demonstrates that the bilateral relationship, built and adapted well over time, can make a material contribution to that shared goal.

Our path forward begins with an acknowledgement that the development of the overall relationship between the two countries is constrained by mistrust and differences on important global strategic issues. It is therefore imperative that mutual trust be built-up and strategic differences be managed and addressed. Building mutual trust will take time; but the differences should not be allowed to stand in the way of closer economic cooperation between the two countries.

Additionally, the business sectors of both countries have identified difficulties and impediments to expanding the economic relationship between them. On the U.S. side, the issues include the role of the state-owned enterprises (SOEs) in the Chinese economy (and state banks as providers of finance), market access into China, protection and enforcement of intellectual property rights (IPR), and cyber security (and in particular, theft of commercial secrets). Chinese complaints include restrictions on U.S. exports of high-technology products to China and U.S. government actions that often appear arbitrary and protectionist in the areas of both trade and investment.

These issues are real, and relevant to expanded economic engagement. In a commercial relationship as extensive and dynamic as that between the U.S. and China, there will be points of contention and concern. Candor in recognizing them, and a commitment to resolving them, is a sign of the maturing of the relationship. For these issues to be resolved, the two governments need to face them squarely. It is a difficult task, and will take time, but it must be done.[1]

However, it would be impossible for this study to adequately, and in a timely manner, address these issues. Rather, the purpose of this study is to focus on the future potential of an enhanced economic relationship through cooperation. Successful cooperation by the two countries will not only bring economic benefits to the two peoples, it will also help build the trust between them. In that same spirit, we fully recognize that a lack of progress in solving these issues will have an adverse effect on deepening economic engagement.

Before moving on to the future, let us begin with some history. Forty-one years ago, President Richard Nixon of the U.S. and Chairman Mao Zedong of the People's Republic of China seized the moment to allow the two countries to collaborate against Soviet hegemony. The two leaders understood the strategic importance of the U.S.-China relationship to both countries. Their collaboration changed the world.

On 15 December 1978, the U.S. and China agreed to establish formal diplomatic relations. Three days later, China announced that it would undertake economic reform and open its economy to the world. Since then, there have been six presidents of the U.S. and four generations of leaders of China. Throughout these four decades, they have all tried to build a strong and durable U.S.-China relationship. Despite many ups and downs over the past decades, the relationship on the whole has endured. With the dissolution of the former Soviet Union in 1991, the foundation of the U.S.-China relationship shifted to economics. Indeed, both countries have benefited a great deal from their economic relations.

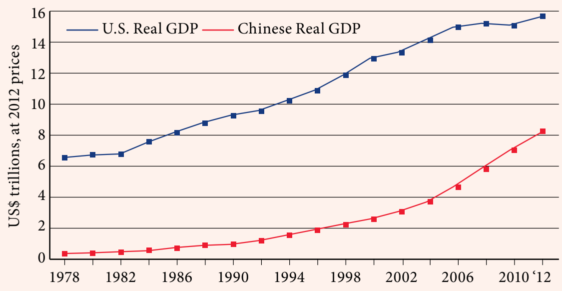
However, the Chinese economy has now reached a critical juncture: it must change the model of development it has followed for more than three decades – from export led to internal-demand (including consumption) led and from input driven to innovation driven. Moreover, decades of sustained increases in income and wealth have also begun to make China an increasingly important and rapidly growing constituent part of the 'world's market', in addition to being the 'world's factory', and an important source, as well as a destination of cross-border investment. China will have to play a rather different role in the world economy. Adapting to these new realities poses enormous challenges to China. Indeed, the next ten years will be a decade of change in China. The U.S. economy, recovering from the most severe global financial crisis in recent history, also has to begin to make significant structural adjustments to lower its budget deficit and its trade deficit, and at the same time try to reduce its high unemployment rate. But it still has the advantages of being the most innovative and the most technologically advanced country in the world as well as having access to low-cost energy in the form of shale oil and gas. Indeed, the next ten years will also be a decade of change in the U.S.

The U.S. and China are likely to remain the world's two largest economies for decades to come. President Barack Obama was just re-elected for a second term. Xi Jinping – elected General Secretary of the Chinese Communist Party in November 2012 and President of China in March 2013 – will lead China for the next ten years. The U.S. and China must realistically confront the challenges facing them, including those arising between them and internally from the dislocations that are often a by-product of economic progress, including growing international trade and investment. Closer economic cooperation between the U.S. and China can help promote economic growth and job creation in both countries. The two countries need to seize this moment to lay the foundations for closer economic cooperation over the next ten years.

The two countries also face many common challenges, such as nuclear proliferation, global terror-

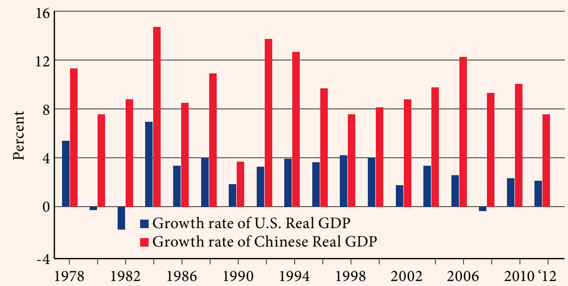
1 Many of these issues are summarized in Chapter 6 and discussed in various chapters in Part II.

Figure 1: The Real GDP of China and the U.S., 1978-2012



Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC)

Figure 2: The Annual Rates of Growth of the Real GDP of China and the U.S., 1978-2012



Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC)

ism, sustainability and climate change. Working together, the U.S. and China will have a better chance to successfully overcome these challenges, not only for their own mutual benefits, but also for the long-term peace and prosperity of the world. Given the degree of economic interdependence in the world today, the economic losses caused by the two countries working against each other can be huge for themselves as well as for all other nations.

A study with a difference

This study, involving eminent scholars and business and community leaders from the two countries, focuses on the future, while recounting the past. It recognizes the benefits derived and costs incurred by the U.S. and China from their past economic exchange and interactions. Moreover, it also identifies the fundamental economic complementarities between the two countries, which provide a solid basis for mutually beneficial and sustainable economic cooperation over the long term. Furthermore, we recognize that the search for mutually beneficial areas of cooperation between the two countries is best done in the context of a mutual understanding of the tremendous challenges faced by each in restoring and sustaining inclusive patterns of economic growth and employment in their respective countries.

Finally, this study also pinpoints the opportunities for the U.S. and China to cooperate in the provision of global public good to the world. For example, as the two largest carbon dioxide emitters, ameliorating the risks of climate change; and, as the two largest trading nations, further enhancing the multilateral trading system (through the Doha Round), are obvious areas that the U.S. and China should work cooperatively to lead global solutions.

B. Stepping Back

The development of the bilateral economic relations

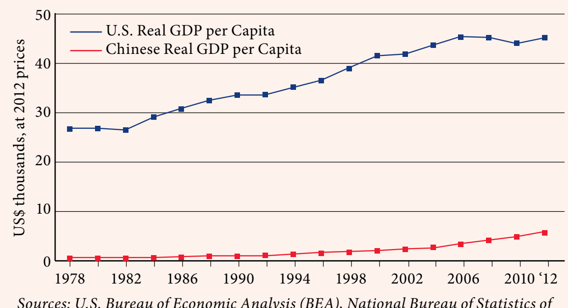
1978 marked the beginning of China's push for economic reform and opening up to the world. It also marked the end of an era of chaos and stagnation in China, wrought by the decade-long Great Proletarian Cultural Revolution. Since then, China has made tremendous progress in its economic development. Between 1978 and 2012, Chinese real gross domestic product (GDP) grew from US$341bn to US$8.262tr (at 2012 prices) to become the second largest economy in the world, after the U.S. (see Figure 1).

The China of today is a very different place. Since 1978, central planning has largely given way to market forces. A modern physical infrastructure has been built. A compulsory free nine-year education has been introduced for all school-aged children. Healthcare and social security have become more widely available. Above all, hundreds of millions of Chinese people have escaped abject poverty and secured a much-improved livelihood. In these 35 years, a closed Chinese society has become much more open. A new generation of Chinese – more educated, more globally connected and more environmentally conscious – has emerged.

In 1978, the U.S. economy was still recovering from the first oil shock of 1973, during which the price of oil quadrupled. One year later, it would be struck by the second oil shock. The two oil shocks led to high inflation and interest rates in the late 1970s and early 1980s. Inflation was finally brought down by the mid 1980s, accompanied by the decline in the real price of oil. This led to the longest period of economic expansion in U.S. history, further abetted by the internet boom beginning in the 1990s. U.S. economic growth continued, with brief interruptions, until 2007, when the global financial crisis, triggered by delinquencies of the sub-prime mortgage-loans, broke out. Since then, the U.S. has been in the process of a gradual, but by historical standards very slow, economic recovery. Nevertheless, between 1978 and 2012, U.S. real GDP grew from US$6.54tr to US$15.68tr (at 2012 prices), at an average annual rate of 2.6% (see Figure 2), which is among the highest within the Group of Seven (G-7) developed economies.

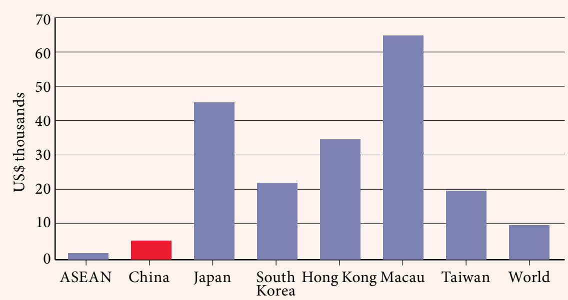
Individual incomes are a different story. The Chinese economy is large, in part because its population is large – more than four times that of the U.S. Despite ranking second in the world by GDP, China is ranked outside of the top 80 in terms of GDP per capita – it is still very much a developing economy. Between 1978 and 2012, Chinese real GDP per capita grew from US$354 to US$6,102, (at 2012 prices), at an average annual rate of 8.7%. By comparison, the U.S. real GDP per capita at 2012 prices grew from US$29,390 to US$49,880, more than eight times Chinese GDP per capita in 2012, at an average annual rate of 1.6%. A huge gap still exists between the per capita GDPs of the two countries (see Figure 3). It is also worth noting that Mainland Chinese real GDP per capita still lags significantly behind the real GDPs per capita of other East Asian economies such as Hong Kong, South Korea, Singapore and Taiwan (see Figure 4), while U.S. GDP per capita remains significantly higher than all the other G-7 countries except Canada (see Figure 5).

Figure 3: The Real GDP per Capita of China and the U.S., 1978-2012



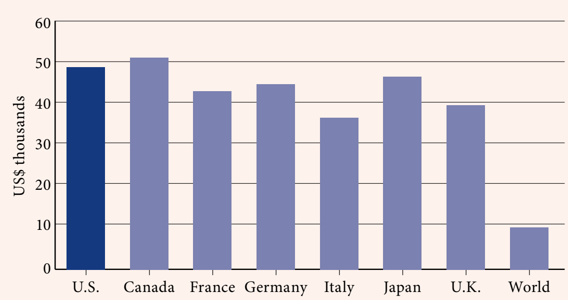
Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC)

Figure 4: The Real GDP per Capita of Selected East Asian Economies, 2011



Source: World Development Indicator 2012

Figure 5: The Real GDP per Capita of the G-7 Economies, 2011



Source: World Development Indicator 2012

Between 1978 and 2011, Chinese real personal consumption per capita grew from US$168 to US$1,911 (at 2011 prices). However, as a percentage

Figure 6: A Comparison of the International Trade of the U.S. and China, 2011-12

	China (US$ billions)		USA (US$ billions)	
	2011	2012	2011	2012
Exports of goods	1,904	2,049	1,497	1,564
Imports of goods	1,660	1,818	2,236	2,299
Total trade of goods	3,564	3,867	3,733	3,863
Exports of services	183	197	606	632
Imports of services	238	261	427	437
Total trade of services	421	457	1,033	1,069
Exports of goods and services	2,087	2,246	2,103	2,196
Imports of goods and services	1,898	2,078	2,663	2,736
Total trade of goods and services	3,985	4,324	4,767	4,932
Trade surplus in goods and services	188	167	-560	-540

Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC)

of GDP, Chinese personal consumption actually declined from 48.4% to 34.4%[2]. By comparison, the U.S. real personal consumption per capita at 2011 prices grew from US$17,769 to US$38,269 – more than 20 times the Chinese level. U.S. personal consumption was 70.9% of U.S. GDP in 2011. The gap between the real personal consumption per capita of the two countries is even larger than that of real income per capita. Given the low Chinese consumption to GDP ratio, there is considerable room for Chinese personal consumption to grow. In fact, continued Chinese growth depends on consumption growing as a share of its national income.

In 1978, before the reform and opening of the Chinese economy, Chinese international trade in goods and services combined was a mere US$20.3bn, whereas the U.S. was already – and still is – the largest trading nation in the world, with a total trade that year of US$399.2bn. Starting from its very low base, Chinese international trade initially grew by leaps and bounds, but mostly through imports. It was only in the 1990s that Chinese international trade began to grow steadily, with its exports aided by a significant devaluation of the renminbi (the Chinese currency) on 1 January 1994 and the granting of (non-permanent) most-favored-nation status by the U.S. China's trade growth picked up significantly after its accession to the World Trade Organization (WTO) in 2001, and accelerated further after the expiry of the quota system of trade in textiles under the MultiFibre Arrangement in 2005. By 2012, China, with a total trade in goods and services of US$4.3tr, has become the second largest trading nation in the world, just after the U.S with US$4.9tr, as well as the largest exporting nation (see Figure 6)[3]. However, the domestic value-added content of most Chinese exports remains relatively low with an average value of approximately 23.7% in 2011[4]. The domestic value-added content is expected to rise in the future as the proportion of 'processing and assembly' exports in total exports declines. It is also anticipated that going forward, Chinese exports are likely to slow while its imports are likely to speed up for a variety of reasons, both internal and external[5].

During the same period, the growth of U.S. international trade has been slower but steadier, both because of its much larger base and because it has long been a founding member of the WTO (and its predecessor organization, the General Agreement on Tariffs and Trade (GATT)). Growth in U.S. international trade was interrupted only by the bursting of the internet bubble in 2000 and the global financial crisis of 2007-2009. However, beginning in 1997, the U.S. trade deficit vis-a-vis the world began to grow. Nevertheless, the U.S. remains the largest trading nation in goods and services combined in the world today (see Figure 6).

In Figure 6, the international trade of the U.S. and China with the world in 2011 and 2012 are

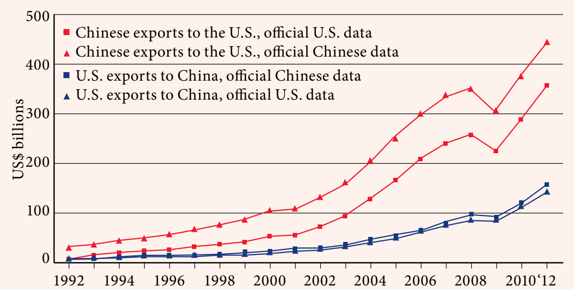
2 Chinese personal consumption data for 2012 are not yet available. The Chinese real GDP per capita were US$346 and US$5,555 (at 2011 prices) in 1978 and 2011 respectively.

3 In 2012, China was actually the largest trading nation in the world in terms of goods alone, by a very small margin, but not in terms of goods and services combined (see Figure 6).

4 The domestic value-added content of Chinese exports to the U.S. is even lower: 22.0% in 2011.

5 Refer to the discussion in Part II, Chapter 8.

Figure 7: The Levels of U.S.-China Bilateral Trade in Goods and Services, 1992-2012



Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC)

compared[6]. The U.S. is also the largest trading nation in the world in services. It is interesting to note that the U.S. trade deficit vis-a-vis the world has been much larger than the Chinese trade surplus vis-a-vis the world. For example, in 2012, the U.S. deficit was US$540bn, compared to a Chinese surplus of US$167bn. Moreover, the Chinese trade surplus with the U.S. (US$201bn or US$299bn in 2012, according to Chinese or U.S. data respectively) has been larger than its trade surplus vis-a-vis the world, indicating that China has been running a trade deficit with the rest of the world (see Figure 7).

Trade between the U.S. and China has grown by leaps and bounds since 1978. According to Chinese official data, Chinese exports of goods and services to the U.S. grew from US$9.65bn in 1992 to US$364bn in 2012[7]. According to U.S. official data, the corresponding numbers are US$27bn and US$446bn[8]. Similarly, according to Chinese official data, U.S. exports of goods and services to China grew from US$10.5bn in 1992 to US$163bn in 2012, whereas according to U.S. official data, the corresponding numbers are US$9bn and US$14bn. The Chinese trade surplus with the U.S. in 2012 was US$201bn according to Chinese official data and US$299bn according to U.S. official data. In Figure 7, the annual levels of bilateral U.S.-China trade according to Chinese and U.S. official data are presented. Both sets of data confirm the historical facts of a very rapid growth in bilateral trade since the early 1990s and a large bilateral trade surplus on the part of China. Interestingly, U.S. exports to China have grown more rapidly than China's exports to the U.S. since the middle of the last decade. This trend is expected to continue, given that Chinese internal demand, including consumption, will become the principal driver of Chinese economic growth going forward and the relatively slow growth of the U.S. economy.

Global factors

Looking back, both the U.S. and China have indeed achieved a great deal since 1978. Their economic prosperity over the past 35 years has been in no small part due to favorable global factors.

First, during this period, apart from some localized conflicts, the world at large has been basically at peace, which has allowed steady economic development. The demise of the former Soviet Union has also created a peace dividend to be shared by all.

Second, there has been a revolution in information and communication technology, led by the U.S., which makes possible the instantaneous availability of information everywhere and direct and immediate communication not limited by either space or time. Information transmission has also become much more affordable. This has resulted in significant reductions in the transactions costs of doing business across national boundaries and long distances, which not only facilitate the trade in goods, but also enable many non-tradable services to become tradable. Even very complex production processes can be profitably fragmented or 'atomized' – subdivided into many sub-processes each to

6 The 2012 numbers are tentative as the trade in services numbers are not yet available and have to be estimated.
7 Ibid.
8 There are many reasons for the statistical discrepancy between the U.S. and Chinese official data. It has to do with the different ways in which exports and imports are valued (financial assistance scheme or free on board versus cost, insurance and freight), with the different treatment as well as valuation of re-exports of Chinese products to the U.S. from Hong Kong, etc. See, for example, the discussion in K. C. Fung, L. J. Lau and Yanyan Xiong, "Adjusted Estimates of U.S.-China Bilateral Trade Balances: An Update," *Pacific Economic Review*, Vol. 11, No. 3, October 2006, pp. 299-314.

be done in different locations where the costs are the lowest. In addition, the whole world has gradually become a single huge market, which greatly enhances the potential returns to innovation and brand-building. Both the U.S. – which is responsible for most of the advances in the information and communication technology and the inventions of new products and processes – and China, which, because of its low wage rate, has the comparative advantage at the final assembly stage of the global division and sub-division of labor, have turned out to be the major beneficiaries of this development.

However, the global division and sub-division of labor resulting from the fragmentation of production and the rise of global supply chains also imply that jobs that can be moved away to lower-cost locations will likely be moved away. The out-migration of lower-skilled jobs is a challenge not only for the U.S. but also, more recently, for China as well. Already, such jobs have begun to move away from China to Bangladesh, Cambodia, Indonesia, Vietnam and even to Myanmar. The division and subdivision of labor around the world also imply that the world economy has become more integrated and more interdependent than ever before.

Another implication of the information and communication technology revolution is the expansion of the senior management's span of control, resulting in the flattening of organizations and the elimination of the middle layers of management jobs. The combination of lower-skilled jobs moving away and the loss of middle-level management jobs mean sluggish wage growth, especially at the middle or lower levels. Thus, the benefits of economic growth have not been evenly shared across the entire population of individual countries. This has been a major cause of the rising income disparity in many economies – developed and developing – and redressing these imbalances remains an important priority in all countries.

Third, the entry of new participants into the world economy such as China, Russia and the former Eastern European socialist economies, whether they are members of the WTO or not, has generated many new opportunities for the growth of world trade from both the supply and the demand sides. The deepening of economic cooperation within the euro zone and within the Association of Southeast Asian Nations (ASEAN) region has also provided new impetus for cross-border trade and direct investment and accelerated global economic growth. However, the entry of new participants has also implied the expansion of the world labor force, putting downward pressure on wage rates in the more developed economies around the world.

Fourth, the real prices of oil and other natural resources remained relatively subdued between the mid 1980s and the mid 2000s, which provided a favorable economic environment for growth.

Fifth, the distribution of the world GDP across the different regions has changed significantly over the past several decades. The share for East Asia (defined as the 10 members of ASEAN + 3 (China, Japan and the Republic of Korea)) of world GDP rose from just above 10% in 1970 to approximately 25% in 2012. If South Asia is included, the share rises to 30%. The Chinese share of world GDP alone rose from less than 2% in 1970 to over 10% in 2012. By comparison, the U.S. share fell from over 35% in 1970 to just over 20% of world GDP today. Europe's share also fell from 25% in 1970 to 20% today[9]. East Asian economies also account for approximately 25% of world trade today, compared to approximately 10% in 1970. Moreover, approximately 50% of the East Asian international trade today consists of trade within East Asia itself. This is what made it possible for the East Asian and Chinese economies to continue to grow, albeit at lower rates, even as the U.S. and European economies remained in recession. In fact, since the beginning of the global financial crisis in 2007, the Chinese economy has

9 The Europe of today covers many more economies than the Europe of 1970, principally because of the inclusion of formerly centrally planned economies of Eastern Europe. So its share of world GDP has actually declined much more than shown by the figures presented here.

been growing at an average annual rate of over 9%.

Finally, the Chinese state leaders also deserve credit for adopting the policy of economic reform and opening up, and persevering with it over the past 35 years. Throughout this period, they have also amply demonstrated their ability to confront important challenges and solve difficult problems, surviving various economic and financial crises including several global and regional financial crises.

How China and the U.S. have benefited

China has benefited enormously from its economic relationship with the U.S. throughout the past 35 years. When China began its economic reform and opening-up policies in 1978, the U.S. opened its market to Chinese exports, and the rest of the developed world followed. This enabled the early success of China's economic reform and opening-up policy. The granting of (non-permanent) most-favored-nation treatment to China by the U.S. in the 1990s and the successful conclusion of the negotiations for Chinese accession to the WTO in 2000 enabled Chinese international trade to grow significantly.

The large U.S. consumer market has been open to Chinese exports – apparel, home appliances, shoes, toys and all other kinds of light manufactured products. It has been estimated that for every US$1bn of Chinese exports of goods and services to the U.S. in 2010, a value-added (GDP) of US$0.573bn and non-agricultural employment of 38,930 person-years are created in China[10]. Chinese exports to the U.S. amounted to US$293.2bn in 2010, resulting in the generation of an estimated US$168bn of value-added, or 2.8% of Chinese GDP, and 11.8 million person-years of employment, or 2.4% of total Chinese non-agricultural employment[11]. Chinese exports of light manufacturing primarily replaced exports from other East Asian economies such as Hong Kong, Taiwan, South Korea, Malaysia and Thailand[12]. The U.S. has not been manufacturing these products in large quantities domestically for several decades. Thus, the net displacement of U.S. jobs by these Chinese exports has been less than is often claimed. Moreover, these light-manufacturing jobs have also begun to be relocated to other Southeast Asian economies from China because of its rising wage rates and increasingly more stringent enforcement of environmental regulations[13].

The U.S. was an early direct investor in China, with the first direct investments being made in the mid 1980s. U.S. direct investment into China averaged approximately US$3bn a year over the last decade. It not only brought in capital, but also technology, access to overseas markets, know-how, business models and management methods.

Chinese outbound foreign direct investment (FDI) is only at the beginning stage, but has been rising rapidly, from US$24.8bn in 2007 to US$77.2bn in 2012. Chinese direct investment into the U.S., which began at a very low level in the late 1990s, averaged approximately US$1.4bn a year. Estimates of Chinese FDI to the U.S. range widely – for 2011, they range from US$1.8bn according to the Chinese Ministry of Commerce to US$4.3bn according to the U.S. Department of Commerce[14]. It is believed that currently it is of the same order of magnitude as the annual flow of U.S. FDI into China of approximately US$5bn.

The stock of U.S. direct investment in China in 2011 was US$54bn according to the U.S. and

10 These include not only the value-added and employment generated directly by the exports, but also the value-added and employment generated indirectly through the production of the domestic inputs used in the production of the exports.

11 Chinese GDP was US$6.06tr (at 2010 prices) and Chinese total non-agricultural employment was 481.74 million in 2010.

12 See Jianguo Huo, "The Development of U.S.-China Economic Relations, 1978 to the Present", Part II, Chapter 1, for examples of various products for which increases in Chinese shares of U.S. imports have been matched by decreases in the shares of other East Asian economies.

13 Chinese factories have been legally required to have anti-pollution equipment installed for quite some time. However, some factories have not been using them. Recently, the enforcement of the use of the equipment has been stepped up in response to rising environmental consciousness on the part of both the government and the public in China.

14 The U.S. Department of Commerce figure is derived from the changes in the stock of FDI by country of ultimate beneficiary between 2011 and 2012. Otherwise the direct estimate given by the Department of Commerce for 2011 is US$0.58bn. The Rhodium Group, a private firm, has estimated that the Chinese FDI into the U.S. in 2011 to be US$4.6bn.

US$70bn according to China, much larger than the stock of Chinese direct investment in the U.S. (US$9.5bn according to the U.S. and US$9bn according to China)[15, 16]. The U.S. direct investment in China also created significant employment opportunities for Chinese citizens. According to the U.S. Bureau of Economic Analysis (BEA), there were 1,189 U.S.-invested firms in China with total sales of US$304bn and a net income of US$39bn, and employing 1.541 million workers in 2010. According to the Research Institute of the Chinese Ministry of Commerce, U.S.-invested firms in China employed 1.842 million people and paid US$14.9bn in taxes in 2010. Even though these numbers differ, the overall picture of U.S.-invested enterprises in China making tens of billions of dollars of profits and employing almost two million workers in China each year is probably reasonably accurate.

The U.S. has also benefited from this economic relationship. It has also been estimated that for every US$1bn of U.S. exports of goods and services to China in 2010, a value-added (GDP) of US$0.88bn and employment of 6,400 person-years are created in the U.S. U.S. exports to China amounted to US$114.5bn in 2010, resulting in the generation of an estimated US$100.8bn of GDP and 732,800 jobs. Chinese exports to the U.S. have been of adequate quality and low cost, which has helped to keep the rate of inflation low in the U.S. Besides exporting from China to the U.S., U.S. multinational corporations also make use of China, as the terminal point of their global supply chains, to produce finished products for delivery and distribution in China and the rest of the world. This has enhanced the competitiveness of the U.S. as well as other multinational corporations globally. U.S.-invested firms in China as a group have consistently made significant profits.

15 The U.S. Department of Commerce's estimated stock of US$3.8bn based on direct cumulation of direct investment data for year-end 2011 is too low in comparison with the other estimates to be credible.

16 According to International Monetary Fund (IMF) data, the stock of U.S. FDI in China in 2011 was US$57.8bn, and the corresponding stock of Chinese FDI in the U.S. was US$3.8bn.

As the Chinese economy continues to grow, Chinese imports from the U.S. have also been increasing rapidly. Indeed, between 2000 and 2011, the value of U.S. exports to China has more than quintupled. Since 2006, China has replaced Japan as the third largest importing nation of U.S. goods and services (after Canada and Mexico, the other two members of the North American Free Trade Area (NAFTA)). In addition, the People's Bank of China, China's central bank, is now the largest holder of U.S. Treasury securities in the world, with US$1.2tr. Its continuing net accumulation of such securities is one factor that has marginally helped to keep interest rates low in the world, including the U.S., and to maintain global financial stability.

Thus, the U.S.-China economic relationship has indeed been mutually beneficial to both countries.

C. Looking Ahead

The future outlook

The global economic environment has remained uncertain: the U.S. economic recovery has been slow and the euro zone seems to be lurching from one crisis to another. Even the other BRICS (Brazil, Russia, India, China and South Africa) economies have been showing strain.

China has set itself the goal of doubling its GDP per capita between 2010 and 2020 and attaining 'moderately well-off' status for all. Given its economic fundamentals – rapid growth of tangible capital and plentiful surplus labor – and its track record of macroeconomic management, China should be able to achieve its objective, which requires an average annual rate of growth of 7.5%, as long as it can maintain the growth of its aggregate demand, which would come from infrastructural investment, urbanization and increases in personal and government consumption[17, 18]. Personal consumption is likely to become one of the major drivers of the Chinese economy, spearheaded by a growing middle class, which is projected by McKinsey & Company to increase from 230 million people in 2012 to 630 million by 2022[19].

However, China still faces enormous challenges – both internal and external – going forward. Internally, achieving and maintaining full employment is a major continuing test for the Chinese government, given the expected rise in urbanization and decline of exports of light-manufactured goods. Moreover, the rapid economic development of the past 35 years has come at a cost. There is growing income disparity (both inter-regional and intra-regional), uneven access to basic education and healthcare and inadequate infrastructure. There is serious degradation of the environment, including air and water. There is deterioration of industrial and food safety. Corruption has become widespread. These are the problems that need to be forcefully tackled. Meanwhile, China also needs to deepen reform and continue to open its economy further. The new Chinese leadership is expected to make these their top priorities.

Externally, for China, in addition to the uncertain global economic environment, there are also the ongoing territorial disputes between it and its neighbors in both the East China Sea and the South China Sea. However, what the Chinese and the other world economies need is a peaceful environment within which to develop. It is therefore imperative for all governments concerned not to let these territorial disputes get out of hand. The best hope is for all parties to shelve the disagreements on territorial disputes, leaving them to future generations, and to focus on building common prosperity. Both the U.S. and China have important roles to play in maintaining peace and prosperity in the region.

The economic recovery in the U.S. has been slow over the past three and a half years, but there are some encouraging signs. Overall, the U.S. economy did much better than almost all other major developed economies. Moreover, there is still significant excess productive capacity in the economy. The U.S. is still the principal source of innovation in the world (consider, Google, the iPhone and iPad, Facebook and Twitter). The discovery of abundant reserves of shale oil and gas in the U.S. and the maturation of the hydraulic fracturing (fracking) technology have made energy in the U.S. more available and much cheaper, potentially making its industries more competitive and ensuring its energy security, especially in combination with Canada and Mexico. The prospect is that within the next ten years, the U.S. is likely to become a net exporter of energy to the world. This is going to be a 'game-changer' as the U.S. trade deficit may be significantly reduced and the price of energy within the U.S. will remain relatively low, providing the foundations for a manufacturing revival. On the basis of these favorable factors, the U.S. economy is projected to grow at an average annual rate of 3% over the next 10 years[20].

In the meantime, reducing the stubbornly high unemployment rate is a challenge of the highest priority. The U.S. will also need to lower the overall recurrent budget deficit to a manageable level. It will also need to build or rebuild infrastructure. There must also be continuing investment in education

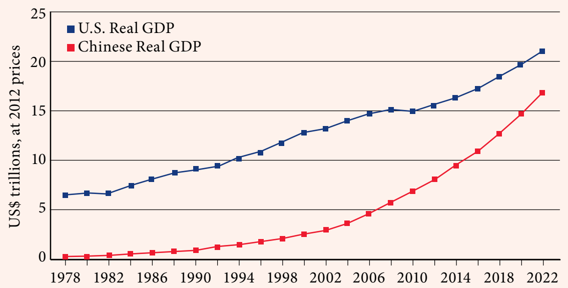
17 The Chinese GDP per capita in 2010 was US$5,234 (at 2012 prices). Doubling it in ten years would bring it to US$10,468 (at 2012 prices) in 2020. The implied average annual real rates of growth of GDP per capita and GDP are 7.2% and 7.7% per annum respectively. Given the real rates of growth of GDP of 9.2% in 2011 and 7.8% in 2012, an average annual rate of growth of 7.5% for the rest of the decade should be sufficient to achieve this goal.

18 The Chinese economy of today is not aggregate supply-constrained as it used to be, but aggregate demand-constrained. There is excess capacity in almost all of the major manufacturing sectors. This is also the reason why the core rate of inflation, that is, the rate of inflation net of the changes in the prices of agricultural and energy goods, is likely to remain subdued.

19 See Part II, Chapter 7.

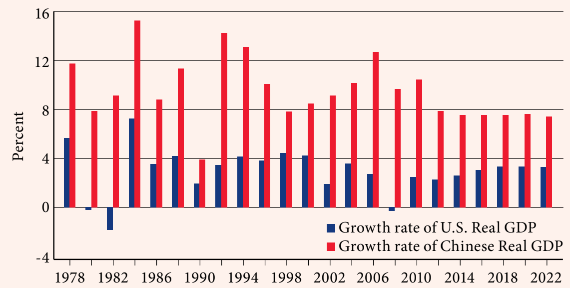
20 The period in between, 1983-2007, is referred to as the period of the 'Great Moderation'. U.S. GDP was US$7.07tr in 1983 and US$15.2tr in 2007 (at 2012 prices), with an average annual real rate of growth of 3.25%. However, some U.S. economists regard this rate of growth as over-optimistic as a long-term average rate because of ongoing demographic changes which slow down the growth of the U.S. labor force and the exceptionally sluggish pace of the current economic recovery.

Figure 8: Actual and Projected Real GDP of China and the U.S., 1978-2022



Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC), estimates made by Professor Lawrence J. Lau

Figure 9: Actual and Projected Rates of Growth of the Real GDP of China and the U.S., 1978-2022



Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC), estimates made by Professor Lawrence J. Lau

and in science and technology, to keep up the U.S. lead in innovation. Internationally, the U.S. should take the lead in helping to maintain a peaceful environment around the world.

In the longer term, the U.S. has an enormous advantage over other nations with its wealth of natural resources and its ability to attract the best minds in the world to live and work in the country. The U.S. has the best universities in the world, and has devoted a huge amount of resources to research and development. These are competitive advantages which will be unmatched by other countries for decades to come.

In Figures 8 and 9, projections of the levels and rates of growth of the real GDPs of the U.S. and China for the next ten years are presented. In 2022, the U.S. is expected to remain the largest economy in the world, even though the Chinese rates of growth are likely to be higher. U.S. real GDP per capita is projected to reach US$62,600, still more than five times the projected Chinese real GDP per capita of approximately US$12,000.

By 2022, the U.S. and China are likely to be each other's largest trading partner in the world. China will also have become the largest importing nation in the world. U.S. exports to China are estimated to rise to US$530bn, more than three times current levels[21]. China will overtake Canada and Mexico as the largest importer of American goods. For every US$1bn of U.S. exports to China, an estimated GDP of US$0.86bn and employment of 4,800 person-years are created in the U.S., so that in 2022, U.S. exports to China are projected to generate US$456bn worth of GDP and more than 2.54 million jobs in the U.S., an increase of 1.81 million over the comparable 2010 figure. If the restrictions on U.S. exports of high-technology products and on oil and gas to China are relaxed, U.S. exports to China are likely to be even higher, as Chinese demands for high-technology products and for energy are likely to remain strong.

By 2022, Chinese exports to the U.S. are estimated to reach US$805bn. For every US$1bn of Chinese exports of goods and services to the U.S., an estimated value-added (GDP) of US$0.641bn and employment of 15,000 person-years are created in China, so that in 2022, an estimated GDP of US$516bn and total employment of 12.08 million person-years are generated by Chinese exports to the U.S.[22]. These are very significant numbers. China's annual trade surplus of goods and services

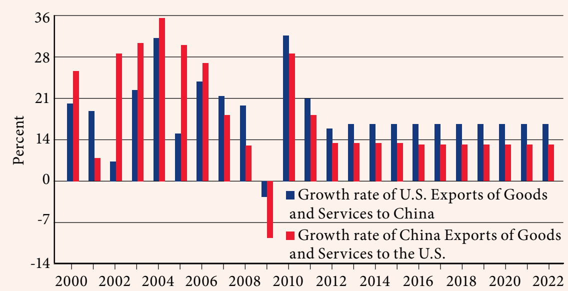
21 US$530bn is the average of four estimates of U.S. exports of goods and services to China in 2022, made by Dr Gary Hufbauer of the Peterson Institute of International Economics, the China Centre for International Economic Exchanges, Chinese Academy of Sciences and by the study team of the China-U.S. Exchange Foundation respectively.

22 It is possible that the GDP generated is higher if the domestic value-added content of Chinese exports has risen and the employment generated is lower if the domestic labor content of Chinese exports has fallen.

Figure 10: Actual and Projected Chinese Exports to the U.S. and U.S. Exports to China, Goods and Services, 2000-2022

Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC) and Chinese Customs Statistics, and authors' projections

Figure 11: Actual and Projected Rates of Growth of Chinese Exports to the U.S. and U.S. Exports to China, Goods and Services, 2000-2022



Sources: U.S. Bureau of Economic Analysis (BEA), National Bureau of Statistics of China (NBSC) and Chinese Customs Statistics, and authors' projections

with the U.S. is likely to remain high at US$275bn (see Figure 10) but as a percentage of its GDP would only be 1.5%.

There is ample opportunity for the exports of U.S. services to China. Today, China's service sector only accounts for less than 45% of the Chinese economy, while the U.S. service sector accounts for more than 80% of the U.S. economy[23]. The U.S. service sector is mature, competitive, customer friendly and efficient. The Chinese service sector is at the early stages of development. There is much that the U.S. service sector can offer to China. In the ten years between 2001 and 2011, although it went unnoticed, U.S. exports of services to China grew almost 500%. These included advisory services such as in law, consulting, finance and accounting. This trend is likely to continue in the years ahead. Particularly noteworthy developments are that more Hollywood movies are being screened in China, the National Basketball Association (NBA) has a nationwide audience in China, and Disney is opening a new theme park in Shanghai. These are only a few examples, but the huge potential is evident.

But this potential growth in trade and net benefits to the U.S. and China cannot be taken for granted. Bilateral tensions, multilateral trade or currency disputes, as well as macroeconomic problems, could derail it. The opportunity cost to Chinese and Americans of allowing it to be derailed is enormous, as demonstrated above.

The Rise of the Middle Class in China

As a result of the success of China's economic reform and opening up policies since 1978, much wealth has been created for the Chinese people and more people have begun to share the benefits of the economic prosperity. At the same time, as the government's social security programs began to take root, a middle class began to take shape. Household consumption began to increase, first with the purchase of television sets, furniture and other home appliances, and then progressing on to the purchase of homes, cars, computers, mobile phones, etc. Additionally, like other people, the Chinese people spent their increased wealth on good food, entertainment and traveling within and outside China as tourists. Moreover, many students were sent overseas to pursue the best education possible. Indeed, China's domestic real retail sales, driven by its growing middle class, have been growing at the rate of 13.8% per annum for the past ten years, or approximately 50% faster than the rate of growth of Chinese real GDP. Of particular note is the exceedingly low consumption share of Chinese GDP, by international and historical standards.

23 The service sector includes government services.

The size of the Chinese middle class has been projected to grow enormously over the next decade. The rapidly rising demand by the Chinese middle class will provide the stimulus for growth not only for China, but also for the U.S. and the rest of the world. That demand will come not only from the increased size of the middle class, but from the rise – from very low levels – of Chinese consumption as a share of GDP.

Different and complementary

Even though the U.S. and the Chinese economies are the two largest in the world in terms of GDP and total international trade, they are as different as they come. The U.S. is technologically the most advanced nation and China is the largest developing nation. The U.S. GDP per capita is more than eight times the Chinese GDP per capita. The two countries are at distinctly different stages of economic development.

However, complementarity between the U.S. and Chinese economies arises precisely because they are so vastly different. The benefits of economic exchange and cooperation between the two economies are the greatest when they are the most different, that is, when their comparative advantages have the least overlap. For example, two economies with similar natural resource endowments do not benefit very much from trading with or investing in each other if they both have similarly low wage rates and high costs of capital, because their resulting cost structures are likely to be essentially the same[24].

In terms of the availability of the primary inputs of production – tangible (or physical) capital, labor and land – the conditions of the U.S. and China are vastly different. On tangible capital stock (structure and equipment), the U.S. has almost a third more than China (US$23tr versus US$18tr in 2012) in absolute value, and 6.2 times as much relative to the labor force[25]. In plain language, a U.S. worker has more than six times more structure and equipment to work with than a Chinese worker. This is one, but not the only reason, why a U.S. worker is much more productive.

On labor, China is still very much a labor-surplus economy. Its working-age population is almost five times that of the U.S. in 2012. The wage differential between the U.S. and China reflects the relative abundance of labor in China – as well as the quality of the human capital embedded in the labor force. The U.S. federal minimum wage is US$7.25 an hour, whereas in China, where the minimum wage differs across regions, the highest minimum wage is US$2.43 an hour in Beijing and the weighted average of the minimum wages of all provinces, municipalities and regions is US$1.85. This indicates that the cost of unskilled, entry-level labor in China, despite its recent rapid increase, is still less than a third that in the U.S.

On arable land, the U.S. has 163 million hectares compared to China's 122 million hectares, a third more, but less than a quarter of China's population[26], resulting in an arable land to population ratio that is almost six times higher than that of China. In addition, U.S. agriculture is tremendously productive.

In terms of human capital, the gross tertiary enrollment rate in the U.S. in 2012 was 95%, compared to 27% in China[27]. Similarly, the percentage of the working-age population with tertiary education is almost 40% in the U.S., compared to less than 10% in China. In terms of research and development (R&D) capital, the U.S. stock was more than ten times that of the Chinese stock in 2012. In the same

24 However, it is still possible for developed economies to benefit from trading with one another if they specialize in different niches, that is, if they have different comparative advantages in different industries that have been created over time. This is the insight of Paul Krugman, Nobel Laureate in Economic Sciences (2008).

25 See Part II, Chapter 2. These figures are sensitive to the exchange rate, but the overall picture of the U.S. having a much higher tangible capital-labor ratio than China for many years to come is clearly evident.

26 The populations of the U.S. and China were 310 million and 1,339 million respectively in 2012.

27 These enrollment rates include all post-secondary education institutions such as junior colleges and technical colleges. The figures quoted here are derived from UNESCO data.

Figure 12: **A Comparison of Factor Proportions between the U.S. and China, 2010-12**

	China			U.S.		
	2010	2011	2012	2010	2011	2012
Tangible capital per working-age population (2011 US$ thousands)	14.27	16.09	18.02	113.41	112.32	111.43
Arable land per working-age population (Hectares)	0.12	0.12	0.12	0.79	0.78	0.78
R&D capital stock per working-age population (2010 US$)	382	449		15,731	16,058	
U.S. Patents granted annually per thousand working-age population	0.003	0.003	0.004	0.522	0.523	0.580

Sources: China census data, Chinese Statistical Year Book 2012, International Financial Statistics (IFS), National Bureau of Statistics of China (NBSC), OECD Statistics, U.S. Patent and Trademark Office, World Development Indicator

year, the number of patents granted in the U.S. to U.S. nationals was 121,247 compared to 3,786 for Chinese nationals[28].

The factor proportions of the U.S. and China are compared in Figure 12. It is clear that in terms of tangible capital per person, arable land per person and R&D capital per person, the U.S. has been, and still is, way ahead of China. What this implies is that the U.S. is likely to have a large comparative advantage over China in industries that are relatively tangible capital-intensive, land-intensive (such as agriculture) and human capital and R&D-capital-intensive (such as high-technology industries), whereas China has a significant comparative advantage over the U.S. in relatively labor-intensive industries.

While tangible capital, human capital and R&D capital can all be increased over time through appropriate investment, they take a long time to accumulate. Chinese R&D expenditure as a share of its GDP only managed to reach 1.97% in 2012 whereas the U.S. has been investing between 2.5% and 3% of its GDP for the past several decades. Thus, U.S. comparative advantages in intangible capital is likely to persist for at least a couple of decades or even longer. The U.S. will continue to be the major source of innovation in the world. It will also take a while for China to catch up to the tangible capital-labor ratio of the U.S. because of the large gap that currently exists between them. And since arable land cannot be easily increased, the U.S. will always have a comparative advantage in land-intensive economic activities relative to China.

Another aspect of the complementarity is the huge difference in the savings rates. The U.S. gross savings rate is about 12% (the net of depreciation private savings rate is 8%, and the net national savings rate is slightly negative due to large government borrowing), whereas the Chinese savings rate approaches 50%. China both saves too much and invests too much and the U.S. saves too little. If China fails to invest substantially all it saves domestically, then it will result in a large trade surplus vis-a-vis the world, which is neither sustainable nor desirable for China. If China invests in China all it saves, it will not have a trade surplus, but over-investment is likely to result, creating excess production capacity and lowering the rate of return on capital. In order to bring the savings rate down, China must strive to increase its domestic personal consumption, which it has been doing, but it will take a long time to be able to bring the domestic savings rate down to a more reasonable level, such as 30%. Thus, in the interim, increases in domestic demand must come not only from domestic personal consumption, but also from public or government consumption such as spending on education and healthcare services, and the provision of public goods such as clean air and water, as well as domestic investment.

Shared interests and responsibilities

In addition to the underlying economic comple-

28 See Part II, Chapter 11.

mentarity, there are also areas of commonality of interest which provide opportunities for economic cooperation. For example, under China's 12th Five-Year Plan (2011-2015), China aims to transform its mode of development from exports driven to domestic demand driven and from input based to innovation based, as well as to balance its international trade. This implies that the Chinese government will be promoting domestic aggregate demand including both investment and consumption. Moreover, it will also be facilitating imports. The U.S., under President Barack Obama, seeks to double its exports by 2014. The U.S. and China can work together to promote U.S. exports to China as part of these efforts.

To increase domestic personal consumption, China will need to increase the disposable income received by the households as well as provide a credible social safety net. To encourage innovation in China, it is inevitable that China will need to tighten its enforcement of IPR, not only because of pressure from the U.S. and other foreign countries, but also because it is in its own interests to do so. Chinese inventors need such protection as much as foreign inventors.

Another shared economic interest is the reduction of the downside risks of a systemic failure of the world economy, however it may occur, and to limit the damage if it actually materializes. This would also require the two countries to work together. A good example is the agreement by the U.S. and China to undertake massive economic stimulus in their respective countries soon after the 2008 global financial crisis began.

Yet another shared economic interest is maintaining and sustaining full domestic employment. Over the past several decades, there has been a steady migration of jobs from high labor-cost areas to low-labor cost areas, a trend which has accelerated in recent years due to globalization and the information and communication technology revolution. This is a challenge which the U.S. has been facing since the 1960s, and which China will begin to face within this decade, as its labor costs are rising rapidly relative to other emerging economies. Longer term, there is also the impact of technology. Networks of computers are replacing routine white-collar jobs while automation and robots have begun to displace manufacturing jobs. Growth of employment occurs only in high-skill professions, while many jobs are lost at the low-skill end. There is no good or quick solution to this problem. Education, training and re-training will help. More jobs that cannot be easily moved away – such as those serving the tourism sector – need to be created. The two countries, through deeper economic engagement with each other, may indeed discover areas and ways in which jobs can be created in both. For example, expansion of the service sector can create millions of new jobs in China. The U.S. firms, with their vast experience in the service sector, can help China as it develops its own service sector, while benefiting from their own participation in China's growing service sector market.

Finally, the U.S. and China, as the two largest economies in the world, have a responsibility to jointly lead in contributing to the global public good, such as the amelioration of the risks of climate change. The U.S. and China are the two largest energy producers and consumers in the world. They share the same objective for energy security. They are also the two largest emitters of greenhouse gases, and therefore should share common responsibility in reducing the risks of climate change and ensuring sustainable development for the entire world. Thus, cooperation in improving energy efficiency – in renewable energy, nuclear energy, clean coal and shale gas and oil technologies – can and should be aggressively pursued. Another global public good is the multilateral system of trade and investment and the associated institutions. Again, jointly, the two countries could provide the stability and sustainability that the world economy needs to continue to grow.

D. Towards Deeper Engagement

In section C, the future economic outlook and the vast economic complementarities and shared interests between the U.S. and China are identified and discussed. In this section, we shall discuss how the two countries can take advantage of these opportunities and complementarities to create jobs and prosperity for the people of both countries in seven promising areas. These will be followed by specific recommendations in each of the areas directed at the two governments, the thinktanks, the business sectors and other institutions of the two countries.

Trade in goods and services

As stated in the previous section C of this study, the U.S. and China will be each other's largest trading partners in the world by 2022. Moreover, the two economies are so different that a free trade agreement between them will maximize the economic benefits of a free trade area for both. What better way is there to unlock the full potential by having the two nations begin, as soon as practicable, negotiations for a free trade agreement? However, before this can happen, it may be necessary to launch a serious study on the feasibility and the potential benefits and costs of a China-U.S. free trade area.

The potential of China as a market for U.S. exports, in addition to being a manufacturing base, is gradually being recognized by U.S. firms. U.S. exports to China have more than quadrupled over the past ten years. However, the potential of U.S. exports to China, particularly by the small and medium size enterprises (SMEs), has yet to be fully realized. The difficulties of selling to the Chinese market, given the inefficiencies and peculiarities of China's domestic logistics and distribution systems, also compound the problems faced by U.S. SMEs.

An initiative which began a couple of years ago as a result of efforts by the U.S. Department of Commerce and Hong Kong's Trade Development Council to assist U.S. SMEs to sell their goods and services into East Asia, and in particular into China, has been bearing fruit. These organizations make annual visits to a number of states to promote this effort. The more U.S. SMEs become aware of these activities, the more they are likely to be able to export to China.

Another possible way to help U.S. SMEs sell their goods and services to Chinese importers is to organize annual export trade fairs in major U.S. cities such as San Francisco. Such trade fairs can play the same role in promoting U.S. exports as the annual Canton Trade Fairs did for Chinese exports in the past. To make these trade fairs effective, active participation by U.S. exporting firms and potential exporting firms, Chinese importers and other trading and services companies is needed. It will take a while to build up a critical mass. However, it has the advantage that many U.S. SMEs who have never considered exporting before, can participate in such a trade fair at a relatively low cost and without having to go abroad. Meanwhile, encouragement should also be given to U.S. SMEs to participate in trade fairs organized in places such as Hong Kong, where many Chinese importers and trading companies are already participating actively. Fostering more state-to-province and city-to-city partnerships between the U.S. and China is also another effective channel through which SMEs on both sides of the Pacific Ocean can get in touch with one another. The Export-Import Banks of both countries can also be encouraged to make credit more easily available to U.S. SMEs exporting to China and vice versa. Promoting and facilitating bilateral trade through online services can enable both U.S. and Chinese SMEs market their products with greater efficiency and lower costs. This should be actively pursued by both governments.

Investment

Given the expected continuing rapid growth of the Chinese domestic market for both consumer and producer goods, China should continue to be a favored destination of U.S. direct investment. Chinese direct investment to the U.S., currently at the same order of magnitude as U.S. direct investment, is also poised to grow, encouraged by the Chinese government. We need to unlock the potential of bilateral investment so that more jobs and economic opportunities can be created in both countries.

China's consumer market is enormous and it is becoming larger every day. Those U.S. companies that entered China early, such as General Motors, Ford, Procter & Gamble, Wal-Mart, Federal Express, KFC, McDonald's and Starbucks, have already reaped huge benefits, winning substantial market shares and becoming household names in China. As the Chinese middle class continues to grow, the benefits to these companies will be further increased. U.S. multinational corporations can serve these Chinese middle-class customers by operating directly in the retail market in China.

The U.S. excels in its service sector. The Chinese service sector is poised to expand as China restructures its economy from being export driven to domestic-demand, including domestic consumption, driven. There is tremendous opportunity for the U.S. to participate in the growth of China's service sector either through exports or direct investment. This has already been happening – the franchise model of service business, pioneered by U.S. firms, has taken root readily in China. In addition, many indigenous franchise chains, following the imported model, have sprung up. Other services, such as mass entertainment (e.g. the NBA), are also being introduced into China. Wal-Mart stores are everywhere. The part of the Chinese service sector which caters to retail consumers is actually quite open to FDI through wholly owned subsidiaries.

In some other sectors, such as banking and insurance, China is more cautious about opening for macro-prudential as well as protectionist reasons. While it is understandable that China needs to take a gradualist approach towards opening its financial sector so as to avoid the occurrence of a financial crisis, foreign financial institutions can also contribute to further reform and liberalization of the Chinese financial sector. If a foreign financial institution is already permitted, under existing rules, to establish a wholly owned commercial bank subsidiary in China, it does not make sense to limit the subsidiary from merging, acquiring or owning more than 20% of another financial institution in the same line of business a priority. It is, however, reasonable for the Chinese regulator to set aggregate limits on the total assets of the subsidiary and impose applicable capital requirements after the acquisition. As long as a wholly owned subsidiary by a foreign financial institution is already allowed, it should not matter whether it grows organically or through merger and acquisition in the same line of business.

The value of financial assets of U.S. households, according to an estimate of the U.S. Federal Reserve Board, was US$54.390tr as of year-end 2012. However, at the present time, there are only limited portfolio investment opportunities in China for U.S. individual investors. U.S. individual investors can only invest through H shares in Hong Kong for Chinese enterprises, or in those Chinese enterprises that are either listed or dually listed on the New York Stock Exchange, NASDAQ and other exchanges. However, they can invest in mutual funds managed by foreign asset managers who buy and sell shares on the Shanghai and Shenzhen Stock Exchanges as 'Qualified Foreign Institutional Investors' (QFII). However, there are relatively few individual retail investors now in the U.S., who are active investors in Chinese enterprises, so it is not clear whether there will be a rush into the Chinese securities market if and when Chinese capital controls are lifted.

The U.S. consumer market continues to be of interest to Chinese enterprises, for example, to Haier and Lenovo, which manufacture and market household electrical appliances and computers, respectively, in the U.S. Companies in the auto parts and high-end steel products are also coming to the

U.S. Indeed, the Japanese experience of establishing manufacturing plants in the U.S. for the consumer market may be a good model for Chinese enterprises to adopt. The energy and agriculture sectors in the U.S. may also attract Chinese FDI. Real estate is another area where there may be keen Chinese interest. Investment in infrastructure is yet another possibility for Chinese investors. All of these activities can generate GDP and create jobs in the U.S.

China has been and still is a major portfolio investor in the U.S. through the investment of its foreign exchange reserves by the People's Bank of China (the central bank). It holds approximately US$1.2tr worth of U.S. Treasury securities. In addition, it probably holds up to another US$1tr worth of US$-denominated portfolio investments. However, the need for the Chinese central bank to hold such a high level of foreign exchange reserves for transaction purposes is diminishing as the renminbi is increasingly used in the denomination and settlement of Chinese international transactions, especially those with East Asia. It is, however, in the interests of both the U.S. and China for the Chinese central bank to continue to hold its Treasury securities. In this highly uncertain environment, it is beneficial for the U.S. if the Chinese central bank is willing to hold bonds of long maturities. However, holding such bonds at this time exposes the Chinese central bank to large capital risks related to possible changes in interest rates, inflation rates and exchange rates during this long time horizon. A possible win-win strategy is for the U.S. Treasury to sell or swap long-maturity (say, 30 years) Treasury Inflation-Protected Securities (TIPS) to the Chinese central bank for the short-maturity non-inflation-indexed Treasury securities that it currently holds. TIPS can provide some degree of protection against not only inflation, but also interest rate risks as well as exchange rate risks for the holder.

If and when China's capital account is liberalized, Chinese private investors are likely to become significant investors in the U.S. securities market, private equity and hedge funds. Currently, the total financial assets of Chinese households may be estimated at US$9.5tr. By 2022, as real GDP per capita is likely to have doubled, the value of total household financial assets is also likely to at least double as well, to US$19tr. Chinese private investors, if given the opportunity, would most likely wish to diversify their investment portfolio into foreign financial assets. If we use the percentage of Japanese household financial assets held overseas of 3% as a guide, this would imply a possible outbound private portfolio investment of US$570bn for a one-time portfolio adjustment. In addition, there will be annual outbound private portfolio investment, estimated to be approximately US$28.5bn per year, as GDP per capita and household wealth continue to grow.

The U.S. need for new infrastructure and the renewal of aging infrastructure is substantial. Such activities can create millions of jobs. Chinese investors, with their surplus savings, can provide some funding for this effort, in the form of either debt or equity. This is good for the U.S., and will also be good for China because of the attractive returns. A U.S. institution should be engaged to study how Chinese investors can be drawn into investing in the U.S. infrastructure projects.

Cooperation in agriculture

As the Chinese economy continues to grow and the standard of living of the Chinese people further improves, Chinese demand for food and agricultural products will grow even faster. Moreover, the rise of the Chinese middle class also implies a significant increase in the demand for meat and poultry. In addition, the ongoing urbanization of China will create even greater demand for food and agricultural products, as the demand for such products is approximately 50% higher for an urban resident than a rural resident. The improvement in Chinese agricultural productivity has thus far helped to satisfy its demand for more food of higher quality. However, the shortage of land and water resources is a serious long-term bottleneck for further expansion within China. The environmental and hygiene problems of raising too much poultry and livestock, and of using too much chemical fertilizer and pesticides, also pose long-term health hazards. How best to mobilize both domestic and global resources and technology to satisfy its rapidly increasing demand for food in a sustainable manner is a major challenge for China.

China is today the largest importing nation of agricultural products in the world. The U.S. is China's largest supplier of agricultural products and China is the largest market for U.S. agricultural products, not only because of the relative abundance of arable land and the availability of water resources in the U.S., but also because of the efficiency and advanced technological level of U.S. agriculture that has resulted from its longstanding investments in agricultural R&D. China is not likely to be able to meet its additional demands in the years ahead through increases in domestic supply alone. The U.S., however, has the capacity to expand its agricultural production to satisfy the incremental demands overseas, particularly in products such as grains and meat. U.S. exports of agricultural products to China can thus potentially increase even more if the U.S. producers can be assured of a dependable, steady long-term demand and the Chinese importers can be assured of security and sustainability of supply. Through cooperation in agriculture with China, the U.S. can put its surplus land resources to work, thus boosting economic activities and creating additional durable employment.

China currently imports pork, beef and chicken from around the world, but such imports from the U.S. have thus far been limited for the following reasons: First, imports of pork are limited because of the use of hormones by U.S. producers in raising the pigs, which China, like the E.U., has banned. If an undertaking is given by U.S. producers that hormones will not be used, as has been done to the European Union, the Chinese market can be open to U.S. pork. Given the importance of pork in the Chinese diet, the potential demand can be huge[29]. Second, imports of beef are limited because of the risk of mad-cow disease. However, as no new cases have been reported for some years, this obstacle can be overcome. Finally, the imports of poultry from the U.S. have become a victim of trade disputes between the two countries. It is hoped that the dispute can be settled soon.

Thus, U.S. producers have an opportunity to supply pork, beef and chicken to China, in addition to corn and soya beans of which the U.S. is already the largest supplier to China. Corn and soya beans are used as feed grains in China. In the longer term, consideration should be given by the Chinese government and enterprises in the food industry to the direct importation of pork, beef and chicken from the U.S., rather than the feed grains. This can conserve scarce land resources, enhance the quality of the pork, beef and chicken, and improve hygiene conditions in China, and possibly reduce freight costs (the ratio of feeds to meat is approximately 8 to 1), as well as create additional economic activities and employment in the U.S.

Given the considerable concerns for food security and food safety in China, the potential for cooperation in agriculture between both countries is enormous and is clearly a win-win situation. The U.S. and China should therefore devote efforts to expand this cooperation. If unimpeded, ten years from now, the value of the total trade in agricultural products between the U.S. and China could be double what it is today.

As the float of uncommitted supplies of grains and meat on the world spot markets is relatively thin, one useful way to promote a significant increase in U.S. agricultural exports to China from its current levels is through the use of long-term (for example, 20 years) commodity supply contracts at pre-deter-

29 Pork holds much weight in Chinese household expenditure and hence in the Chinese consumer price index. Much of the inflation in China has been caused by the rise in the price of pork.

mined prices agreed to by both the buyer and the seller (such as on a cost-plus basis). Such long-term supply contracts will provide the incentive for U.S. producers to invest in new long-term supply capacity while at the same time mitigate Chinese importers' concern about the uncertainty of supply. The price formulae agreed to by both sides will also cushion both the buyers and sellers from volatile commodity prices. The supply contracts of corn and soya beans and other grain products can be pursued by U.S. producers and Chinese importers along the lines described above. Long-term supply contracts for meat and poultry can also be similarly pursued.

However, there is concern that either government may, for whatever reasons, prevent the agricultural products from being exported from the U.S. or imported into China. To provide certainty to both the Chinese importer and the U.S. exporter that the long-term contract will be honored, a warehouse in China, stocked with one-year's supply of the agricultural product under contract, could be held by the Chinese importer as collateral. At the same time, the Chinese importer would put the necessary funds for one year's purchase in an escrow account in a bank in the U.S. to guarantee its purchase, if the supply is actually delivered. Such collateral arrangements, underpinned by prior agreements on the parts of both the importer and the exporter, and supported by both governments, should be sufficient to dissuade both sides from not fulfilling their respective contractual obligations. This is because once the agreement is broken, by either side, it will terminate automatically. The U.S. producer will be stuck with the new productive capacity, with no longer a buyer for the product, if for any reason it fails to ship the contracted supply. The Chinese importer will have to pay anyway, even if it refuses delivery. Such long-term supply contracts can alleviate Chinese concerns about food security and can lead to genuine interdependence.

Cooperation in tourism

As discussed under "Global Factors" in section B above, in today's world economy, any job that can be moved away to a lower-cost location will be moved away. Tourism is, however, unique in the sense that it can generate many lower-skilled jobs that cannot be moved away, through the demands for lodging, food, retail, transportation, communication and entertainment. A person wishing to visit New York will have to go to New York, stay in a hotel, eat in restaurants and shop in department stores, thus creating demand for local services.

Hong Kong has been a major beneficiary of mainland Chinese tourists. A major effort to lure Mainland tourists was initiated in Hong Kong in 2003, in what is called the "Individual Visit Scheme". At that time, the total number of overnight mainland Chinese tourists visiting Hong Kong was 8.5 million[30]. By 2012, this number has risen to 34.9 million, approximately 72% of all inbound overnight tourists to Hong Kong. They stayed an average of three nights and spent an average of US$1,054 per day. These tourists generated a large number of local jobs in Hong Kong – it has helped to bring the unemployment rate in Hong Kong, with a population of approximately seven million, down to 3.2%, even though almost all of the manufacturing jobs and back-office jobs have migrated to the Mainland and elsewhere from Hong Kong. Experience in other places such as Japan and Europe suggests that a large influx of well-heeled tourists can make an immediate positive impact to the local economies.

Ten years ago, there were 16.6 million Chinese tourists visiting abroad (including Hong Kong and Macau). By 2012, this number increased to 83.2 million. By 2022, it is projected that this number is likely to reach 182.7 million a year[31]. Interest among Chinese tourists to visit the U.S. is consider-

30 This number does not include day visitors from mainland China.

31 See Part II, Chapter 11. A March 2011 report published by the Boston Consulting Group estimated that the number of Chinese outbound trips would grow by over 10% per annum from 2010 to 2020, and that about 20 million trips would be made to long-haul destinations in 2020.

able for a variety of reasons. The U.S. is the most developed and technologically most advanced economy in the world; it has a rich and varied culture; it has a storied history; it boasts Hollywood, Broadway and Disney; it is home to some of the greatest universities in the world; and it has beautiful scenery. Moreover, interest in American consumer goods, from fashion to electronic gadgets, is also substantial. With the rise of the middle class in China, outbound tourism will increase further by leaps and bounds. These tourists will bring with them enormous spending power to help support the local economies.

In 2012, about 1.5 million Chinese tourists visited the U.S. By 2022, this number is projected to increase to 5.73 million, constituting 3.1% of the total number of outbound Chinese tourists. If visa-free access were granted to Chinese tourists by the U.S., as is already the case for Japanese and South Korean tourists, the number of Chinese tourists visiting the U.S. annually by 2022 is projected to be somewhere between 8.1 million and 10.7 million.

It has been estimated that a typical Chinese tourist will spend approximately US$750 a day. Assuming that the average visit to the U.S. lasts 14 days, this will imply, on average, a total spending of US$9,000 per tourist (not counting the days of arrival and departure)[32]. A million Chinese tourists a year is estimated to generate a total expenditure of US$9bn, a value-added (GDP) of US$3.5bn and 61,352 jobs. If by 2022, the number of Chinese tourists visiting the U.S. actually hits 10 million, the creation of approximately US$35bn of GDP and 610,000 jobs in the U.S. is projected.

Today, 130,000 Chinese students are studying in the U.S., and 30,000 American students are now studying in China. The two countries have committed to increase the number of U.S. students visiting China to 100,000 over the next five years. This exchange of students will indeed become an important bridge for friendship and understanding between the two countries, as well as a significant and direct contributor to economic growth and employment in both countries. Foreign students in the U.S. (they can be viewed as 'long-term tourists') can also increase domestic aggregate demand in the same way as tourists. Chinese students in the U.S. spend less per day, but much more per person per year, for instance, around US$50,000 on average. Assuming an inflow of 100,000 Chinese foreign students into the U.S. per year, and assuming an average stay per person of four years, the total expenditure by these students will amount to US$20bn over those four years, which is capable of creating additional GDP of US$7.8bn and more than 136,000 local jobs that cannot be moved away. In addition, thousands of business professionals also travel between the two countries every year. The impacts on GDP and job creation are quite significant.

There were 2.12 million U.S. tourists that visited China in 2011, approximately 3.6% of all U.S. outbound tourists. This number can also be much higher given proper promotion and easier visa access by China. Every effort should be made to increase bilateral tourism between the two countries.

Visits between the two countries not only support the economic relationship between the two countries. An increasing flow of people between the U.S. and China will help to enhance understanding and build friendship among the two peoples which will further facilitate even closer economic cooperation and collaboration. Moreover, with a deeper economic relationship between the two countries, more people will move across the Pacific Ocean, and the bridge of friendship between the two countries will become so much stronger.

Cooperation in science and technology

At the present time, by any measure, the U.S. has an overwhelming superiority over China in science and technology. This is very much the result of long years of investment in human capital and in R&D

32 The U.S. Department of Commerce has estimated that a Chinese tourist to the U.S. will spend, on average, US$7,100.

in the U.S. The U.S. has been the source of major innovations such as the iPhone and Facebook. The U.S. leads over China, and for that matter all other nations, by a large margin in science and technology. The significant gap between the U.S. and China in science and technology is across the board and is likely to remain so for the foreseeable future, certainly for the next decade.

China has been increasing its investment in human and R&D capital. It is also trying to nurture a culture of collaborative research and innovation. China recognizes that science and technology are the keys to China's modernization and sustainable development.

The U.S. and China have been collaborating successfully in science and technology without interruption since 1978, under an agreement entitled "US-China Intergovernmental Science and Technology Cooperation Agreement", through its academic and research institutions. The areas of cooperation are: energy, environmental protection, basic science, transportation, health and pharmaceuticals, nuclear safety, civilian use of nuclear technology, research involving agriculture, etc. The major impediment in this collaboration is in the area of IPR protection[33]. In this respect, the attempts of the two governments to provide a platform to educate the Chinese on how to properly value intellectual property have been a very important step forward. China must double its efforts to protect intellectual property rights, whether owned by Chinese or foreigners, within China. Indeed, China needs to make the shift from being a consumer of intellectual property to a producer of intellectual property.

Looking into the future, government-to-government collaboration in science and technology can, on the basis of the existing foundations, be expanded and strengthened. One possible opportunity that is worthy of serious consideration by both governments is collaboration in the 'manned space program'. The U.S. is the undisputed leader in this area. China has been making good progress in its own manned space program. We believe that a collaborative manned space program can be a win-win for both countries. Other collaborative research opportunities include genomics – research on the possible application of genetic therapy to treat currently incurable diseases – and on the application of traditional Chinese medicine to the treatment of chronic illnesses.

Cooperation in energy, including research

The U.S. and China are the two largest energy-producing and energy-consuming nations in the world. Together, the two countries produce around 30% of the world's energy and consume 40%. Thus, both countries share the same objective of energy security. On the basis of its vast shale oil and gas reserves and its hydraulic fracturing technology, the U.S. is on its way to becoming a potential net energy exporter. This should free the U.S. from dependence on the oil supply from the volatile Middle East. U.S. energy firms, which excel in energy exploration and extraction technologies, can cooperate with Chinese energy firms to develop its unexploited reserves of shale oil and gas in a clean and efficient manner, benefiting both economies[34]. In so doing, the U.S. can help China achieve energy security and avoid dependence on the Middle East. It is also possible for the U.S. to become an exporter of oil and gas to China.

It is interesting to note that government-to-government collaboration in science and technology in the field of energy has been greatly expanded as a result of the Strategic Economic Dialogue in 2006. At the time, the two governments recognized how important this effort is. The research conducted through the China-U.S. Clean Energy Research Center, specially established by the two govern-

33 See the discussion in section E below.

34 According to an estimate made by the U.S. Energy Information Administration in 2011, China has 'technically recoverable' shale gas reserves of 1.3 quadrillion cubic feet, 50% more than the U.S.

ments for this purpose, placed special emphasis on clean coal technology, electric cars and energy-efficient buildings, etc. In these efforts, scientists, academics and researchers from both countries have been participating. The business sector has also been invited to participate in this effort.

At the same time, the two governments have also encouraged the business sectors of the two countries to collaborate directly in the energy sector. Today, there are extensive business-to-business collaborations in areas such as clean coal technology, liquefaction of coal, smart grid, biofuel, third and fourth-generation nuclear energy, high voltage transmission, carbon dioxide sequestration, integrated gasification combined cycle (coal into gas), etc. The following are some successful examples, among others:

a) Collaboration between China National Nuclear Corporation and Westinghouse of the U.S., on the construction of nuclear power plants in China and the U.S. Furthermore, there may be joint bids for nuclear power plants around the world.
b) Collaboration between China Shenhua and General Electric on integrated gasification combined cycle research and development.
c) Collaboration between China's ENN and the U.S.' Duke Energy on clean energy.

The two countries are also the largest greenhouse gas emitters in the world. People of both countries are concerned about sustainability of development, protection of the environment and reduction of the risks of climate change. Cooperation in science and technology in the area of energy can result in more efficient and more environmentally friendly use of energy and lead to a reduction of greenhouse gas emission. Working together, the U.S. and China can help ensure energy security and affordability and reduce the risks of climate change, not only for themselves, but also for the rest of the world.

Cooperation in enhancing sustainability

Both the U.S. and China have solemnly promised to combat threats of climate change, protect the environment and help ensure sustainability of development for the world. As the two largest greenhouse gas emitters in the world, they are committed to reducing these emissions. The two governments have initiated collaborative research in building efficiency, renewable energy, nuclear energy, clean coal technology, electric vehicles, carbon dioxide capture, utilization and sequestration and other methods for reducing the carbon emission into the atmosphere, with the support of the private sector, which, if successful, can control the increase of greenhouse gas emissions and thereby slow down global warming and climate change. This should be a priority for the two countries.

E. Recommendations to the Two Governments

To turn complementarities and deeper engagement into economic opportunities and jobs requires the support of the entire spectrum of the societies of both countries, including, of course, the full participation of the business sector. But above all, the leadership role of the two governments can have a decisive impact. It is the governments that can create an open, transparent, fair and competitive market environment to attract investment and trade. For this reason, we put forward eight recommendations to the two governments:

1) Drawing on the expertise of government agencies in the U.S. and China, thinktanks from both countries should be engaged to study the feasibility and the benefits of a free trade agreement between the two countries. This study should be completed within one year of commencement. If the results of the study are positive, then a process toward negotiations should be initiated. As the two largest trading nations in the world, China and the U.S. should also take the lead to reinvigorate the Doha Round of world trade negotiations.

2) Discussions for a bilateral investment treaty have been ongoing for some time. In order to facilitate two-way investment flow, we urge both countries to commit to complete treaty negotiations as soon as possible, preferably within one year.
3) The two governments need to encourage even more business to business collaboration in science and technology as it relates to energy, in such areas as building and industrial efficiency, renewable energy, shale oil and gas, carbon dioxide capture, utilization and sequestration, electric cars, etc. In addition, as it relates to climate change, the two countries should agree to a common negotiating position for the meeting in December 2013, and rally other nations to ensure a successful outcome of the 2015 United Nations Framework Convention on Climate Change treaty process.
4) Both countries should streamline their visa application process, and extend visa durations to five years to begin with, then ten years, and eventually move to a visa-free regime. People need to feel that they are welcome. These changes will take time, but a deadline of two years would seem reasonable for five-year visa durations to start.
5) During U.S. Secretary of State John Kerry's recent visit to Beijing, it was agreed by the two countries that a special working group will be established under the S&ED to begin discussion on the issue of cyber security. The group should work toward developing a roadmap on how the two countries can a) enhance and enforce cyber security, and b) collaborate to develop an international convention on cyber space. These need to be dealt with urgently, and therefore it is suggested that the S&ED complete the negotiations within 18 months with interim reports from time to time.
6) There is global and domestic interest for China to vigorously pursue IPR protection. Indeed, it is in China's own interest to do so from the point of view of spurring innovation and economic growth, and also upgrading its industrial base. To achieve this objective, much work still needs to be done. We wish to make the following recommendations to the Chinese government: a) The Leading Group for National IPR Protection, the single cross-ministerial organization within the State Council of China that is responsible for IPR protection, should further strengthen enforcement to ensure full compliance and deter intellectual property theft. b) China should consider establishing a special national court exclusively for intellectual property disputes. This will greatly facilitate the resolution and settlement of intellectual property disputes in China. c) We note S&ED's recent discussion has resulted in an agreement under which Chinese central and local government entities will eradicate the use of pirated software by the end of 2013. We urge the Chinese government to mandate that all Chinese SOEs and bank systems should do the same as soon as possible.
7) Relaxation of U.S. export controls of high-tech products is a long-standing request by China. It is proposed that this issue be reviewed by the U.S. administration with added urgency, in the hope that a mutually beneficial outcome will emerge.
8) Some U.S. government actions in both trade and investment, including actions by CFIUS, appear to Chinese enterprises to reflect political rather than policy considerations. The operation of CFIUS can be made more transparent and better understood in China. We propose that clearer rules and regulations on investment approval processes be issued by the U.S. government.

With the support of the two governments, and the people of the two countries, there is a good chance that the full potential of the complementarities and deeper engagement can be realized.

F. Conclusion

From the preceding sections, it is evident that the U.S.-China economic relationship can and should be as interdependent as never before. Over the coming decade, with the determined efforts of the two countries, many economic opportunities and millions of new jobs can be created for the two peoples.

President Barack Obama said in his speech on 7 November, right after his re-election last year:

"We want our kids to grow up in a country where they have access to the best schools and the best teachers – a country that lives up to its legacy as the global leader in technology and discovery and innovation – with all of the good jobs and new businesses that follow."

In a similar vein, China's new leader Xi Jinping said upon his election as the General Secretary last November:

"Our people love life, and expect a better education, more stable jobs, a better income, more reliable social security, medical care of a higher standard, more comfortable living conditions, and a more beautiful environment. They hope that their children can grow up better, work better, and live better. People's yearning for a good and beautiful life is the goal for us to strive for."

The words spoken by the two leaders suggest that the two peoples share the same dreams for a better life for themselves and their children. Closer economic cooperation between the two countries will help turn that dream into reality. By 2022, on the 50th anniversary of President Nixon's visit to China, it is our hope that deeper economic engagement for mutual benefit is what drives the further evolution of a lasting and mutually beneficial U.S.-China relationship, founded on trust, understanding and peace. The leaders of the two countries are beginning a new term of office. The two countries are setting a new direction in economic development in order to provide sustainable growth and employment for their people. Working together, starting now, we can make this happen. Let us seize the moment.

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Co-convenors

Victor K. FUNG

Chairman, The Fung Group

Chairman, The Fung Global Institute

Vice-Chairman, China-United States Exchange Foundation

Dr Victor K. Fung is Group Chairman of the Fung Group, a Hong Kong-based multinational which comprises major subsidiaries in trading, logistics, distribution and retailing. He holds independent non-executive Directorships with China Petrochemical Corporation (People's Republic of China), Bank of China (Hong Kong) Limited, Chow Tai Fook Jewellery Group Limited (Hong Kong) and Koc Holding A. S. (Turkey). He is also Chairman of the Asia Advisory Board of Prudential Financial, Inc (USA). Through the philanthropic Victor and William Fung Foundation, Dr Fung is Founding Chairman of the Fung Global Institute, an independent, non-profit thinktank based in Hong Kong. Dr Fung is a member of the Hong Kong Government's Economic Development Commission, the Chinese People's Political Consultative Conference and Vice-Chairman of the China Centre for International Economic Exchanges, among other public service and academic appointments. He is also Vice-Chairman of the China-United States Exchange Foundation, Honorary Chairman of International Chamber of Commerce headquartered in Paris and a member of the World Trade Organization Panel on Defining the Future of Trade. Dr Fung holds Bachelor and Master Degrees in Electrical Engineering from the Massachusetts Institute of Technology and a Doctorate in Business Economics from Harvard University, where he taught as a professor at Harvard Business School.

Lawrence J. LAU

Ralph and Claire Landau Professor of Economics, The Chinese University of Hong Kong

Kwoh-Ting Li Professor in Economic Development, Emeritus, Stanford University

Professor Lawrence J. Lau received his B.S. degree (with Great Distinction) in Physics from Stanford University in 1964 and his M.A. and Ph.D. degrees in Economics from the University of California at Berkeley in 1966 and 1969 respectively. He joined the faculty of the Department of Economics, Stanford University in 1966, became Professor of Economics in 1976, and the first Kwoh-Ting Li Professor in Economic Development in 1992. Upon his retirement from Stanford University in 2006, he became Kwoh-Ting Li Professor in Economic Development, Emeritus. From 2004 to 2010, Professor Lau served as Vice-Chancellor (President) of the Chinese University of Hong Kong. Since 2010, he has been serving as Chairman of CIC International (Hong Kong) Co., Limited, a subsidiary of China Investment Corporation, and also concurrently as Ralph and Claire Landau Professor of Economics at the Chinese University of Hong Kong.

Members

Michael J. BOSKIN

Tully M. Friedman Professor of Economics and Senior Fellow at the Hoover Institution, Stanford University

Michael J. Boskin is Tully M. Friedman Professor of Economics and Senior Fellow, Hoover Institution, Stanford University and Research Associate, National Bureau of Economic Research. He is the author of more than 150 books and articles on world economic growth, tax and budget theory and policy, saving and consumption patterns and the implications of changing technology and demography on capital, labor and product markets. His op-eds appear regularly in the *Wall Street Journal* and other leading newspapers, including a bi-monthly column on global economics syndicated in 145 countries. He served as Chairman of President George H.W. Bush's Council of Economic Advisers from 1989 to 1993, where he originated the idea for North American Free Trade Agreement, introduced emissions trading for SOx into the Clean Air Act, helped to resolve the Third World Debt and S&L financial crises and place the first effective controls on government spending. He chaired the Commission on the Consumer Price Index, whose 1996 report transformed the way government statistical agencies in the U.S. and around the world measure inflation, productivity and real GDP. Advisor to governments and businesses globally, Dr Boskin also serves on several corporate and philanthropic boards of directors. Dr Boskin received his BA with highest honors and the Chancellor's Award as outstanding undergraduate in 1967 from the University of California at Berkeley, where he also received his MA in 1968 and his PhD in 1971, all in economics. In addition to Stanford and the University of California, he has taught at Harvard and Yale. Among his many professional awards and citations, he is proudest of Stanford's Distinguished Teaching Award.

FAN Gang

Director, National Institute of Economic Research

Chief Researcher, China Center For International Economic Exchanges

Professor of Economics, Peking University and the Graduate School of Chinese Academy of Social Sciences

Professor Fan Gang, Director of National Institute of Economic Research, Chairman, China Reform Foundation (NERI-China), Beijing, China; Professor of Economics, Peking University and the Graduate School of Chinese Academy of Social Sciences. Born 1953 in Beijing, Professor Fan received his PhD in economics from the Graduate School of Chinese Academy of Social Sciences (CASS) in 1988. He was visiting fellow of the National Bureau of Economic Research (NBER) and Harvard University, MA, USA, 1985-1987; his publications include over 100 academic papers published in Chinese and English academic journals and 10 books on macroeconomics, and economics of transition. He is guest professor of number of universities and graduate schools domestic and abroad, and served as the academic member of the Monetary Policy Committee of China's central bank 2006-2010. He is an advisor to various departments of Chinese Central Government and provincial governments, and consultant to The World Bank, IMF, UNDP and OECD. He was listed as one of "World's Top 100 Public Intellectuals" jointly by *Foreign Policy* and *Prospect*, 2005 and 2008 consecutively, and one of "100 Global Thinkers" by *Foreign Policy*, 2010.

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HAI Wen

Vice President, Peking University

Chancellor of Shenzhen Graduate School, Peking University

Founding Dean and Professor of Economics, HSBC Business School, Peking University

Wen Hai is Professor in Economics at the China Centre for Economic Research and HSBC Business School in Peking University. He is Vice President of Peking University, Chancellor of Shenzhen Graduate School and the Founding Dean of HSBC Business School, Peking University. He received his BA in economic from Peking University, MA and PhD in economics from University of California at Davis. His research has focused on international trade, development economics and China's trade policy. He has published many academic books and journal articles in English and Chinese, including *American Economics Review*, *NBER Working Papers* and *International Economics Review*. He is one of the most respected teachers and has won Outstanding Teacher Award at Peking University. He is a member of Advisory Committee for Economic and Trade Policy of China's Ministry of Commerce. He has been Chairman of the Board of China Economic Annual Conference since 2008. He served as President of Chinese Economists Society 1993-1994. He has frequently delivered special speeches to researchers, government officials and business leaders on China's economic reforms, and often appeared on national television discussing China's international trade and economic development policies.

Michael SPENCE

Professor of Economics, Leonard N. Stern School of Business at New York University

Senior Fellow at the Hoover Institution and the Philip H. Knight Professor Emeritus of Management at the Graduate School of Business, Stanford University

Recipient of the Nobel Prize in Economic Sciences in 2001

Michael Spence served as the Chairman of an Independent Commission on Growth in Developing Countries (2006-2010). He is a Professor of Economics at the Stern School at New York University, Professor Emeritus of Management and former Dean (1990-1999) at the Graduate School of Business at Stanford University. He is a Senior Fellow of the Hoover Institution at Stanford University and the Chairman of the Academic Council of the Fung Global Institute. In 2001, Professor Spence received the Nobel Prize in Economic Sciences. He is the author of the book, T*he Next Convergence: The Future of Economic Growth in a Multispeed World*, Straus Ferrar and May Giro 2011. He serves on the boards of Genpact and Mercadolibre, and a number of private companies. He is a member of the board of the Stanford Management Company, and the International Chamber of Commerce Research Foundation. He is a senior advisor to Oak Hill Investment Management and a consultant at PIMCO.

Part II

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CHAPTER 1

THE DEVELOPMENT OF U.S.-CHINA ECONOMIC RELATIONS, 1978 TO THE PRESENT

HUO Jianguo
President, Chinese Academy of International Trade and Economic Cooperation (CAITEC)

With contributions from LI Wei, Carol MA (The Fung Business Intelligence Centre), HUANG Zhilong (Associate Research Fellow, Department of Strategic Research at CCIEE)

Executive Summary

The rapid growth of China since its reform and opening up in 1978 is one of the most significant economic events of the world economy in the past few decades. The U.S. played an important role in China's development during this period, not least because the U.S. has been one of the most important markets for China's exports. Direct investments from the U.S. to China brought with them not only financing, but also technology, management knowhow and global market access. Economic cooperation with the U.S. helped generate a lot of job opportunities for China's abundant labor force. The U.S. has also benefited from China's development. The increase in imports of value-for-money consumer goods from China helped to raise the living standard of most Americans and keep consumer price inflation low in the U.S., and the latter in turn led to lower interest rates that underpinned faster U.S. economic growth. Meanwhile, many U.S. multinational corporations (MNCs) and small and medium enterprises (SMEs) have built up large production and trading businesses in China, selling goods not only back to the U.S., but also in the Chinese domestic market and to third markets. China has become a profit center of many U.S. businesses. Services trade is also a key aspect of the U.S.-China trade relationship. U.S. service providers are competing globally in sectors from financial services to education, and to energy and environmental services, etc. Advancing bilateral services trade will provide multiple benefits for the U.S. and China. Not only will it support high-paid American jobs, but it will also help China develop its services sector which is a key component in China's next stage of economic transformation. An input-output analysis shows that exports of goods and services by the U.S. and China to each other created 0.73m jobs in the U.S. and 11.4m jobs in China in 2010[1].

More than half of China's exports are products produced by foreign companies based in China. Many of the components used to produce China's exports are imported from other economies, notably East Asia, often from foreign companies that produce in these economies. This pattern of production and trade is a reason why China runs trade deficits with most East Asian economies while it has trade surpluses with the U.S. The rapid growth of China's exports therefore has occurred together with a rapid rise in intra-Asian trade and an increasing sophistication in the global supply chain of many industries and products. U.S. import statistics also show that in many products, the rise in the proportion of U.S. imports from China was matched by a fall in the share of imports from other East Asian economies. These facts reflect the increased use of China by foreign companies as an assembly base to enhance their global competitiveness and the pivotal role China plays in the development of global supply chains. A lot of these foreign companies are American. U.S.-China economic cooperation is therefore not only a matter for the two countries concerned. In a broader context, it is an integral part of a globalization process that flourished during the past few decades. Both the U.S. and China are major beneficiaries of this globalization process.

Although growing U.S.-China trade ties are obviously mutually beneficial, trade tensions between the two countries arise from time to time. The two countries are concerned about 'unfair' trade. There

1 See Chapter 8 in Part II for details.

are also accusations by both sides of various trade protectionist measures adopted by the other party.

Specific trade disputes between the two countries could be resolved through the appropriate World Trade Organization (WTO) resolution procedures. More importantly, both countries should understand the long-term complementarities that underpin their trade relations and the enormous potentials for bilateral trade growth in the coming years, which will positively impact on jobs and economic development. Promotion of imports and domestic consumption is a key part of China's 12th Five-Year Plan and it is aiming to increase its aggregate imports to US$10tr or more in five years[2]. Meanwhile, the U.S. National Export Initiative aims to double exports to US$3tr by the end of 2014. These will not only help to promote bilateral trade but also redress the trade imbalance between the two countries. Since 2006, U.S. exports to China have grown faster than Chinese exports to the U.S. every year. From 2001 to 2011, U.S. exports of goods and services to China increased by about four times, meaning that exports double every five years, or have an average annual growth rate of close to 15%.

Given the large size of China, after the rapid growth over a period of over three decades, it today has become an important market in itself. China's middle class is expanding fast and urbanization is continuing at a rapid rate. China's surge in demand for resources such as iron ore, coal and oil, and of food, have become a major factor influencing commodity markets. More and more Chinese savings are looking for investment opportunities around the world, not only as portfolio investments, but also increasingly in the form of direct investments. As China keeps expanding to integrate itself into the global economy, the outside world also wants to tap into the many opportunities that arise from China's development.

2 "Bashing China isn't going to solve the world's debt crisis", Chen Deming, *The Telegraph*,3 November 2011, http://www.telegraph.co.uk/news/worldnews/asia/china/8867884/Bashing-China-isnt-going-to-solve-the-worlds-debt-crisis.html

To realize the potentials of further trade growth, China and the U.S. should act in a collaborative manner to achieve their respective goals and targets for trade. Building on the results of the fourth round of the U.S.-China Strategic and Economic Dialogue (SED) in May 2012, the two nations should continue to strive for a more open global trade system and jointly resist trade protectionism so as to drive economic growth in both countries and achieve a more balanced trading relationship.

One specific suggestion made by this study is for both the U.S. and China to organize trade fairs to help U.S. SMEs to export to China. The China Import and Export Fair – known as the Canton Fair – played an important role in promoting Chinese exports. There is room for a similar trade fair to take place in the U.S. – perhaps in San Francisco – to help boost SME exports to China. More efforts to foster state-to-province and city-to-city partnerships by both countries would also be helpful.

U.S. high-tech export controls have constrained U.S. exports to China. Since 2002, U.S. high-tech products trade with China has been in deficit. From 2002 to 2010, the deficit increased from US$11.8bn to US$94.2bn[3]. Relaxation of high-tech export controls to China could alleviate some of the current U.S.-China trade imbalance. Both sides should promote bilateral trade in high-tech products, while the U.S. should reform and streamline its export control processes.

The U.S. and China are the two largest economies and trading nations in the world, accounting for 18.5% of world merchandise exports and 21.8% of world merchandise imports in 2011[4]. Trade relations between the two countries will therefore have a significant impact on the multilateral trade system. Having a constructive relationship between the two countries is important, not only for the future of these two countries, but also for the world as a whole.

3 Data sourced from US Census Bureau.
4 World Trade Organization (2012), International Trade Statistics 2012.

The Development of U.S.-China Economic Relations, 1978 to the Present

The Development of U.S.-China Economic Relations

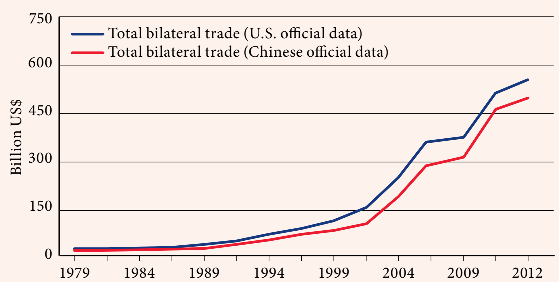
History of the economic exchange between the U.S. and China

In 2012, China was the second largest trade partner of the U.S. and the U.S. is China's largest export market. According to Chinese statistics, the total trade in goods between China and the U.S. amounted to US$484.7bn in 2012[5], 198 times of that in 1979. The U.S. statistics showed an even bigger figure at US$536.2bn, 226 times of that in 1979[6] (Figure 1). Bilateral trade in services totaled US$38.03bn in 2011[7](Figure 2).

Direct investment flows between the U.S. and China also witnessed a significant increase. U.S. direct investments in China rose from around US$326m in the early-1980s to around US$5.42bn in the early-2000s[8]. By the end of 2011, the U.S. had set up accumulatively 66,500 companies in China and made over US$70bn worth of investment in China, representing 5.9% of China's total foreign direct investment (FDI) utilization. The U.S. was the third largest source of foreign investment after Hong Kong and Japan[9].

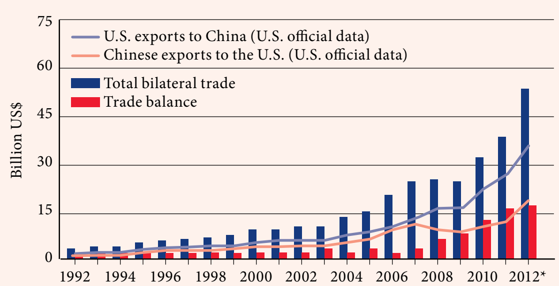
Chinese direct investment in the U.S. increased almost 28-fold between 2003 and 2011 – from US$65m to US$1.8bn in 2011[10]. According to statistics compiled by the Rhodium Group[11], the amount

Figure 1: U.S.-China Trade in Goods, 1979-2012



Source: Chinese Statistics from Chinese Customs Year Book; *U.S. Statistics from USITC Dataweb and Census Bureau*

Figure 2: China-U.S. Trade in Services, 1992-2012



Source: U.S. Bureau of Economic Analysis
**Trade in service figures for 2012 are estimated. Official data have not yet been released.*

of Chinese investment in the U.S. reached a record US$6.5bn in 2012. Chinese companies operated in at least 35 of the 50 U.S. states in 2010[12].

The developments of U.S.-China economic relations since 1979 can be roughly divided into the following four phases:

Phase 1: Bilateral trade increased rapidly after China's economic reforms and opening up, 1979-1992
China began its process of economic reform and opening up in the late 1970s and established diplo-

5 Data sourced from China Customs.
6 Data sourced from U.S. Census Bureau.
7 Data sourced from U.S. BEA.
8 Data sourced from Chinese Ministry of Commerce (MOFCOM).
9 See Chapter 13 for more details.
10 Data sourced from MOFCOM. See Chapter 13 for more details.
11 "Foreign Investment in China: A Tale of Two Statistics", Thilo Hanemann, Rhodium Group, 4 January 2013.
12 See Chapter 13 for more details.

matic relations with the U.S. in 1979. The most obvious feature of this first phase of bilateral economic exchange is its primary focus on trade in goods.

Starting from a low base, total bilateral trade of goods increased rapidly from US$2.45bn in 1979 to US$17.49bn in 1992, according to Chinese statistics[13]. The U.S. statistics show a similar trend with the bilateral trade increasing from US$2.37bn to US$33.15bn[14].

Much of the trade took the form of the so-called "processing and assembly" trade, under which most inputs and components would be imported into China and all outputs would be exported, thus minimizing any impact on the domestic market which was then highly regulated.

Phase 2: U.S.-China economic ties strengthened after Deng Xiaoping's southern tour, 1993-2001

The starting point of phase 2 was marked by the late Chinese senior leader Deng Xiaoping's inspection tour of South China in mid-1992. Late in that year the Chinese government announced plans to build a socialist market economy and to renew its efforts at economic reform and opening to the world.

U.S.-China trade grew steadily with Chinese exports aided by a significant devaluation of the renminbi (RMB) on 1 January 1994 and the granting of (non-permanent) most-favored-nation status by the U.S[15]. In 1999, China and the U.S. entered into a bilateral agreement for China's accession into the WTO. This agreement expedited the process of China's WTO accession, and created favorable conditions for the stable, healthy, long-term development of U.S.-China economic relations.

According to Chinese official statistics, bilateral trade of goods increased from US$27.65bn in 1993 to US$80.49bn in 2001[16]. (The U.S. official statistics recorded a bilateral trade increase from US$40.30bn to US$121.52bn[17].) Other areas of economic cooperation such as services trade and technological cooperation also grew in depth and breadth.

Besides, FDI flow from the U.S. to China had a quantum jump, from only US$511m in 1992 to US$2.06bn in 1993 and US$4.43bn in 2001[18].

Phase 3: Further expansion of bilateral trade and investment after China's accession to the WTO, 2002-2010

China became an official WTO member in late 2001. This was a milestone in China's opening to the world, and gave further impetus to the growth in U.S.-China economic relations. China began to evolve into an important part of an East Asian and global consumer market production and supply chain network.

The Multi Fiber Agreement (MFA), an agreement that imposed quotas on the amount of textile and garments developing countries could export to developed countries, came to an end on 1 January 2005. This was another important event in the development of China's trade. As China was very competitive in the textiles and garments industries at that time, the end of the quota system led to a very rapid increase in Chinese exports.

In this phase, China continued to be the fastest growing market for U.S. exports. According to U.S. statistics, U.S. exports to China grew by 317% and U.S. imports from China grew by 192%[19].

At the same time, U.S.-China trade in services grew 219% to US$31.43bn, compared to an overall growth in U.S. trade in services of 84%. China's share of U.S. services exports rose from 2.1% to 4%[20].

In the beginning of the early 2000s, Chinese enterprises began to make direct investments in the U.S. and elsewhere, but the cumulative total of Chinese direct investment in the U.S. as of 2010 was less

13 Data sourced from China Customs.
14 Data sourced from US Census Bureau.
15 In 2000, the U.S. Congress granted China permanent most-favored-nation status (MFNS) for trade. This opened the door for China to become an even bigger player in the world economy.
16 Data sourced from China Customs.
17 Data sourced from U.S. Census Bureau.
18 Data sourced from MOFCOM.
19 Data sourced from U.S. Census Bureau.
20 Data sourced from U.S. BEA.

than US$5bn[21], a small fraction of the cumulative U.S. direct investment in China of approximately US$70bn by around 65,000 U.S. firms. Cumulatively, U.S. direct investment accounts for 6.7% of the total stock of FDI in China.

Phase 4: Stronger commitment to strengthen cooperation, 2011 onwards

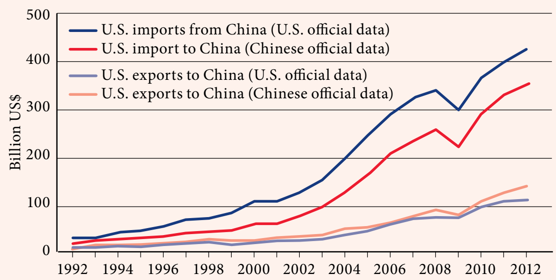
The U.S. and China are entering a new phase of mature and comprehensive economic exchange. In May 2011, the U.S. and China signed the "U.S.-China Comprehensive Framework for Promoting Strong, Sustainable, and Balanced Growth and Economic Cooperation". The two countries affirm that both will, based on common interests, and from a strategic, long-term, and overarching perspective, promote more extensive economic cooperation in joint efforts to build a comprehensive and mutually beneficial economic partnership, to boost prosperity and welfare in the two countries, and to achieve strong, sustainable and balanced growth of the world economy. Within the next 10 years, the U.S. and China will enter into a new phase of a comprehensive and mutually beneficial economic partnership; the two countries will be able to conduct broad cooperation on trade, investment, finance, technology, clean technology, infrastructure and global economic governance.

Developments in U.S.-China trade since China's WTO accession

One of the significant economic events during the past three decades has been China's entry into the WTO. China and the U.S. have clearly benefited from China's WTO entry. As a result of market openings mandated by the WTO agreement, U.S.-China trade has advanced at breakneck pace. This trade has helped create jobs, raise incomes and contribute to economic growth in both countries.

21 Data sourced from MOFCOM.

Figure 3: U.S. Merchandise Trade with China, 1992- 2012



Source: Chinese Statistics from Chinese Customs Year Book*; U.S. Statistics from USITC Dataweb and Census Bureau*

Trade in goods

U.S. merchandise exports to China increased from US$19.2bn, or 2.53% of total exports, in 2001 to US$110.6bn, or 7.1% of total exports, in 2012 (see Figure 3)[22]. China is now the largest market for US agricultural exports such as soybean and cotton. The U.S. also has a comparative advantage in automobiles and airplanes. For instance, the Boeing Company has predicted that over the next 20 years, China will buy 5,000 new commercial airplanes valued at US$600bn and will be Boeing's largest commercial airplane customer outside the U.S.[23].

Chinese merchandise exports to the U.S. also grew at a rapid pace, with an annual average growth of about 19% between 2001 and 2012, reaching US$425.64bn in 2012[24]. As the U.S.'s major supplier of goods imports, China has comparative advantage in machinery, toys and sports equipment, furniture and bedding, and footwear.

Trade in services

From 2001 to 2011, U.S. service exports to China expanded from US$5.41bn to US$26.7bn. Over the same period, the U.S. service trade surplus with China rose from US$1.88bn to US$15.37bn[25]. The U.S. has distinctive competitive advantages in the

22 Data sourced from U.S. Census Bureau.
23 The Boeing Company, statement on Chinese approval of 200 Boeing Aircrafts, 19 January 2011.
24 Data sourced from U.S. Census Bureau.
25 Data sourced from U.S. BEA.

areas of tourism, education, financial services and transfer of patent rights (see Figure 2).

China plans to increase the contribution of the service sector to total GDP from 43% in 2010 to 47% in 2015, which means tremendous opportunities for U.S. service providers[26]. Instead of continuing to develop low-cost, low-value-added industries, China is vigorously developing services and advanced manufacturing industries. U.S. companies engaging in professional service industries such as design, brand building, IT, research and development (R&D), and legal and financial services could give full play to their strengths to assist in the upgrading and restructuring of Chinese enterprises and factories. Advancing services trade with China could support American jobs.

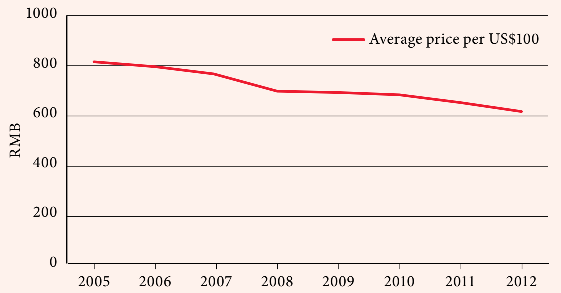
Future competitive advantages hinge on companies' ability to provide value-added services. Indeed, a number of companies are putting increasing focuses on building their services strengths. For example, the world's largest automaker General Motors (GM) established its own lending operation GM Financial in 2010. This captive lending arm can be an important profit contributor and help generate more vehicle sales for GM by providing attractive loan and lease terms to consumers.

In response to the growing demand for commercial airline pilots and maintenance technicians in the Asia Pacific region[27], Boeing has also expanded its Flight Services business in China, greatly enhancing training capacity for airlines in the region. With the introduction of an advanced 787 Dreamliner training suite for pilot and maintenance training, and a newly-installed 747-400 full-flight simulator, the company is tripling its offerings at the Boeing Flight Services Shanghai training campus.

26 The service industries account for about 68% of U.S. GDP. This information was sourced from the Office of the United States Trade Representative, 25 October 2012, http://www.ustr.gov/trade-topics/services-investment/services

27 The "Boeing Pilot & Technician Outlook" projects the largest demand for global pilots and maintenance technicians will be in the Asia Pacific region. China's expected requirement leads the region's demand with a need for 72,000 new commercial airline pilots and more than 108,000 maintenance technicians over the next 20 years.

Figure 4: US$/RMB Exchange Rate (average price per 100 US$), 2005-2012



Source: China Statistical Yearbook 2012

Frictions in U.S.-China economic and trade relations

Although growing U.S.-China economic ties are widely considered to be mutually beneficial, tensions between the two countries have risen over a number of issues.

China's currency policy

Many U.S. policymakers, labor groups and representatives of import-sensitive industries have charged that, despite gradual reforms, the Chinese government continues to manipulate its currency to keep its value artificially low against the dollar. The critics claim that this policy constitutes a de facto subsidy of Chinese exports to the U.S. and acts as a tariff on U.S. imports to China. They believe China keeps the value of the RMB artificially low to gain a competitive trade advantage.

China's response is that it intends to "proceed further with reform of the RMB exchange rate regime and to enhance the RMB exchange rate flexibility", but it rules out any large one-time revaluation, stating "it is important to avoid any sharp and massive fluctuation of the RMB exchange rate"[28]. Since China began exchange rate reforms in 2005,

28 "Statement on Promoting the Reform of the RMB Exchange Rate Regime and Enhancing the RMB Exchange Rate Flexibility", 19 June 2012, http://www.pbc.gov.cn/publish/goutongjiaoliu/524/2010/20100621164121167284376/20100621164121167284376_.html

the RMB has appreciated in nominal terms by about 23% against the U.S. dollar[29](see Figure 4).

Trade restrictive measures

A number of trade restrictive measures such as tariff-rate quotas (TRQ), import duties and trade remedies have been imposed by the U.S. and China. History shows that trade restrictive measures introduced in times of crisis might meet the short-term domestic political needs but can also hamper long-term economic development.

Both China and the U.S. resort to trade remedy measures including countervailing and anti-dumping duties to protect domestic industries and employment. These have led to an increasing number of cases brought to the WTO trade dispute settlement process.

Since 2010, China has launched a number of anti-dumping and countervailing cases against U.S. imports including dispersion unshifted single-mode optical fiber, caprolactam, distillers dried grains, coated bleached folding, solid bleached sulphate (SBS), folding boxboard (FBB), coated ivory board or white card paper, ethylene glycol monobutyl ether, diethylene glycol monobutyl, and resorcinol (resorcin)[30]. On the other hand, the U.S. has also initiated a series of anti-dumping investigations of Chinese imports, including steel wheels, steel cylinders, crystalline silicon photovoltaic cells and modules, wind towers and drawn stainless steel sinks[31].

In March 2012, U.S. President Barack Obama signed into law a bill that authorizes the U.S. Commerce Department to impose punitive countervailing duties on non-market economies including China, providing subsidies to manufacturers and importers.

29 Data sourced from the *China Statistical Yearbook*, various years.

30 World Trade Organization (2012), "Director-General's report on trade-related developments (Mid-October 2011 to mid-May 2012), World Trade Organization.

31 "Director-General's report on trade-related developments (Mid-October 2011 to mid-May 2012)", World Trade Organization, 2012.

Intellectual property rights protection

Although China has improved significantly its intellectual property rights (IPR) protection regime over the past decades by beefing up its laws and conducting periodic focused campaigns against major infringers, protection of IPR is still inadequate. The U.S. International Trade Commission (USITC) estimated that in 2009, U.S. intellectual property-intensive companies that conducted business in China lost US$48.2bn in sales, royalties and license fees because of IPR violations[32]. U.S. Customs and Border Protection reported that China accounted for 66% of pirated goods seized by the agency in 2010. There is also a growing trend for counterfeit goods from China to be shipped by mail or courier.

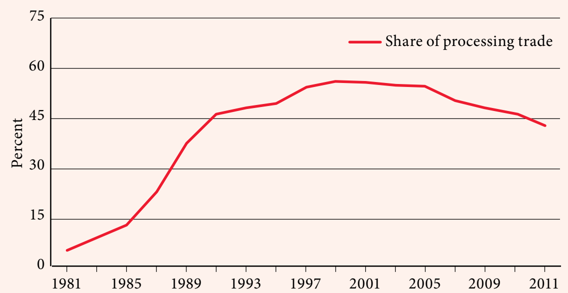
Government procurement

Foreign firms are disadvantaged in their access to China's government procurement market. In June 2009, the Chinese government issued a circular with a "Buy China" provision, requiring that projects funded by the US$586bn stimulus package gave preference to domestic firms. U.S. businesses are concerned that final implementing regulations for the forthcoming Chinese government procurement law will promote the use of domestic content to the disadvantage of products and services from foreign-owned companies.

China committed to the Government Procurement Agreement (GPA) as part of its WTO accession. But its inclusion in the GPA is still under negotiation. Since 2007, China has submitted three offers, but each time economies already part of the GPA have asked it to make improvements so that the terms are comparable to the concessions they made when they acceded to the agreement.

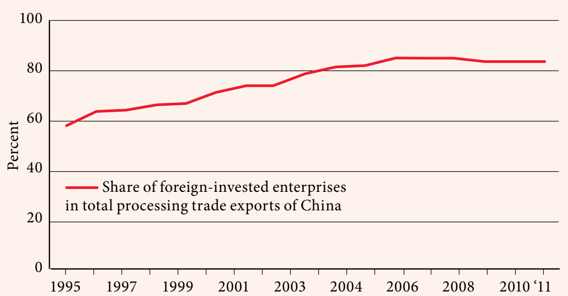
32 See Chapter 14 for more details.

Figure 5: Share of Processing Trade in China's Total Exports, 1981-2011



Source: General Administration of Customs of China

Figure 6: Share of Foreign-invested Enterprises in Total Value of China's Processing Trade Exports, 1995-2011



Source: General Administration of Customs of China

Reasons and perspectives on the U.S.-China trade imbalance

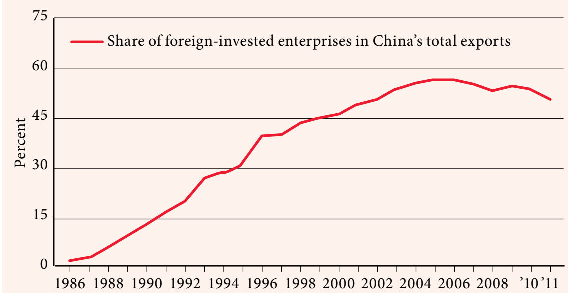
Since China's exports to the U.S. exceed by a wide margin U.S. exports to China, the U.S. trade deficit with China is likely to continue for a long time, even though U.S. exports to China have been increasing faster than Chinese exports to the U.S. in recent years.

From a macroeconomic perspective, the low savings rate and high consumption rate in the U.S. are the fundamental reasons for the growing trade deficit the U.S. has with the rest of the world.

However, to understand better the bilateral U.S.-China trade imbalance, one should take a closer look into China's trading pattern.

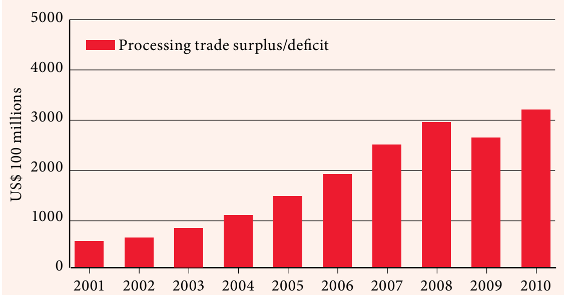
Although the relative importance of processing trade has been decreasing over the past decade, it still accounted for 44% in total exports in 2011 (see Figure 5).

Figure 7: Share of Foreign-invested Enterprises in China's Total Export Value, 1986-2011



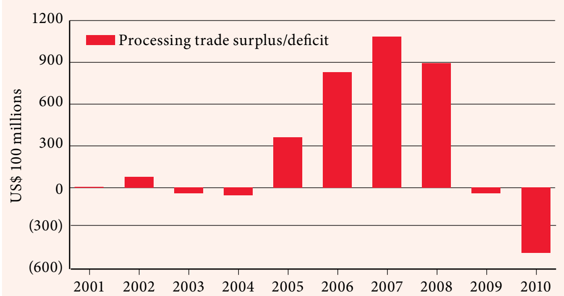
Source: General Administration of Customs of China

Figure 8: China's Balance of Processing Trade, 2001-2010



Source: NBS and China Customs

Figure 9: China's Balance of General Trade, 2001-2010



Source: NBS and China Customs

Foreign-invested enterprises have dominated the export sector, with 52.4% of total export value and 83.7% of the processing trade in 2011 (see Figures 6 and 7).

Processing trade accounts for most of China's trade surplus (see Figure 8).

In the two years since 2009, China has recorded a trade deficit in the general trade sector (see Figure 9).

These facts show that a substantial proportion of China's trade surplus comes from the processing trade surplus that is created by foreign-invested enterprises using China as a base for the assembly of final products.

The growth of China as part of this East Asian and global supply chain has also resulted in a 'transfer' of trade surpluses with the U.S. from other Asian economies to China. Standard gross trade statistics therefore need to be examined in more detail before valid conclusions could be drawn.

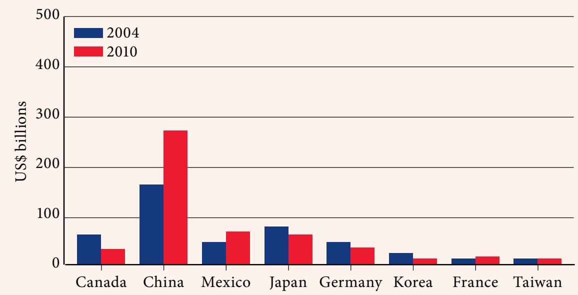
The imposition by the U.S. of controls on high-tech exports to China also helps to explain part of the U.S. trade deficit with China, as indicated by a fall in the U.S.' market share of China's import of high-tech products and a rapidly growing trade deficit the U.S. has with China in high-tech products trade.

China as the final assembler in Asia-wide production networks

The sizable bilateral goods trade deficit that the U.S. has with China has a lot to do with the growing internationalization of production with China as the final assembly point for many products. As companies in Japan, South Korea, Singapore, Taiwan and other neighboring economies and regions have moved production plants to China or expanded their operations in China, products previously made in these countries and exported to the U.S. would be exported from China to the U.S. and classified as made in China. Therefore, a side effect of these developments is the 'transfer' of the trade surpluses these economies have with the U.S. to China.

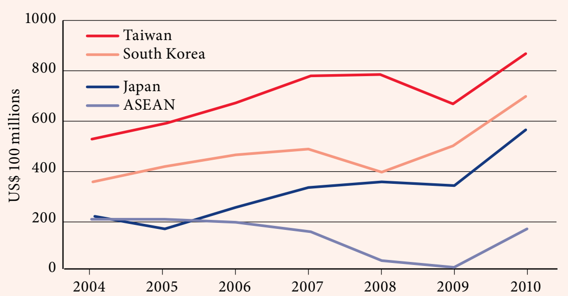
As shown in Figure 10, the trade deficits of the U.S. with South Korea, Japan and Taiwan edged down in recent years. From 2004 to 2010, South Korea's trade surplus with the U.S. decreased from US$19.9bn to US$10.1bn; Japan's dropped from US$75.2bn to US$59.8bn; and Taiwan's went from US$12.9bn to US$9.9bn. These falls occurred as China's trade surplus with the U.S. built up and

Figure 10: Changes in Trade Surplus of Major U.S. Trade Deficit Sources, 2004 and 2010



Source: U.S. Census Bureau

Figure 11: China's Trade Deficit with Neighboring Economies, 2004-2010



Source: General Administration of Customs of China

China's trade deficits with its neighboring economies and regions grew. For example, China's trade deficit with Japan rose from US$20.8bn in 2004 to US$55.7bn in 2010; the deficit with South Korea increased from US$34.4bn to US$69.6bn; and the deficit with Taiwan expanded from the US$51.1bn to US$86.0bn (see Figure 11).

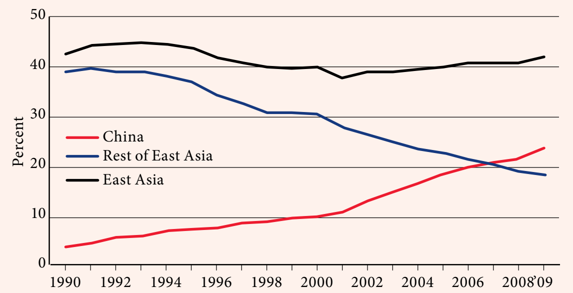
In 2004-10, Asia accounted for about 55% of the total U.S. trade deficit, with this figure relatively stable over the period. But as the production base of many consumer products, China became the major source of the U.S. trade deficit with Asia, with its contribution increasing from 24.85% to 43%. These figures show that the trade surpluses of some Asian economies with the U.S. have been 'transferred' to China.

Another set of data also illustrate the transfer of trade surpluses to China from other East Asian economies. Figure 12 shows that East Asia's share of U.S. manufacturing imports stood at about 40% between 1990 and 2009, during which the share of imports from China increased from 3.51% to 23.72%, while that of the rest of East Asia decreased from 39.18% to 18.72%.

From 1990 to 2009, China's share of total U.S. high-tech imports increased from 1.81% to 28.33%, while its share of medium-high tech imports grew from 1.06% to 13.53%, medium-low tech imports from 1.87% to 15.54%, low-tech imports from 9.37% to 36.86%, and ICT imports from 1.97% to 40.31%. Over the same period, the share of imports by the U.S. from other East Asian economies gradually decreased – from 60.64% to 24.64% for high-tech products, from 37.97% to 22.74% for medium-high tech products, from 21.63% to 11.81% for medium-low tech products, from 33.57% to 10.25% for low tech products, and from 72.34%% to 30.59% for ICT products (see the Appendix to this chapter for more details).

Global sourcing trends have been changing in recent years. Due to rising labor and other costs in China, a growing number of manufacturers in China, particularly those low-value-added, assembly-type manufacturers, have been relocating production plants to lower-cost emerging markets such as Vietnam, Indonesia, Cambodia, Bangladesh and Mexico. Some companies have pursued a "China plus" strategy by setting up factories outside China to test the waters in new markets and diversify their supply chains. These developments suggest that part of China's bilateral trade surplus with the U.S. would likely be shifted to these emerging countries in the coming years.

Figure 12: Contribution of East Asian Economies to U.S. Imports of Manufactured Products



Source: OECD STAN

Gross data may not show China's real gain from its trade with the U.S.

Processing trade, characterized by a relatively small share of domestic added value and high import content, accounts for about half of China's foreign trade. The trade picture would be different if the actual value-added in each country is taken into account, rather than the total imports and exports of goods and services.

A Study by Professor Chen Xikang[33] of the Academy of Mathematics and Systems Science at the Chinese Academy of Sciences found that in 2010 every US$1,000 of U.S. exports to China (including re-exports from Hong Kong) generated an added value of US$880 for the American economy. In comparison, for every US$1,000 of Chinese exports to the U.S. – including re-exports from Hong Kong – the added value was only US$573. The domestic value-added contribution to the U.S. economy of U.S. exports to China was thus about 54% more than that of the added value contribution to the Chinese economy of Chinese exports to the U.S. Moreover, China's trade surplus with the U.S. in 2010 as measured by the value-added approach was US$91.7bn, about 58% less than the US$ 217.9bn based on the gross value of trade.

33 See Chapter 8 for more details.

Who captures the value?

There is little value in high-volume product assembly. The following cases demonstrate the real gain that China realizes from engaging in processing trade.

Mattel Barbie dolls

The U.S. bought 45% of China's total toy exports from 2000 to 2009. For every Barbie doll selling at US$9.90 on the U.S. market, Chinese manufacturers pocketed only US$0.35, while brand owner Mattel took in US$8.0 (information sourced from "Interview with Sheng Guangzu on issues of China's trade surplus and trade balance", China: Xinhua News Agency, 2010).

HP notebook computers

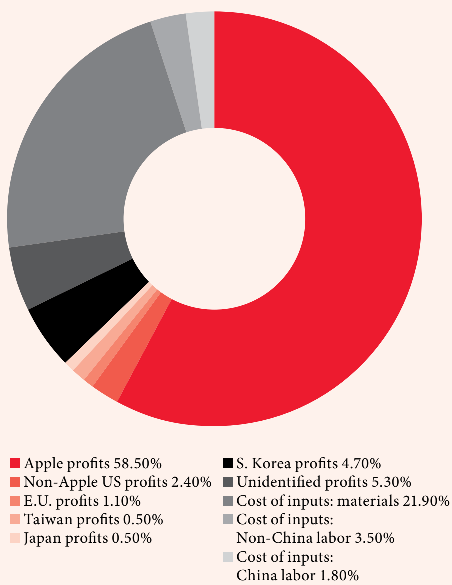
China exported a total of 620 million computer units from 2000 to 2009, of which nearly 30% went to the U.S. In that period, China imported Intel chips and other components from the U.S. valued at US$5.6bn (information sourced from, "Interview with Sheng Guangzu on Issues of China's trade surplus and trade balance", China: Xinhua News Agency, 2010.)

According to Shanghai Customs, HP notebook computers exported to the US from China sold for about US$1,000 each to end users, of which U.S. companies shared US$169.60, while the processing fees of Chinese enterprises were only US$30.30, or 3% of the retail price.

Apple iPhones

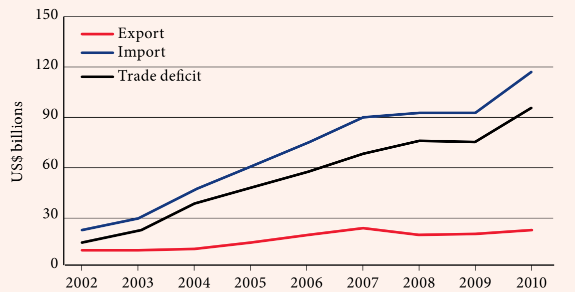
The iPhone is one of Apple's big money makers. U.S. academics Kenneth L. Kraemer, Greg Linden and Jason Dedrick determined that Apple kept about 58% of the retail price of the iPhone 4 – a far bigger share than other firms in the supply chain received (information sourced from, "Capturing Value in Global Networks: Apple's iPad and iPhone", Kenneth L. Kraemer, Greg Linden and Jason Dedrick, University of California, Irvine; University of California, Berkeley; and Syracuse University, July 2011). A 2010 study by the Asian Development Bank Institute showed of the US$2.02bn worth of iPhones exports to the U.S. from China, 96.4% was transferred added value from other economies – Japan (US$670m), Germany (US$326m), South Korea (US$259m), the U.S. (US$108m) and other countries (US$542m). The value added in China was only US$73.45m, or 3.6% of the value of iPhone exports to the U.S. (information sourced from, "How the iPhone Widens the United States Trade Deficit with the People's Republic of China", Xing, Yuqing, and Neal Detert, ADBI Working Paper 257, Tokyo: Asian Development Bank Institute, December 2010)(see Figure 13).

Figure 13: Value Distribution of the iPhone, 2010



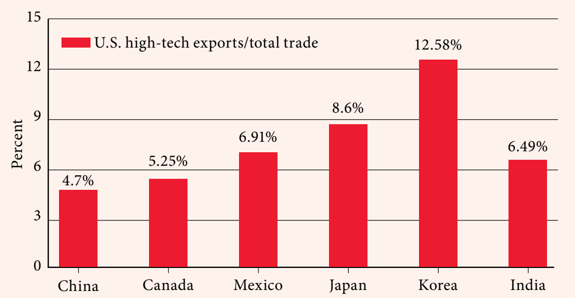
Source: Kenneth L. Kraemer, Greg Linden, and Jason Dedrick, Capturing Value in Global Networks: Apple's iPad and iPhone, University of California, Irvine, University of California, Berkeley and Syracuse University, July 2011.

Figure 14: **U.S. High-Tech Products Trade with China, 2002-2010**



Source: U.S. Census Bureau

Figure 15: **Proportion of U.S. high-tech exports in total bilateral trade volume between the U.S. and the respective countries**



Source:

U.S. controls have severely limited its high-tech exports to China. U.S. high-tech products trade with China has been in deficit since 2002, when the shortfall was US$11.8bn. By 2010, the deficit had risen to US$94.2bn (see Figure 14). In 2003, the U.S. tightened controls on high-tech exports to China, especially software and equipment, and stepped up monitoring of China's nuclear and missile technology development. Four years later, the U.S. Department of Commerce announced fresh limits on the export to China of dual-use products and technologies[34]. These entailed 31 provisions, regulating 20 categories of products that could not be exported to China.

According to Chinese statistics, during 2001 to 2010, China's high-tech imports rose from US$64bn to US$412.7bn, representing an increase of 5.4 times with an average annual growth of 23%. Meanwhile, U.S. high-tech exports to China increased by 150.7%, far below the growth rates of exports from the E.U. (219.6%) and Japan (332.8%). If the U.S. had not imposed controls, its exports to China could have increased significantly more.

The Benefits of Economic Cooperation to the U.S. and China

Over the past 30 years, closer U.S.-China economic ties have not only brought more goods and services, but have created job opportunities and raised living standards for both countries. It has also encouraged exchange of ideas, personnel and technology. These economic benefits are largely attributable to candid dialogue and constructive cooperation between China and the U.S.

Benefits to the U.S.

China has become an important overseas market for many U.S. products

According to the U.S. Department of Commerce (USDOC), China was the 23rd largest market for U.S. exports in 1979. But China has become the third largest goods market since 2007. In 2012, the export of goods from the U.S. to China amounted to US$110.6bn, 64 times that in 1979; China's share of U.S. exports also increased from less than 1% in 1979 to 7.1% in 2012[35].

It is noteworthy that China was on the list of top five export markets of 42 U.S. states and was the biggest export market for Louisiana, Oregon and Washington in 2010[36].

The U.S. exports a wide range of high-tech products such as mechanical and electrical prod-

34 'Dual use' refers to items or technologies that have civilian, commercial and military applications.

35 Data sourced from U.S. Census Bureau.

36 "U.S. Exports to China by State: 2000-2010", The U.S.-China Business Council, 30 March 2011, https://www.uschina.org/public/documents/2011/03/full_state_report.pdf.

Figure 16: Contribution of Chinese market to Total Sales of Majority-owned Foreign Affiliates of U.S. Companies, 1994 -2008

	Sales in China – US$ millions	Share
1994	2,520	78.14%
1995	4,377	81.06%
1996	5,825	67.12%
1997	8,213	67.67%
1998	9,292	63.60%
1999	14,306	70.19%
2000	18,524	70.28%
2001	23,036	70.54%
2002	30,205	73.02%
2003	36,824	75.53%
2004	46,207	74.43%
2005	52,665	67.88%
2006	65,107	67.76%
2007	79,349	70.99%
2008	98,952	75.32%

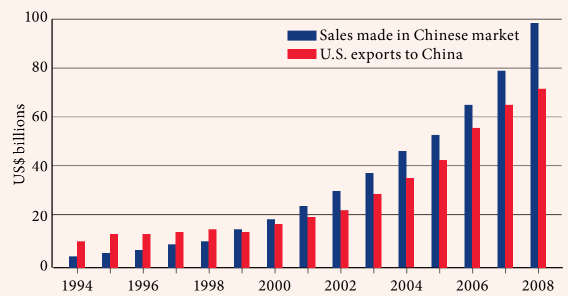
Source: U.S. Bureau of Economic Analysis, U.S. Direct Investment Abroad, 1994-2008

ucts, medical appliances, airplanes and automobiles to China. In 2010, the U.S. exported US$4.5bn worth of automobiles to China, a 134.34% growth over the previous year. (In the same year, total U.S. automobile exports grew by 34.4%.) According to Boeing Company statistics, Boeing airplanes are the mainstream passenger and cargo airplanes in China. By June 2009, among the 1,383 operating civil airplanes, 736 (or 53%) are Boeing planes[37]. In 2010, U.S. airplane exports to China grew by 7.9% from the previous year, reaching US$5.76bn. (In the same year, the total U.S. airplane exports increased by 3.9%.)

U.S. companies yield significant investment returns in China

The U.S. is the third largest foreign investor in China: By the end of 2011, FDI stock from the U.S. to China totaled US$54.2bn, 49.25% of which had been invested in manufacturing, followed by whole-

Figure 17: Sales Revenues Made by Majority-owned Affiliates of U.S. Companies in Chinese Market and Total U.S. Exports to China, 1994 -2008



Source: U.S. Census Bureau

sale trade (8.89%), holding companies (non-bank) (8.94%), information (5.56%), depository institutions (5.49%), mining (5.25%), and finance (except depository institutions) and insurance (4.58%)[38].

U.S. companies generate revenues from the Chinese market through direct investments: According to MOFCOM statistics from the annual joint inspection on foreign investment enterprises (FIEs) in China, U.S.-invested companies in China generated US$310.4bn in sales revenues in 2011, of which US$228.1bn and US$82.3bn came from sales in China and global markets including the U.S., respectively. Since 1994, of the total sales made by foreign affiliates of U.S. companies, 70% are derived from China. And the sales volume in the Chinese market grew from US$2.52bn in 1994 to US$98.95bn in 2008 (see Figure 16). It is also noteworthy that since 1999, sales made by majority-owned Chinese affiliates of U.S. companies have been larger than the volume of U.S. exports to China (Figure 17).

China has also been the profit center for many U.S. businesses: According to MOFCOM statistics from the annual joint inspection on FIEs in China, U.S.-invested companies in China made US$21.1bn in profits in 2011. Despite the global financial crisis, the majority of U.S.-invested companies in China still performed above par, and contributed significantly to profit growth of their parent companies.

37 Information sourced from on 8 September 2011, http://www.boeingchina.com

38 Data sourced from U.S. BEA.

In 2005, repatriated profits of all U.S. affiliates in China amounted to US$3.3bn[39]. According to an estimate, between 1999 and 2009, the operational net profit margin of U.S. direct investment in China was 15%, and if asset appreciation and Chinese currency appreciation factors are considered, the actual profit margin might have been 18%[40].

U.S. companies are actively participating in China's services sectors

The U.S. ran a trade surplus with China in its export of services. The figure grew from US$515m in 1992 to US$15.37bn in 2011[41], representing a 29-fold increase. Statistics from U.S. Bureau of Economic Analysis (BEA) suggest that the value of U.S.-China trade in services was US$38.03bn in 2011; of which, 70% was the U.S.' exports to China.

By the end of 2010, U.S. businesses had set up footholds in most of the 100 services sectors which are marked for liberalization in China. In accounting, banking, insurance, securities and commerce sectors, U.S. service providers are proven to have distinct comparative advantages. According to the statistics of the Chinese Ministry of Justice, as of March 2011, U.S. law firms had set up 101 representative offices in China, accounting for 42.98% of all the representative offices established by foreign law firms. According to the annual joint inspection statistics by MOFCOM, 1,343 U.S. consulting companies made sales revenue of US$2.3bn in China in 2011.

Imports of consumer goods from China have greatly improved the standard of living for Americans

Chinese exports to the U.S. have been of adequate quality and low cost, which have helped to keep the rate of inflation low in the U.S.

Imports of 'Made-in-China' products have also improved the living standard for Americans. Among the Chinese exports to the U.S. market, about 75% are consumer products like garments and footwear, toys, bags and cases, and electronic and electrical products.

To take footwear as an example, according to the U.S. customs, the U.S. imported US$15.07bn worth of footwear products from China in 2010, accounting for 76% of the total U.S. footwear imports (or equivalent to 87% of the total 2.07 billion pairs of footwear). The average price of a pair of imported shoes from China was US$7.57 which was lower than the imported price from other regions by US$7.99. It is estimated that the U.S. consumers saved US$16.55bn in 2010 by importing footwear products from China[42].

Division of labor between China and the U.S. benefits workers on both sides

The article "China makes, the world takes" by James Fallow illustrated that Chinese workers making US$1,000 a year have been helping American designers, marketers, engineers and retailers make US$1,000 a week (and up) to earn even more. Plus, they have helped shareholders of U.S.-based companies[43].

Another article[44] published by the Federal Reserve Bank of San Francisco found that goods and services from China accounted for only 2.7% of U.S. personal consumption expenditures in 2010; of which, less than half reflected the actual costs of Chinese imports. The rest went to U.S. businesses and workers transporting, selling and marketing goods carrying the 'Made in China' label.

Trade with China has also brought significant job opportunities in the U.S. In April 2010, the International Trade Administration and the

39 "The China Effect: Assessing the Impact on the US Economy of Trade and Investment with China", Erik Britton, Christopher T. Mark, Sr. a report by Oxford Economics and the Signal Group, January 2006.

40 "Why the financial restructuring is needed", Pan Yingli, *Jie Fang Daily*, 14 November 2010, Column 8 (潘英丽，《为何需要加快金融转型》，《解放日报》2010年11月14日第八版).

41 Data sourced from U.S. BEA.

42 Data sourced from USITC.

43 "China makes, the world takes", James Fallow, *The Atlantic*, July-August 2007, pp.19.

44 "The U.S. Content of 'Made in China'", Galina Hale and Bart Hobijn, *FRBSF Economic Letter*, 8 August 2011, http://www.frbsf.org/publications/economics/letter/2011/el2011-25.html

Figure 18: **Jobs in the U.S. Supported by Exports of Goods and Services to China, 1993-2008**

	Jobs generated by goods exports to China (thousand jobs/person)	Jobs generated by services exports (thousand jobs/person)	Total (thousand jobs/person)
1993	112.2	16.1	128.4
1994	114.0	17.0	131.0
1995	139.3	20.4	159.7
1996	135.4	24.6	160.1
1997	138.3	27.6	165.9
1998	149.0	30.1	179.1
1999	130.3	28.7	159.0
2000	150.5	34.9	185.4
2001	173.8	38.4	212.2
2002	187.4	40.2	227.6
2003	222.7	37.8	260.5
2004	250.2	45.6	295.8
2005	280.0	51.4	331.4
2006	350.1	62.1	412.2
2007	388.3	72.4	460.7
2008	413.6	80.4	494.0

Source: Calculations based on International Trade Administration, Economic and Statistics Administration of the USDOC, Exports Support American Jobs, *2010*

Economic and Statistics Administration of the USDOC released the report "Exports Support American Jobs", which examines the relationship between U.S. exports and the jobs they support for the period 1993 to 2008. Based on the number of export-driven employment and the percentage of export to China in the overall trade volume, U.S. exports to China supported 128,400 jobs in the U.S. in 1993, 112,200 and 16,100 of which are generated by goods trade and service trade, respectively. In 2008, exports to China helped create 494,000 jobs in the U.S., and goods trade and services trade generated 413,600 and 80,400 jobs respectively (see Figure 18).

An analysis by Professor Chen Xikang and his team found that for every US$1bn of U.S. exports of goods and services to China in 2010, 6,400 person-years in non-farm employment were generated in the U.S. Since U.S. exports to China amounted to US$114.5bn in 2010, this implies that an estimated 732,800 jobs were generated.

Many bemoaned the loss of American jobs to China. Indeed, statistics from the Bureau of Labor Statistics (BLS) show that since 2004, there have been 5,000 to 16,000 job losses in the U.S. per annum, accounting for 0.4-1.6% of the total layoffs. Of the total number of losses, within-company relocations account for 66%-93%[45] (see Figure 19). Even if all these relocations had gone to China, the impact is so small that it should not be a key factor affecting the big picture of the U.S.-China economic relations.

Benefits to China

The U.S. plays an important role in China's GDP and export growth

During the past few decades, China has gained significant benefits through access to the U.S. market, investment and technology. Helped by the continu-

45 Movement of work actions by type of separation where number of separations is known by employers, 2004 through 2008, 2009 and 2010, http://www.bls.gov/mls/

Figure 19: **Job Losses in the U.S. due to Work Transferred Overseas, 2004-2010**

	Number of out-of-country relocations				Total losses from the U.S.	Percentage of out-of-country relocations in the overall employment
	Total number of losses	Within company relocations	Losses to other companies	Percentage of within-company relocations in the total number of losses		
2004	16,197	12,905	3,292	79.68%	993,909	1.63%
2005	12,030	9,438	2,592	78.45%	884,661	1.36%
2006	13,367	11,776	1,591	88.10%	935,969	1.43%
2007	11,856	9,887	1,969	83.39%	965,935	1.23%
2008	11,431	10,392	1,039	90.91%	1,516,978	0.75%
2009	10,378	9,630	748	92.79%	2,108,202	0.49%
2010	5,336	3,548	1,788	66.49%	1,257,134	0.42%
1st Half 2011	3,325	3,042	283	91.49%	486,482	0.68%

Source: Movement of work actions by type of separation where number of separations is known by employers, 2004 through 2008, 2009 and 2010; Extended mass layoff events and separations, selected measures, 2004-2011.

ously expanding economic and trade cooperation with the U.S., China has been able to overcome the bottlenecks of market, resources and technology, and improve its economy in terms of size, structure and quality, and begin the process of its modernization.

Since the early 1990s, China has maintained an average annual economic rate of growth of nearly 10%, mainly due to its adherence to an open trade and investment regime. As an export-oriented economy, exports has played an important role in China's economic growth, accounting for over 40% of China's GDP, and contributed over 20% to its growth. As China's largest export market, the U.S. accounted for about 20% of China's total export for many years. The U.S. is also the biggest source of China's trade surplus.

Exports to the U.S. support employment at home

In the past 30 years, the composition of China's exports has witnessed a continuous process of upgrading. In the earlier years, primary products and low-technology, labor-intensive, light-manufactured products accounted for a dominant share of Chinese exports to the U.S. In recent years, mechanical and electrical products have gradually dominated China's exports to the U.S.

Exports to the U.S. have helped create employment. It has been estimated by Chen Xikang and his team that every US$1bn of Chinese exports of goods and services to the U.S. in 2010, created employment of 38,930 person-years in non-agricultural employment in China. Since Chinese exports to the U.S. amounted to US$293.2bn in 2010, this means that an estimated 11.4 million person-years of employment was generated, equivalent to 2.4% of total Chinese non-agricultural employment. Besides, the contribution to Chinese GDP (value-added) from majority-owned Chinese affiliates of U.S. companies has increased from US$678m in 1994 to US$27.3bn in 2008.

In 2011, U.S.-funded enterprises paid a total tax of US$21.7bn, employed 2.19 million workers including 26,100 expatriates, with 290,000 of them newly added that year[46].

U.S.-China economic cooperation contributes to China's industrial upgrading and modernization

By the end of 2010, U.S. companies have cumulatively set up over 250 R&D centers in China. The R&D expenditures by majority-owned Chinese affiliates of U.S. companies have grown from US$7m in 1994 to US$1,517m in 2008. (see Figure 20) U.S. direct investments in China have helped China to accelerate its industrial restructuring and upgrading process, and

46 Sourced from MOFCOM statistics from the annual joint inspection on FIEs in China.

Figure 20: Contribution of the Majority-owned China Affiliates of U.S. Companies to China's GDP and Employment, 1994-2008

	Added value in GDP US$ millions	R&D expenditure US$ millions	Number of newly employed Thousand persons
1994	678	7	62.4
1995	1,092	13	80.9
1996	2,073	25	101.4
1997	3,194	35	138.4
1998	3,004	52	175.5
1999	3,945	319	252.4
2000	5,495	506	252.0
2001	5,995	(D)	273.0
2002	7,631	645	316.7
2003	8,747	565	338.9
2004	12,529	575	459.9
2005	16,221	668	521.8
2006	18,489	759	591.5
2007	21,438	1,173	676.2
2008	27,296	1,517	774.2

Source: U.S. Bureau of Economic Analysis; U.S. Direct Investment Abroad, 1994-2008

have contributed to China's technological advancement. They have also helped Chinese enterprises to enhance management skills, learn from the international markets and broaden the global scope[47].

Prospects for Cooperation in the Next Decade: Further Trade Growth Opportunities and a Gradual Fall in the Trade Imbalance

Given the momentum built up in China's modernization process, China's economy is expected to continue growing at a rapid rate in the next decade and beyond, with urbanization, industrial upgrading, and consumer demand growth continuing to be major growth drivers. Meanwhile, while the U.S. economy is going through a difficult process of adjustment to the after effects of the financial crisis of 2007-2008 and the need to manage public sector deficits, prospects for the U.S. economy continue to be promising, given the strong innovative and technological capabilities of the American economy. Looking forward into the next decade, the further growth of the U.S. and Chinese economies will create a lot of opportunities for the two countries to develop further their economic cooperation, to deepen engagement, and to benefit from this mutually interdependent relationship.

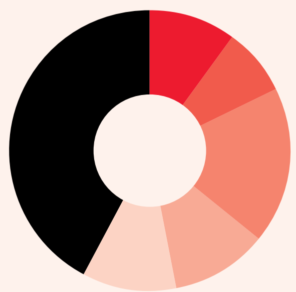
Promotion of imports and domestic consumption under China's 12th Five-Year Plan, and the U.S. National Export Initiative to double exports by the end of 2014 will both help promote bilateral trade and improve the trade imbalance. Both countries should seek common ground for trade cooperation to achieve a more balanced trade in the next decade.

Promotion of China's imports and domestic consumption

China's 12th Five-Year Plan states that domestic consumption will be a key driver of growth in the

47 See Chapter 13 for more details.

Figure 21: **Projected Share of U.S. Nominal Export Growth, 2009-2014**



Source: "Investigation Report of Households' Financial Assets", Investigation and Research Center of China's Household's Financial Assets, Southwest University of Finance and Economics, China.

future. This will be achieved by promoting urbanization, steadily reforming the income distribution system, improving the social security system and creating a favorable consumption environment. By 2015, China plans to increase the total retail sales of consumer goods to RMB32tr with an annual average growth of 15%.

China will also gradually change the focus of its trade policy from export orientation of the past 10 years to consolidating exports and promoting imports to achieve a more balanced trade. China aims to increase the size of its imports, with aggregate imports reaching US$10tr or more in five years. China also plans to double its merchandise imports from the U.S. by 2015, increasing the value to US$200bn, up from US$122.1bn in 2011. Boosting imports will entail developing a more open market for a range of consumer goods. Based on current trends, China will overtake the U.S. to be the world's largest importer by 2020.

Doubling U.S. exports and re-industrialization

In January 2010, President Obama set out the National Export Initiative, a plan to double U.S. exports to US$3tr by 2014, which implies an average annual growth rate of 15%. Besides setting up an 'export promotion cabinet' to involve all important economic sectors in the campaign, the U.S. government devised an action plan to achieve the goal.

According to the "2011 Economic Report of the President", from 2010 to 2014, Canada, the E.U. and other key U.S. trading partners would play significant roles in the initiative. While about 10% of export growth would come from the E.U. and 8% from Canada, more than 70% would be generated by trade with China, Mexico, Brazil and other emerging and developing countries and regions. China's share of export growth would reach 18%, far higher than that of any other economy (see Figure 21).

Implementation of the National Export Initiative and the 're-industrialization plan' to revitalize U.S. manufacturing, together with other moves such as the gradual relaxation of high-tech export controls, will not only help reduce the U.S. trade deficit but will also create jobs for Americans.

Return of manufacturing to the U.S.

A report by the Boston Consulting Group (BCG) published in 2012 finds that the U.S. could gain two to three million jobs and an estimated US$100bn in output as seven industry clusters, i.e. transportation goods, electrical equipment/appliances, furniture, plastics and rubber products, machinery, fabricated metal products and computers/electronics shift production back from China to the U.S. in the next five years. The seven sectors account for about US$2tr in U.S. consumption per year and about 70% of U.S. imports from China, valued at nearly US$200bn in 2009. The job gains would come directly through added factory work and indirectly through supporting services, such as construction, transportation and retail[48].

This BCG report also predicts that, within five years, the total cost of production for many products will be only about 10% to 15% less in Chinese coastal cities than in some parts of the U.S. where factories are likely to be built. Factor in shipping, inventory costs and other considerations, and the

48 "US Manufacturing Nears the Tipping Point: Which Industries, Why, and How Much?", Harold L. Sirkin, Michael Zinser, Douglas Hohner, Justin Rose, The Boston Consulting Group, 2012.

Figure 22: Export Control Reform Initiative

Phase	Control list	Licensing	Enforcement	IT
I	Refine, understand, harmonize definitions to end jurisdictional confusion between two lists; establish new control criteria.	Implement regulatory-based improvements to streamline licensing.	Synchronize and de-conflict enforcement; create Enforcement Fusion Center.	Determine enterprise-wise needs.
II (Requires congressional notification; requires additional funding.)	Restructure two lists into identical tiered structures; apply criteria; remove unilateral control while appropriate; submit proposal multilaterally to add/ remove controls.	Complete transition to mirrored control list; fully implement licensing harmonization.	Expand outreach and compliance.	Transition toward a single electronic licensing system.
III (Requires legislation)	Merge two lists into a single list; implement process for updating list.	Implement single licensing agency.	Consolidate enforcement activities under one agency.	Implement a single system for licensing and enforcement.

Source: Ian F. Fergusson, Paul K.Kerr, "The US Export Control System and the President's Reform Initiative", Washington D.C.: Congressional Research Service, 2012.

cost gap between sourcing from China and manufacturing in the U.S. will be minimal. Certain U.S. states, such as South Carolina, Alabama and Tennessee, will turn out to be among the least expensive production sites in the industrialized world. As a result, the BCG report expects companies to begin building more capacity in the U.S. The early evidence of such a shift is mounting[49]:

- The Coleman Company is moving production of its 16 quart wheeled plastic cooler from China to Wichita, Kansas, owing to rising Chinese manufacturing and shipping costs.
- Ford Motor Company is bringing up to 2,000 jobs back to the U.S. in the wake of a favorable agreement with the United Auto Workers that allows the company to hire new workers at US$14 per hour.
- Sleek Audio has moved production of its high-end headphones from Chinese suppliers to its plant in Manatee County, Florida.

U.S. export control reform

After President Obama called for a broad review of the U.S. export control system in August 2009, the U.S. launched the Export Control Reform (ECR) Initiative (see Figure 22), which is to change fundamentally the export control system in three phases. The goal is to achieve four 'singularities' – a single licensing agency, a single control list, a single enforcement structure and a single information technology system. The changes should reduce significantly restrictions on technology transfers, limiting them only to technologies that have a clear impact on national security and are not readily available elsewhere.

In the fourth round of the U.S.-China SED in May 2012, the U.S. agreed to "facilitate the export of civilian high-tech exports for civilian end-users and civilian end-uses" and to "process, in a timely manner, specific requests for items for civilian end-users and civilian end-uses that China wishes to procure that may be subject to export controls, once the United States receives all necessary information required under the Export Administration Regulations"[50] (see Figure 23).

China's tariff cuts

According to the "2011 Report to Congress on China's WTO Compliance" published by the U.S. Trade Representative, China has implemented its tariff commitments for industrial goods on time each year. During its bilateral negotiations with in-

49 "Made in America, Again- Why Manufacturing Will Return to the US", Harold L. Sirkin, Michael Zinser, Douglas Hohner, The Boston Consulting Group, 2011.

50 U.S. Department of the Treasury, Fourth Meeting of the U.S.-China Strategic and Economic Dialogue, Joint U.S.-China Economic Track Fact Sheet, http://www.treasury.gov/press-center/press-releases/Pages/tg1567.aspx (5 April 2012).

Figure 23: **Results of the Fourth Meeting of the U.S.-China Strategic and Economic Dialogue**

Enhancing macroeconomic cooperation	Foster a durable global recovery, and establish a strong, sustainable and balanced future global growth. The U.S. plans to move toward a pattern of growth that features increased levels of investment, exports, and gross saving rate. China plans to transform its economic development pattern, improving the livelihood of its people and expanding domestic demand primarily by increasing consumption. Import tariffs will be reduced. Both plan to move towards more market-determined exchange rate systems and enhance exchange rate flexibility
Promoting open trade and investment	Foster open, fair and transparent investment environments to their domestic economies and to the global economy. Building a more open global trade system and jointly resisting trade protectionism. Strengthen law enforcement against IPR infringement.
International rules and global economic governance	To establish an international working group of major providers of export financing to create a set of guidelines on the official export financing that are consistent with international best practices. Strengthen information exchange of regional free trade agreements. Deepen the study of bilateral trade methodology.

Source: U.S. Department of the Treasury, Fourth Meeting of the U.S.-China Strategic and Economic Dialogue, Joint U.S.-China Economic Track Fact Sheet, 5 April 2012.

terested WTO members leading up to its accession, China agreed to increase market access for U.S. and other foreign companies by reducing tariff rates on industrial goods from 2002 through 2010. On the first day of each year, China implemented its scheduled tariff reductions as required. Indeed, since its WTO accession, China has reduced tariffs on goods of the greatest importance to U.S. industry from a base average of 25% to approximately 7%, significantly increasing market access for U.S. exporters in a range of industries[51].

China has implemented several rounds of tariff cuts in 2012. In January, it reduced the interim import tariff rates on some 730 products, including energy and raw materials, high-tech manufacturing equipment, inputs for agricultural production, food and public health products. In April, China further reduced tariffs on such products as slitting blades for paper cutting machines (from 8% to 3%) and objective lenses (from 15% to 10%). In the Fourth Meeting of the U.S.-China SED, China committed to another round of import tariff cuts on a series of consumer goods before the end of 2012.

Recommendations for promoting bilateral trade

The U.S. and China recognize that achieving a more balanced trade relationship can advance economic growth in both countries, positively impact global economic stability and promote international security. Listed below are the recommendations to promote bilateral trade in the next decade:

1. With the participation of chambers of commerce in the U.S. and China, both countries should establish information-sharing and early-warning mechanisms in areas of anti-dumping, countervailing and other trade issues to prevent decision-making errors.
2. The U.S. and Chinese governments should agree to an expedited process for the adjudication of their disputes at the WTO. A speedy resolution of these disputes can prevent a problem from festering and spreading over to other unrelated areas and also reduce the risks of either country engaging in purely 'tit-for-tat' type retaliatory behavior.
3. The increasing complementarity between FDI and trade has resulted from the growing fragmentation of production and the globalization of distribution networks. Both sides should establish a bilateral investment committee to promote investments in manufacturing and service sectors, and regularly exchange views on U.S.-China investment laws and policies.
4. The expansion of high-tech exports to China is a key initiative to ease part of the U.S.-China trade imbalance. Both sides should promote bilateral trade in high-tech products, and the U.S. should consider streamlining further its export control processes.

51 "2011 Report to Congress on China's WTO Compliance", USTR, December 2011, p. 28.

5 Both sides should organize trade fairs particularly for SMEs to promote U.S. exports to China and foster the establishment of state-to-province and city-to-city partnerships. The China Import and Export Fair – the Canton Trade Fair, the world's largest manufacturing goods fair – plays an important role in promoting exports from China. There is room for a similar trade fair to take place in the U.S. – in a city such as San Francisco – with the aim of helping SMEs to sell products to China.

6 Both sides should jointly prevent the politicization of trade issues. Disputes should be addressed in a timely manner through communication to avoid escalation, thus leading to unnecessary and harmful consequences. Think tank scholars should establish a specialized research group to carry out collaborative studies and other projects so that both sides have a holistic picture of trade issues of common concern.

7 Nearly 150 countries have recognized China's market economy status (MES). But major developed economies such as the U.S., E.U. and Japan have not done so due to political, diplomatic and even ideological reasons. China should also play its part in expediting its market-oriented reforms to gain MES recognition from these economies[52].

8 The Doha Round of multilateral trade negotiations under the WTO has been going on since 2001, but there is still no sign that a conclusion is near. The impasse is due to the fundamental differences in the positions of key members including the U.S., E.U., China, Brazil and other major trading economies. The U.S. and China should work together to achieve a breakthrough so that a conclusion to the Doha Round could be achieved. This would promote multilateralism in global trade negotiations and reinforce the free trade momentum globally.

In the absence of progress on the multilateral Doha Round of trade negotiations, countries have turned to smaller and more focused deals. For example, the bilateral free-trade agreement (FTA) between the U.S. and South Korea took effect in March 2012. The U.S. is in negotiations of a regional, Asia-Pacific trade agreement, known as the Trans-Pacific Partnership (TPP) Agreement with the objective of shaping a broad-based regional pact[53]. Japan, China and South Korea also plan to open negotiations for a trilateral FTA by 2012.

The U.S. and China could study the feasibility of establishing an FTA. The China Center for International Economic Exchanges estimated that if China and the U.S. had already established an FTA and hence reduced their tariffs by 10%, China's economy would have increased by 3.93% in 2011 while the U.S. economy would have risen by 0.45%[54]. U.S.-China FTA will further facilitate and liberalize trade and investment between the two countries and more importantly, send a strong message of confidence to the world market.

Conclusion

While some economic indicators show that the global economy is stabilizing, the debt problem in the euro zone alluded to the risks still remaining in the global financial system. The austerity policies of many governments have resulted in high unemployment in many developed economies. The 'quantitative easing' policies of more and more central banks around the world have raised concerns about the uncertainties these policies may have on exchange rates with some countries expressing concerns about their export competitiveness. The

52 According to WTO rules, China will acquire MES 15 years after entering the organization. China joined the WTO in 2001, which means it should receive this recognition by 2016 at the latest. Due to China's failure to achieve MES, Chinese products are calculated based on the market prices of a substitute country – often with much higher production costs than China – as the benchmark instead of its real costs, making Chinese companies vulnerable to anti-dumping and anti-subsidy investigations.

53 "Bilateral trade deals are moving ahead", EIU Global Forecasting Service, The Economist, 2012.

54 "FTA process will take time", Wei Jianguo, China Center for International Economic Exchanges, 2012.

impact of such unconventional monetary policies has also aroused concerns from many emerging economies about the impact of global capital flows on asset bubbles and inflation. Trade protectionism, capital flow control restrictions and other administrative measures to deal with the uncertainties of such a new economic and policy environment remain global threats. In addition, the implementation of Basel III could have an adverse impact on both the pricing and supply of trade finance. The road to full global economic recovery is replete with challenges.

Thanks to the collaboration of the American and Chinese governments, business communities, and other stakeholders in both countries, the bilateral trade relationship has made positive strides over the past three decades. On a bumpy road to recovery, more work needs to be done to develop fully commercial ties and tackle unresolved issues in order to bring greater mutual benefit to companies, employees and consumers.

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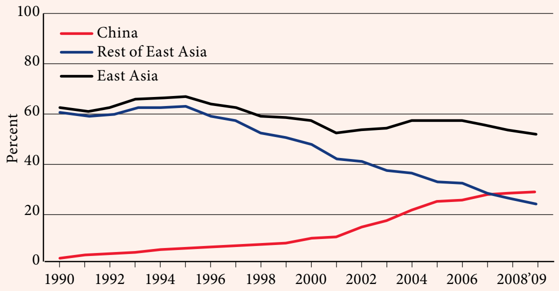
Appendix

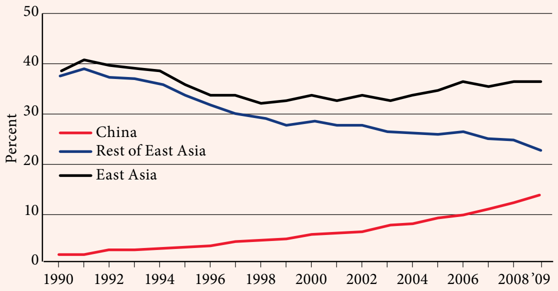
Figure 1A: Contribution of East Asian Economies to U.S. Imports of High-Technology Manufactured Products, 1990-2009



Notes:
East Asia refers to China, Japan, South Korea, Singapore, Taiwan, Hong Kong, Malaysia, Thailand, Philippines and Indonesia. Rest of East Asia is defined as East Asia less China.
According to the International Standard Industrial Classification (ISIC) of All Economic Activities, Revision 3, high-technology manufactured products comprise pharmaceuticals, office, accounting and computing machinery, radio, television and communication equipment, medical, precision and optical instruments, and aircraft and spacecraft.

Source: OECD STAN

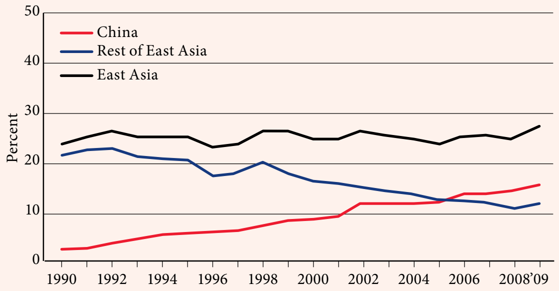
Figure 2A: Contribution of East Asian Economies to U.S. Imports of Medium-High Technology Manufactured Products, 1990-2008



Notes:
East Asia refers to China, Japan, South Korea, Singapore, Taiwan, Hong Kong, Malaysia, Thailand, Philippines and Indonesia. Rest of East Asia is defined as East Asia less China.
According to the International Standard Industrial Classification (ISIC) of All Economic Activities, Revision 3., medium-high technology manufactured products comprise chemicals and chemical products less pharmaceuticals, machinery and equipment, electrical machinery and apparatus, motor vehicles, trailers and semi-trailers, railroad equipment and transport equipment N.E.C.

Source: OECD STAN

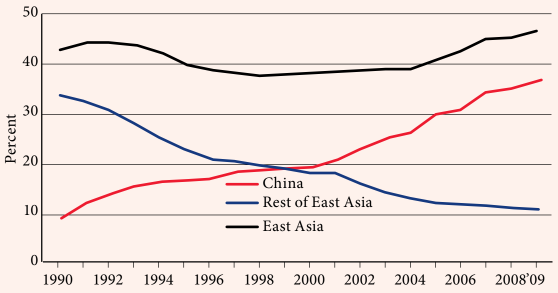
Figure 3A: Contribution of East Asian Economies to U.S. Imports of Medium-Low Technology Manufactured Products



Notes:
East Asia refers to China, Japan, South Korea, Singapore, Taiwan, Hong Kong, Malaysia, Thailand, Philippines and Indonesia. Rest of East Asia is defined as East Asia less China.
According to the International Standard Industrial Classification (ISIC) of All Economic Activities, Revision 3., medium-low technology manufactured products comprise coke, refined petroleum products and nuclear fuel, rubber and plastics products, other non-metallic mineral products, basic metals and fabricated metal products, building and repairing of ships and boats.

Source: OECD STAN

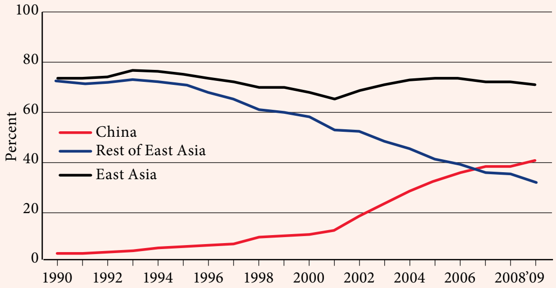
Figure 4A: Contribution of East Asian Economies to U.S. Imports of Low-Technology Manufactured Products



Notes:
East Asia refers to China, Japan, South Korea, Singapore, Taiwan, Hong Kong, Malaysia, Thailand, Philippines and Indonesia. Rest of East Asia is defined as East Asia less China.
According to the International Standard Industrial Classification (ISIC) of All Economic Activities, Revision 3., low technology manufactured products comprise food products, beverages and tobacco, textiles, textile products, leather and footwear, wood and products of wood and cork, pulp, paper, paper products, printing and publishing, manufacturing N.E.C. and recycling.

Source: OECD STAN

Figure 5A: **Contribution of East Asian Economies to U.S. Imports of ICT Products**



Notes:
East Asia refers to China, Japan, South Korea, Singapore, Taiwan, Hong Kong, Malaysia, Thailand, Philippines and Indonesia. Rest of East Asia is defined as East Asia less China.

Source: OECD STAN

Chapter 2

Evolving Economic Complementarity between the U.S. and China

Professor Lawrence J. Lau
Ralph and Claire Landau Professor of Economics, The Chinese University of Hong Kong
Kwoh-Ting Li Professor in Economic Development, Emeritus, Stanford University

ZHANG Yongjun
Research Fellow and Deputy Director General, Department of Economic Research at China Center for International Economic Exchanges (CCIEE)

With contributions by ZENG Shaojun (Associate Research Fellow, Department of Strategic Research at CCIEE)

Executive Summary

Comparative advantages arising from the huge differences in the stage of development, resources, labor force, capital and science and technology form the foundation and strong complementarity in the economic cooperation between the U.S. and China. The shortage of some vital natural resources such as energy and water to satisfy China's development needs, in particular, offers a lot of win-win cooperation opportunities for both countries. Leveraging U.S. technology to deal with China's many development problems will not only offer business opportunities for U.S. companies, but also help China to develop in a more sustainable manner, while helping to mitigate many of the global issues the world faces as a whole.

As China develops and as China invests heavily in physical and human capital over the years, there is a gradual change in the pattern of comparative advantage between the U.S. and China. The development experiences of many Asian economies such as Japan, South Korea and Taiwan show that comparative advantage is not determined by factor endowments alone as orthodox textbook theories suggest, but could be acquired over a period of time. China is set to repeat such experiences and evolve from primarily a low-cost, labor-intensive, assembly-type manufacturer to an economy possessing a diverse range of competitive advantages.

However, the potential for U.S.-China economic cooperation will not be reduced, even as China modernizes. For example, as income of the Chinese consumers grows, China is becoming an increasingly important market. Given the substantial scale of the U.S. and Chinese economies, the strong ability of the U.S. economy to re-invent itself from time to time, and the rapid rate of development in the Chinese economy, it could be envisaged that the room for further growth in trade and economic cooperation between the U.S. and China – both in scale and in complexity – remain substantial going forward.

Economic cooperation between the U.S. and China is not confined to the bilateral relations of the two countries. In an increasingly networked world, U.S.-China economic cooperation is an important part of a global supply chain of goods and services, an inter-connected global flow of investments, and a network of exchanges in technology, human resources, and business opportunities. China has been a crucial link between Asia and the U.S. in the supply chain of many goods. Looking forward, as the emerging economies become increasingly important markets, there are also ample opportunities for U.S.-China cooperation in third markets, given the technical superiority of the U.S. and the practical experience China has of the development world's needs. U.S.-China economic cooperation is important, not only for the two countries concerned, but also for the world, both in terms of economic growth and development, as well as in dealing with challenges confronting the world as a whole such as environmental sustainability, climate change and global governance.

China has a much higher savings rate than the U.S. because of its relatively less-developed economy and younger population. Even after a high domestic investment rate, China still runs a net saving-investment surplus. This contrasts with a low savings rate and persistent current account deficits in the U.S. in the past two decades. However, U.S. direct investment flows to China far exceeded Chinese direct investment flows to the U.S. in the past, due to a much higher level of technological and managerial expertise, and the much stronger global market reach capabilities of U.S. companies than the Chinese ones. But Chinese official portfolio investments in the U.S. over the years are huge as reflected in the large amount of U.S. treasuries held by China. As China's economy continues to develop, Chinese direct investment flows to the U.S. have been rising rapidly in recent years. In the long term, however, as the Chinese population ages, China's savings rate will fall. As the U.S. and China are the two biggest economies in the world, the savings and investments flows of the two countries reflect the very different and rapidly evolving economic, social and demographic realities of the two countries. Such investment flows have also significant implications for each other as well as on global financial market developments. There is ample room for cooperation in promoting an efficient allocation of the savings and investments of both countries.

The U.S. has been and still is a large market. But developments in recent years show that the U.S. economy needs to re-balance from over-consumption and current account deficits to growing its exports. China has developed into a manufacturing export powerhouse – the 'world's factory'– but is rapidly becoming the 'world's market' as it also needs to reform its economy further to rely more on domestic demand rather than exports as an economic growth driver. The U.S. and China therefore need each other to facilitate their economic reform and restructuring efforts. It is important to realize that policies and thinking applicable in the past in U.S.-China economic cooperation will require a fundamental and forward-looking review.

While the U.S. and Chinese economies are the two largest in the world in terms of gross domestic product (GDP) and in international trade, they are vastly different in many respects. The U.S. is technologically the most advanced nation in the world and China is the largest emerging nation in the world.

Evolving Economic Complementarity between the U.S. and China

The U.S. and China have clear comparative advantages because of different factor intensities and a big gap in the level of development

Geographically, the U.S. and China are comparable in total land area – the U.S. covers 9.827 million square kilometers in area, 1.2% larger than China's 9.707 million square kilometers. But China has a population of 1.34 billion, 4.3 times that of the population of the U.S. of 313.9 million. In 2012, the working-age population in the U.S. was 209 million while China had 1,004 million, close to five times that of the U.S. China's arable land area amounts to 122 million hectares, accounting for about 12.7% of its total land area. In the U.S., arable land amounts to 163 million hectares, or 33% higher than that in China, and accounts for about 20% of the total land area in the U.S.

Because of a big gap in the level of development, the tangible capital per working age population of the U.S., estimated at around US$111,430 (at 2011 prices), is 6.2 times that of China's US$18,020. This

Figure 1: Comparison of Factor Endowments: Capital, Labor, Land, Human and Research-and-Development Capital

	China			U.S.		
	2010	2011	2012	2010	2011	2012
Tangible capital stock (US$ billions)(at 2011 prices)	14,256	16,136	18,093	23,435	23,322	23,289
Working-age population (million persons)	999	1,003	1,004	207	208	209
Employment (million persons)	761	764		139	140	
Area of arable land (million hectares)	122	122	122	163	163	163
Graduates of tertiary institutions (thousands)	5,754	6,082		2,998		
R&D capital stock (US$ billions)(at 2010 prices)	382	450		3,251	3,334	
Number of U.S. patents granted (units)	2,657	3,174	4,637	107,792	108,626	121,026

Capital flows are from NBSC and IFS database. Capital stocks are estimated by Prof Lawrence J Lau.
CN: Chinese Statistical Yearbook 2012 Table3-3; 2012 data from annual statistical report. U.S. data: WDI

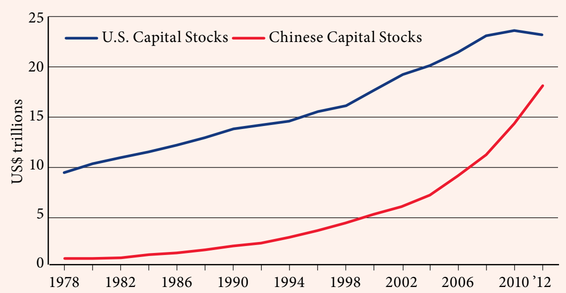
CN: Data from 2008 census; U.S. from WDI, published in 2009 only
Census data from China and the .U.S
Data on R&D expenditure: From OECD statistics; R&D stocks are estimated by Prof Lawrence J. Lau.
Data from http://www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_utl.htm

Figure 2: A Comparison of Factor Proportions between the U.S. and China

	China			U.S.		
	2010	2011	2012	2010	2011	2012
Tangible capital per working-age population (US$ thousands)(at 2011 prices)	14.265	16.090	18.020	113.407	112.322	111.430
Arable land per workingage population (hectares)	0.0012	0.0012	0.0012	0.0079	0.0078	0.0078
R&D capital stock per working-age population (US$billions)(at 2010 prices)	382	449		15,731	16,058	
U.S. patents granted annually per thousand working-age population	0.0027	0.0032	0.0046	0.5216	0.5232	0.5791

Calculated from data in Figure 1 above

Figure 3: Chinese and U.S. Tangible Capital Stocks (at 2011 prices), 1978-2012



Source: Estimates by Lawrence J. Lau

Figure 4: University Graduates – bachelor degree or higher – by age group, 2010

	U.S.		China	
	Number	Age group	Number	Age group
Age group	(1000 persons)	(%)	(1000 persons)	(%)
25 - 34	13,480	32.81	15,874	8.01
35 - 44	13,378	33.08	8,781	3.62
45 - 54	13,061	29.43	3,895	2.11
55 - 64	11,229	31.72	1,388	0.99
15 - 64	51,148	31.71	29,937	3.41

Source: US Census Bureau; National Bureau of Statistics of China

large difference in capital intensity is one major reason why an average American worker is more productive than an average Chinese worker.

Another important factor that determines the productivity of an economy is the amount of human capital accumulated over time. An indicator of the amount of human capital available in an economy is the level of education attainment of the people. In China, people with bachelor degrees or above accounted for 3.41% of all the people aged between 25 to 64 in 2010. In the U.S., this ratio was 31.71%.

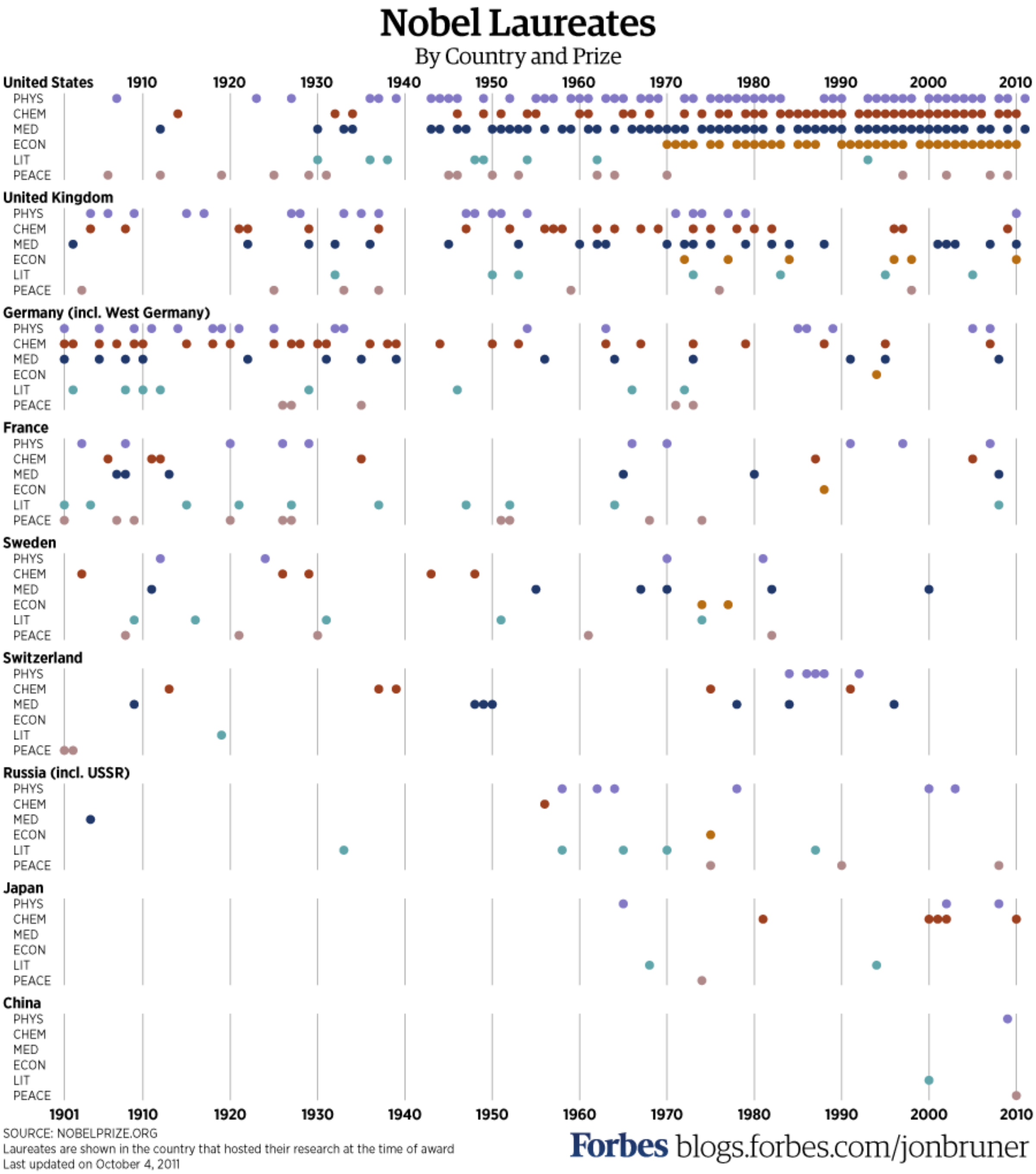
In terms of the total number of university degree holders aged between 25 to 64, the U.S. had 51.15 million while China had 29.94 million in 2010. The age profile of university graduates in the U.S. is much more mature than that of China, as China stepped up significantly its investment in higher education only in recent decades. In the short term, this means that the lead by the U.S. over China in human capital is not only due to a larger number of university graduates, but also much more work experience amongst these university graduates. But in the longer term, as China keeps training more young people and as these young people build up their experience, the gap in human capital stock between the U.S. and China will gradually narrow.

Education and training apart, the productivity and comparative advantage of an economy also depends on the innovation, research and technological capabilities. A measurable indicator of such developments is the amount of research and development (R&D) investment. For the country as a whole, the U.S. has spent on average between 2.6% to 2.8% of its GDP on R&D over the past few decades. China used to spend very little on R&D, but is stepping up its investments in this direction in recent years[1]. The cumulative stock of R&D capital of the U.S. is estimated to be 7.4 times that of China (see Figure 1). The U.S. is a global leader in innovation and is far ahead of China in science and technological capabilities.

The U.S. has successfully developed many of the best universities and the best scientific research laboratories in the world – as indicated by the number of Nobel Laureates from the U.S. shown in Figure 5. U.S. universities have become magnets for attracting many of the world's best talents. Indeed, the majority of the students in some faculties in some of the best universities in the U.S. are foreign students. Many of these graduates subsequently work in the U.S. or maintain close ties with the U.S., even if they work elsewhere around the world. This has helped the U.S. to build a global network of schoolfellows with shared values and experiences. While China has stepped up significantly its university enrolment in recent years, the quality and rankings of China's universities have yet to catch up[2].

1 See Chapter 12 for more details on a comparison of R&D spending by the U.S. and China.
2 Refer to Figures 1A and 2A in the Appendix to this chapter for two different sources of university rankings.

Figure 5: **American Leadership in Science, measured in terms of Nobel Prizes**



Source: www.nobelprize.org

Both China and the U.S. are rich in coal resources and in shale gas and possibly shale-oil resources. There may be opportunities for fruitful technological cooperation that is win-win[3] for both nations. China has about 20% of the world's population, but only 7% of the world's arable land. Per capita fresh water availability is only about 28% of the world average, and such fresh water is unevenly distributed within the country. Solving China's water needs is a key issue for the country's development. Importing more agricultural products, including meat as an alternative to feedstock from the U.S. is actually a way to import water[4].

The U.S. is not only much stronger than China in innovation and in science & technology, but also in system integration on a global scale. In an increasingly globalized world where knowledge and technologies could be sourced around the world, such system integration capabilities have become a very important competitive edge. On the other hand, China is learning very fast in technology applications – in both breadth and depth – as the country rapidly industrializes.

However, improvements in China's technological capabilities have actually generated more opportunities for U.S.-China cooperation, including developing jointly the business potentials of third markets. In nuclear technology, for example, China has built a large number of nuclear power plants in recent years to satisfy its energy needs. In the process, China has imported much nuclear technology from the U.S. and other advanced countries, as well as acquired a lot of practical application experiences. This has also opened up new opportunities for China to cooperate with the U.S. in exporting third generation nuclear energy capabilities to third countries[5].

3 Further details are given in Chapter 12.
4 Further details are given in Chapter 10.
5 Further details are given in Chapter 12.

China's Acquired Competitive Advantages and the Impact on Future U.S.-China Economic Cooperation

Traditional textbook theories about trade tend to focus on comparative advantage that arises from differences in factor endowments. Such theories help to explain the trade between developed countries that have an edge in capital and technology, and developing countries that have abundant resources. For a long time since China's reform and opening up, China's competitive advantage lay mainly in its abundant labor supply. This led to large inflows of foreign direct investment, leveraging on the low labor costs, producing value-for-money consumer goods for export.

But as China's economy gradually developed and its industrialization process intensified, the competitive advantages of the country also evolved. Heavy investments in infrastructure, a gradual improvement in the quality of the labor force through increased education opportunities and learning by doing, as well as the improvements in the software infrastructure such as streamlined government regulations, have helped to raise significantly the efficiency and productivity of the manufacturing industries.

Given the large size of China, upstream and downstream linkages amongst many industries gradually developed within different regions of the country, leading to the development of closely knit supply networks. Such conglomeration of manufacturers have helped to enhance the competitiveness of firms in China through network effects, such as in having more competition amongst suppliers, more choice and more varieties in input, higher efficiency in sourcing labor, and higher efficiency and lower costs of intra and inter-industry supply chains. A compact supply chain network also enables firms in the network to have short reaction times and they could respond faster to changes in market conditions or changes in customer demands. In a business world that is increasingly marked by the speed of change, such strong network effects enhance the competitiveness of all the firms along the supply chain in global competition.

Meanwhile, the growth of the Chinese economy leads to the rise of an increasingly important domestic market. This is an important reason why global companies want to invest in or sell to China, as gaining better insights about the local market in China and being successful in the China market have become an important factor of global competitiveness. To many sectors and companies, the large size of China's economy means that, in most lines of business, there is a lot of potential to scale up and benefit from significant economies of scale. Being successful in the China market gives firms a significant scale advantage when they compete in the global market. This is also one of the reasons why an increasing number of Chinese companies are beginning to expand into overseas markets in recent years, after they have established themselves and built up scale in the local market in China.

The comparative advantage of China and of firms based in China is therefore evolving continuously. This means that the basis of economic cooperation between the U.S. and China will change gradually, and the nature of such cooperation will require a different mindset and approach from both countries.

While factor endowment and comparative advantage theories tend to explain the benefits of trade between industrialized nations exporting manufactured products and developing countries exporting raw materials, it has been observed for a long time that a large part of contemporary world trade is 'north-north' trade – i.e. trade is amongst the developed economies, mostly in manufactured goods. The list of the world's largest exporters and importers is dominated by the developed economies. Furthermore, a large proportion of such trade is found to be 'intra-industry' trade as opposed to 'inter-industry' trade, with countries specializing in the production of part of the products and components in the industry concerned while importing those that they do not produce. Such 'similar-similar' trade is thus not adequately explained by traditional comparative advantage and factor endowment theories.

Consumers' preference for a variety in the products they consume help to explain the trade in consumer products amongst the developed economies, even if the participating trading countries have similar levels of technology and similar capital-labor factor proportions. This is also the argument that explains why consumers in Beijing can eat in McDonald's while American consumers can dine in great Chinese restaurants set up by people from China[6].

Paul Krugman's 'new trade theory' further explains that given increasing returns to scale – the average cost of production falls as the scale of production increases – firms would choose to produce in one location to serve customers in scattered locations instead of locating production in different places that are close to consumers, so long as transportation costs are not so high as to make this uneconomical. Furthermore, increasing returns to scale also leads to a tendency for monopolistic competition market structures to evolve, with a small number of global producers dominating the market. "Because of the scale economies, markets are imperfectly competitive. Nonetheless, one can show that trade, and gains from trade, will occur, even between countries with identical tastes, technology, and factor endowments."[7] Krugman's 'new trade theory' not only explains the large volume of trade amongst the developed economies, but also describes the dynamics of how manufacturers' locational decisions produce certain geographic patterns of industrial production.

6 "What is New Trade Theory?", Tyler Cowen's Marginal Revolution blog, 13 October 2008, (http://marginalrevolution.com/marginalrevolution/2008/10/what-is-new-tra.html)

7 "Increasing returns, monopolistic competition and international trade", Paul Krugman, *Journal of International Economics*, November 1979, pp. 469-79.

Developments in 'new trade theories' suggest that while trade and investment patterns between the U.S. and China in the past were driven primarily by comparative advantage, differences in factor endowment and in the level of economic development, the future potential for further economic cooperation remains very substantial, even when the gap of development between the two countries narrow. The substantial scale of both the U.S. and Chinese economies, coupled with the rapid rate of change in China and the noted ability of the U.S. economy to re-invent itself from time to time, both suggest that the opportunities for economic cooperation are abundant[8]. But it is imperative that both governments keep an open mind on such opportunities and resolve the obstacles to such cooperation opportunities as they emerge. For example, U.S. exports of tourism services to China could increase significantly in the coming years. But this needs to be facilitated by improvements in visa arrangements[9].

Another noteworthy development is the growth of 'south-south' trade and investments. For example, United Nations Conference on Trade and Development (UNCTAD) figures show that the share of exports from developing countries going to other developing countries rose from 12% of world exports in 1990 to 23% in 2010[10]. While this has been a long-term development, the scale of such trade has become substantial and as the emerging economies continue to develop, the implications and business opportunities of such rapid trade growth have become important. While this 'south-south' trade is recorded as trade amongst the developing countries, a considerable proportion of such trade is actually carried out by foreign and multinational enterprises located in these emerging economies. Over half of China's exports, for example, are exports by foreign companies based in China. The rapid growth of 'south-south' economic relations is therefore another dimension that offers potential for further U.S.-China economic cooperation.

8 See Chapters 8 and 9 for different U.S.-China trade projections.
9 See Chapter 11 for more details.
10 "South-South Trade Monitor", UNCTAD, June 2012.

U.S.-China Cooperation in the Context of Globalization, Fragmentation of Production and Global Integration of Supply Chain

Globalization trends brought about by liberalization of economic and trade policies, the information revolution and significant technological advances in the last few decades led to the fragmentation of manufacturing production and the growth of global supply chains. These processes gathered momentum rapidly since the 1980s as China's open door and reform policies took hold.

In East Asia, this global supply chain development process during the 1970s and 1980s consisted largely of the formation of a 'flying geese pattern' of Asian manufacturing production, with Japan leading the pack, followed by the four Asian Dragons – Taiwan, South Korea, Hong Kong and Singapore – and further followed by the rest of east Asia – largely Malaysia, followed by Thailand and Indonesia. Low-cost manufacturing migrated to the lower cost economies while the more developed economies specialize in the production of key components and high-tech inputs.

China's reform and opening up provided a new dimension and impetus to this global supply chain development process in East Asia. As China's economic development took off, manufacturing investments in China grew rapidly. Starting with outward processing manufacturing arrangements, mostly by Hong Kong and Taiwanese manufacturers in selected coastal parts of China in the 1980s, China's industrialization process led gradually to many large-scale investments by foreign investors from all over the world. The range of industries broadened and the level of technology involved deepened.

Initially, most of these foreign manufacturing investments were downstream manufacturing processes aimed at using China as a production base for exports to the rest of the world, partly due to Chinese government policy restrictions that such manufactured products should primarily be exported, and partly due to the fact that the local market was not ready for such products.

As China became a 'world factory', the manufacturing landscape in East Asia also gradually changed as the rest of Asia adapted to the rise of a significant manufacturing power. Typically, this led to the more developed East Asian economies migrating the lower value-added manufacturing processes to China, allowing them to specialize more in the production of parts and components, or in natural resources. For example, South Korea and Taiwan used to dominate in shoe-making, but as China developed, most of these shoe-making factories relocated to China. By the 1990s, the assembly of computers and other electronic products also relocated to China. The many components and parts, machinery, as well as chemicals and raw materials needed for manufacturing activities in China, in turn, were imported from the rest of the world. The upper stream production processes such as product design and prototype production, as well as the lower stream production processes such as marketing and distribution and customer service were also largely done outside of China.

Meanwhile, indigenous Chinese firms also gradually matured and they in turn also become part of the global supply chain.

China's large size means that for many industries, economies of scale can be readily attained. China's capacity to absorb a long chain of upstream, downstream and related industries together also generated a lot of conglomeration and synergy, as well as fast reaction time advantages for the companies and industries concerned. China has therefore become an integral part of the strategy of many companies, as they restructure their global value chains. This process has had a significant influence on how business activities are restructured in East Asia, with the result that more and more industries and companies use China as the assembly site for final products for exports, a significant proportion of which goes to the U.S. market.

The rapid growth in China's exports also reflects the increasing use by many global companies to use China as the base for the final assembly of their products for exports to other countries, as more and more companies and industries restructure their global division of labor. U.S.-China trade, by its nature, is therefore no longer just a trade between the two countries. It represents a part of the global supply chain. For example, about half of China's total exports to the rest of the world are produced by foreign or joint-venture companies, many of which are American. The bilateral trade surplus China has vis-à-vis the U.S. is also, to a large extent, the result of a migration of trade surpluses from other economies to China[11].

When exports from China to other countries are produced by multinational firms operating in China, the bulk of the profits accrue to the multinational firms. For example, Apple sales to Europe may count as Chinese exports as the Apple products are assembled in China, but the bulk of the profits accrue mostly to Apple in the U.S. In Apple's case, it does not own the factories that assemble the iPads – this is done by Foxconn, which is a Taiwanese company listed in Hong Kong. However, in other cases, the multinational firms also own the domestic producer, and thus will share in the value-added returns to capital, either in whole or in part. Thus, part of the GDP created in China will accrue to foreign owners of the capital. It will become part of the gross national product of the country of the foreign direct investor.

The rise of the emerging countries as increasingly important markets is creating more opportunities

11 See Chapter 1 for further details.

for U.S.-China cooperation. In a 'globalization 2.0' world, emerging economies are now accounting for the majority of global growth and about 50% of global GDP. Meanwhile, a rapidly increasing number of Chinese companies have developed to a stage when they could expand outside of China. These Chinese companies understand well the needs of consumers in the emerging world and have practical experience in dealing with the rather different operating environments in the developing economies. They are therefore potentially good partners with U.S. multinationals that possess global reach capabilities, strong brands and technological strength.

Complementarities in Savings and Investment, Driven by Differences in Demographic Factors and Economic Development

China has a much higher savings rate than the U.S. because of its relatively less developed economy and younger population. Even after a high domestic investment rate, China still runs a net savings-investment surplus. This contrasts sharply with a low savings rate and persistent current account deficits in the U.S. in recent years. And given the much higher level of technological and managerial expertise, and the global market reach of U.S. companies compared with Chinese companies, U.S. direct investment flows to China far exceeded Chinese direct investment inflows in the other direction in the past. But Chinese portfolio investments in the U.S. over the years were huge, as reflected by the large amount of U.S. treasuries held by China. Looking forward, as the Chinese population ages and as the Chinese economy develops further, the savings rate in China will fall and Chinese direct investments in the U.S. will rise. Being the two largest economies in the world, U.S. and Chinese savings and investments flows have significant implications on each other as well as on global financial market developments. There is ample room for enhancing cooperation so as to promote an efficient allocation of savings and investments[12].

The Need for Further U.S.-China Cooperation as Both Economies 'Re-balance'

The world economy experienced one of its fastest growing periods of the past few decades from 2005 to 2007. With the benefit of hindsight, this rapid growth is clearly unsustainable. In many developed economies, the financial systems have built up excessive leverage, and the public and private sectors have accumulated too much debt. The 'global financial crisis' of 2007-2008 marked an inflection point in global economic development when many developed economies had to start a very difficult process of deleveraging and macroeconomic 're-balancing'. These developments have also had an impact on the growth dynamics in the emerging world.

In the U.S., economic growth for a long time was supported by excessive consumption, very low to negative household savings, housing price inflation driven by financial market excesses, persistent fiscal deficits and a growing current account deficit. As the financial crisis of 2007-2008 hit, the fiscal deficits and level of government debt worsened rapidly. With consumer demand recovery constrained by the deleveraging needs of the household sector, high unemployment and weak income growth because of a weak economy, and the inability of the government to provide much stimulus to the economy because of a high level of government debt and political gridlocks, increasing exports was an important element to putting the U.S. back onto a sustainable growth path. Indeed, this is already gradually happening.

In China, economic growth in recent years has been characterized as 'unstable, unbalanced, un-

12 Further details are given in Chapter 13.

coordinated and unsustainable'. Economic growth has relied too much on exports and excessive investments. There is a need to re-orientate growth towards more domestic demand. There is also an urgent need to improve the quality of growth through raising economic efficiency, upgrading technology, investing in human resources, encouraging innovation, promoting 'inclusive growth' and avoiding environmental degradation. The World Bank has time and again reminded China of the dangers of falling into a 'middle-income trap' if China fails to address these issues. China's 11th and 12th Five-Year Plans have also put much emphasis on the need for restructuring, and indeed this re-orientation is already occurring gradually.

Going forward, both China and the U.S. need each other when they try to re-balance their economies towards longer-term sustainable growth paths. While the rapid growth of Chinese exports to the U.S. helped China to develop in the past, the U.S. will need to tap into the growth in the China market to enable it to increase U.S. exports as China encourages domestic consumption. Apart from exporting directly from the U.S. to China, there are also opportunities for the U.S. to benefit from its exports of services. Tourism is a very good example and this topic will be discussed in more detail in Chapter 11.

China will continue to need a lot of technological support from the U.S. in order to upgrade its economic structure while the U.S. could exploit its technological edge to gain commercial competitiveness. While a large amount of U.S. investments flowed to China in the past, the amount of Chinese investments available to invest in the U.S. is likely to increase significantly in the next decade.

It is important to recognize this paradigm shift in U.S.-China economic relations. The set of factors that will drive U.S.-China economic relations in the coming decade will not be the same set of factors that worked in the past few decades. To facilitate such developments, a fundamental and forward-looking review of policies and perspectives from both governments is necessary.

Appendix

Figure 1A: World University Rankings, 2011-2012

World rank	Institution	Country/region
1	California Institute of Technology	U.S.
2	Harvard University	U.S.
2	Stanford University	U.S.
4	University of Oxford	U.K.
5	Princeton University	U.S.
6	University of Cambridge	U.K.
7	Massachusetts Institute of Technology	U.S.
8	Imperial College London	U.K.
9	University of Chicago	U.S.
10	University of California Berkeley	U.S.
11	Yale University	U.S.
12	Columbia University	U.S.
13	University of California Los Angeles	U.S.
14	Johns Hopkins University	U.S.
15	ETH Zürich - Swiss Federal Institute of Technology Zürich	Switzerland
16	University of Pennsylvania	U.S.
17	University College London	U.K.
18	University of Michigan	U.S.
19	University of Toronto	Canada
20	Cornell University	U.S.

Source: The Times Higher Education, *http://www.timeshighereducation.co.uk/world-university-rankings/2011-2012/top-400.html*

Figure 2A: Academic Rankings of World Universities, 2011

World Rank	Institution	Country
1	Harvard University	U.S.
2	Stanford University	U.S.
3	Massachusetts Institute of Technology (MIT)	U.S.
4	University of California, Berkeley	U.S.
5	University of Cambridge	U.K.
6	California Institute of Technology	U.S.
7	Princeton University	U.S.
8	Columbia University	U.S.
9	University of Chicago	U.S.
10	University of Oxford	U.K.
11	Yale University	U.S.
12	University of California, Los Angeles	U.S.
13	Cornell University	U.S.
14	University of Pennsylvania	U.S.
15	University of California, San Diego	U.S.
16	University of Washington	U.S.
17	University of California, San Francisco	U.S.
18	The Johns Hopkins University	U.S.
19	University of Wisconsin - Madison	U.S.
20	University College London	U.K.

Source: Shanghai Jiaotong University

CHAPTER 3

PROSPECTS AND CHALLENGES: GLOBAL, U.S. AND CHINESE ECONOMIES IN THE NEXT DECADE

Michael SPENCE
Professor of Economics, New York University Stern School of Business, and Nobel Laureate in Economic Sciences, 2001

Executive Summary

The advanced countries now account for about 50% of the global economy. All are struggling to restore sustainable patterns of growth and employment. Among them, the U.S. economy is further along in deleveraging and growth is returning, though not up to pre-crisis trend, and employment is lagging. Developing countries by contrast are growing, appear resilient and to some extent are able to sustain growth in the face of very low advanced country growth. China is the largest, highest growth and most important emerging economy. Well into the middle income transition, China's economy is changing rapidly on the supply side and is evolving toward a growth pattern in which domestic consumption and high return investment along with higher value exports drives growth. Innovation, competition and marketization are key elements in this transition. The new leadership's principal economic challenge is to implement the numerous reforms that are required to support this shifting growth pattern. In summary, both countries have major, though different, structural shifts and challenges in the next decade. Establishing a cooperative, mutually beneficial relationship will make a material contribution to the success of each country, and provide benefits that spill over to the rest of the global economy.

Prospects and Challenges: Global, U.S. and Chinese Economies in the Next Decade

Introduction

The global economy in the next decade is going to be characterized by major structural adjustments and shifts in individual and international economies. The speed and effectiveness of these changes may not be easy to predict, creating uncertainty and some risk.

By way of background, the U.S. and a number of other developed economies prior to 2008 were growing in a pattern that included the accumulation of excess debt. In some cases the debt was in the private sector (household, corporate and financial) and in others the excess debt build up occurred in the public sector. This pattern included excess consumption and levels of investment often below those required to sustain growth. This was enabled in some cases by misbehavior in the financial sector and deficient regulation. And it was a pattern that could not be sustained. In fact, the growth dynamics broke down in 2008.

We are now in a lengthy period of deleveraging – that is bringing debt levels down over time. During deleveraging, domestic aggregate demand drops, causing growth to slow or turn negative. Employment also declines. At this point, deleveraging is incomplete. Generally, debt has declined in the private sector and has risen on the public side.

Monetary policy in the U.S. and Europe has been accommodating the deleveraging process. This has meant low or even negative real interest rates. The idea is to limit damage from excess indebtedness, to accelerate the recovery of asset prices (including housing), and hence to facilitate the recovery of balance sheets and mitigate the negative wealth effect on consumption. Returns to savers are clearly damaged and there is a known risk of reigniting the leveraged consumption model and returning in part to the prior growth pattern.

The prolonged negative demand shock means that growth will be subdued for an extended period. In an open global economy, a partial recovery can be aided by supplying to markets that continue to grow. But it is important to understand (and this is frequently overlooked) that this growth potential applies only to the tradable part of the economy. Generally, recent research indicates that in advanced economies, the tradable part of the economy accounts for about one third of total Gross Domestic Product (GDP) and somewhat less in terms of employment. The non-tradable part is large and completely dependent on domestic aggregate demand. It is therefore reasonable to believe that the demand-constrained growth pattern that we have lived with for the past four plus years will continue for some time – well into the next decade.

Europe, and in particular the euro zone, faces the factors described above, but with the complication of a defective structure (monetary union without fiscal and political union). This has created evident instability in euro zone sovereign debt markets and related systemic risk, the response to which inevitably creates further headwinds to growth and structural adjustment of the growth patterns, productivity levels and competitiveness. In fact, Europe-wide growth is presently negative. That is likely to persist, at least for the next few months.

At the moment, the systemic risk is in remission as a result of commitments by important countries (Italy and Spain) to fiscal stabilization and growth-oriented reform, and by the European Central Bank (ECB) with backing from Germany and the euro zone core to stabilize the sovereign debt markets (i.e. prevent excess yield increases and destructive self-fulfilling upward shifts in credit risk). The euro zone has also committed to the stabilization and unified regulation of the banking system, with a goal of putting it in place this year (2013).

While this represents real progress, systemic risk could reappear. The uncertainty surrounding the incomplete stabilization process, and the inevitable focus on fiscal stabilization and related risk will further delay a full recovery in terms of growth and employment.

Developed countries are still a large part (roughly half) of the global economy. The patterns described above mean that growth in aggregate demand coming from advanced countries for the next five years is likely to be quite limited. The consequence is that for developing economies to sustain high growth, they will have to generate the demand that supports it. This is a sharp departure from the past when both relative large size and growth of developed economies meant that developing countries could focus primarily, in terms of growth strategy, on the supply side, productivity, competitiveness and structural transformation. These supply side strategies will remain important, but collectively generating enough of the right kind of demand will also be crucial.

This brings us to one of the most important trends in the global economy: the rise in size of the developing economies. But that increase in size is caused by the rise in incomes and the rapidly changing patterns of demand. This phenomenon or trend is usually referred to as the explosive growth of the global middle class, and its purchasing patterns and power. It is crucial for the success of China's growth strategies and other major developing countries. It is a significant positive for smaller, earlier-stage developing countries because it creates large new potential markets. And it represents a significant growth opportunity for developed countries to grow in higher value-added components of global supply chains in the tradable parts of their economies.

Developing countries will continue to benefit from structural change and productivity growth in the tradable parts of their economies. But now, for major countries like China, growth will depend on demand growth on the non-tradable side, and in the longer term on growth in productivity and value added on the non-tradable side. Here, that is in the growing non-tradable part of the economy, external competition cannot be a stimulus. It therefore requires a focus on domestic competition, supportive regulatory regimes, human capital and infrastructure investment, and innovation.

Employment, Distribution and Social Cohesion

New technologies of various kinds, together with globalization, are powerfully affecting the range of employment options for individuals in advanced and developing countries alike – and at various levels of education. Technological innovations are not only reducing the number of routine jobs, but also causing changes in global supply chains and networks that result in the relocation of these jobs and, increasingly, non-routine jobs at multiple skill levels in the tradable part of many economies. This powerful trend seems set to continue. Thus far it has affected mainly developed economies, but in the relatively near future, it is likely to spread to developing economies.

The core of the technological tsunami is a set of information technologies driven by Moore's law (explained below) and a host of previously unavailable services delivered with standardized networks of computers and databases. Knowledgeable analysts suggest that far from being near the end of this cycle, we are rather at the point of accelerating structural change. It is important to understand the power of these trends and also the math.

Moore's law says that the number of transistors on a semi-conductor chip doubles every 18 months. Translated into growth rates of the type we understand, that is a growth rate of close to 60%. China is the fastest growing economy ever recorded, going through periods of 10% growth during which GDP has doubled every seven years. And we know what that kind of change looks like. The technological growth rates are six times higher. These translate over three decades into enormous cost reductions and hence the expansion of affordable services.

We also know that even with very high growth rates, the initial impact is small. Thirty years ago China was growing at almost 10%, but the impact on the global economy was very small as was the size of the economy. But with 30 years of this level of growth, you have a US$7.5tr economy. Now even 8% growth is a huge and growing contribution to the global economy. The same principles apply in technology (but with complex cascading innovations). A 60% annual cost reduction over 30 years to the present has produced a total cost reduction of 1.3 million times. That has enabled the automation of processes, the removal of routine jobs and the development of efficient but complex global supply chains that make human resources accessible. But the point here is that technologists tell us that this growth will continue and that the economic impacts will become even larger.

How, then, should policymakers confront the new and difficult challenges for employment – and, in turn, for the distribution of income and wealth – especially in developed economies? From recent research, we have learned a number of interesting developments about how the evolution of economic structure affects employment.

The tradable side of developed economies has not generated any real net increases in employment for at least two decades, while the jobs that it has created are concentrated in the upper income and upper education ranges, with employment declining in the middle and lower-income and education range. Growth in high-end service employment is matched by the contraction in the high-employment components of manufacturing supply chains.

Until the crisis of 2008, middle and lower-income job growth occurred entirely in the non-tradable sector of the economy, which accounts for roughly two thirds of developed countries' output and employment. Here, incomes and value added per employee were largely flat, jobs could be eliminated by technology but not global competition, and unsustainable, debt-fueled domestic-demand growth helped delay the current employment deficits.

As a result, developed economies have been shedding routine jobs at a rapid rate, while adding non-routine jobs, for example, those that cannot yet be replaced or reduced by machines or networked computers. This has fueled a dramatic rise in the return on education and high-level skills, with the share of total income received by owners of capital and high-end employees increasing in developed countries for more than two decades.

Growth and employment thus are diverging in developed countries. The key force driving this trend – technology – is playing multiple roles. The replacement of routine manual jobs by machines and robots is a powerful, continuing and perhaps accelerating trend in manufacturing and logistics, while networks of computers are replacing routine white-collar jobs in information processing.

Part of this is pure automation. Another important part is disintermediation – the elimination of intermediaries such as banking, online retail and a host of government services.

But technology's impact does not stop there. The same class of information technologies that automate, disintermediate and reduce costs of remoteness are also enabling the construction of increasingly complex and geographically diverse global supply chains and networks.

Global supply chains – constantly in flux owing to rising developing countries' incomes and shifting comparative advantage – locate productive activities where human and other resources make those activities competitive. Links in the chain include not only intermediate products and assembly, but also a growing range of services – such as research and development, design, maintenance and support, customer service and business processes – as transaction, coordination and communication costs fall.

The result is what is sometimes called the 'atomization' of global supply chains: increasingly fine subdivisions are feasible and efficient, and can be located almost anywhere. Proximity still matters in terms of transport and logistics costs. But, with the developing world accounting for the largest new markets and most of the growth in global demand, the logic driving atomization should become even more compelling.

The efficient ongoing decomposition of global supply chains, networks and services has two related consequences. One is that the tradable part of the global economy – where competition for economic activity and jobs is direct – is becoming a larger share of the whole; the same is true of individual economies.

The second consequence is that parts of global supply chains that were not competitive but were sheltered by the costs of remoteness, are no longer protected by being adjacent to parts that were. Adjacency is no longer a requirement.

These dynamics and related challenges are not confined to developed countries. Over the next decade, for example, China will replace much of its labor-intensive assembly employment with higher-value-added employment in manufacturing and services not only in the tradable sector, but also – even more noticeably – in the rapidly growing non-tradable part of its economy. The expanding scope and diminishing costs of automation and additive manufacturing may affect labor-intensive functions globally, including in earlier-stage developing countries.

A key factor in adapting to these forces is investment. For individuals, businesses, educational institutions and governments in developed countries, broad-based, elevated and efficient investment in education and skills is critical. Closing wide informational gaps in the market for skills would also increase the efficiency of these investments. However, the period of sluggish growth and high unemployment will be prolonged, as will structural adjustment by a continuation of a pattern of deficient public sector investment. It is not clear whether many of the developed countries have either the fiscal capacity or, more importantly, the will to reverse these trends in the short run. Income has already taken a hit in the crisis. Elevating investment would entail a further hit to short and medium-term consumption in pursuit of longer-term sustainable growth. It is possible, but at this stage it seems unlikely as a political outcome.

The differential effects of these underlying trends, interacting with the crisis and the negative demand shocks are striking. Unemployment is concentrated among the young to some extent. The distribution of income has deteriorated as a rising fraction of income goes to the owners of capital and those who possess ample amounts of human capital. Labor's share is declining. This sets off a vicious cycle in which the upper end of the income distribution range accumulates more physical and human capital, and then experiences further increases in income based on the rising capital share. Countries have variously resisted these trends through the tax system, public delivery of important services such as education and healthcare, and ownership of public capital (as in the case of China). A minority have successfully used skill development programs to maintain positions in high value-added niches in global supply chains.

Adverse trends in the distribution of the benefits of technology, growth and globalization threaten both social cohesion and political functionality. Trends that require decisive policy steps instead are being met with a blizzard of competing explanations, along with political polarization and gridlock. The result is considerable policy uncertainty in developed countries. The uncertainty itself adversely affects investment and recovery. Beyond that, important reforms and moves to address public-sector investment deficits are impeded or delayed, and certainly exacerbated by the widespread loss of fiscal flexibility of the past four to five years.

There is little question that the complexity and speed of change of the technological foundations of the global economy and of its structure are bewildering and relatively new. Comprehending and responding to these forces takes time and at least at this stage the responses appear to be falling behind the pace of change.

China and the Middle-Income Transition

China is well into what is normally called the middle-income transition, or sometimes, middle-income 'trap'. The latter term comes from the fact that many (though not all) countries that enter the middle-income phase, slow down dramatically. There is ample historical data to support this assertion.

The middle-income transition involves complex interacting changes in structure on both the demand and supply sides of the economy and in both the tradable and non-tradable components. These structural shifts are captured well in the details of the 12th Five Year Plan (FYP). Briefly, they include a shift in the share of national income toward the household sector and away from government and the corporate sector. This will supply rapid growth in consumption and drive growth in response to the demand of the household sector. Investment will remain high, but low return investment should be reduced by rationalizing policies in the public sector, by changes in the environment of state-owned enterprises (SOEs) – including competition and governance – and by financial sector development that will reduce imbalances in access to capital across the supply side of the economy. Urbanization will expand and absorb labor from rural areas. Huge amounts of investment will be required to accommodate this flow, in infrastructure (transport, water, sewer systems, telecommunications and of course electricity), and in residential and commercial real estate.

A crucial aspect of this phase of development will be the productivity of the non-tradable sector of the economy, in part because it is becoming relatively larger and more important, and in part because the discipline of direct international competition is absent. Of course, by policy, foreign competitors can be given access via foreign direct investment to the non-tradable part of the economy (such as Nestlé and Carrefour in food). That is a policy choice.

Innovation is quite properly another focus of this set of transitions in China. It is a shared function internationally. Ideas, knowledge and technologies flow relatively freely across boundaries. China is at the stage that domestically generated innovation will make an important contribution to growth and to the global economy.

Chinese analysts and policy makers are skeptical (quite properly) of western models of macroeconomic financial management and regulation, and they view the mismatch between assets and liabilities on public sector balance sheets as a problem. It constrains governments in responding to shocks, engaging in countercyclical demand management, driving structural change and dealing with deepening distributional issues. As social services and insurance rise in China, we expect that the holding of public assets will not diminish. Hence among others, there is a challenge in managing public assets well and in a way that promotes growth and structural change rather than the opposite.

The justified skepticism of aspects of developed country macroeconomic management and public finances does not extend to the more microeconomic features of dynamic innovative economies. As noted above, innovation is an appropriate high priority in China at this stage of growth and development. Innovative ecosystems have a number of common features. One important one is competition, the presence of actual and potential competition. This drives incumbents and newcomers to innovate in products, services and costs, with the return coming from the transitory market power that comes with successful innovation. This model is now quite well understood, and while there are variants in different regions, there really aren't any compelling examples of alternative approaches. Competition, access to markets and capital, regulatory even handedness and a level playing field are all requirements that will be the target of institutional and system reform.

A significant part of the plan will be addressing rising inequality of income and wealth and unequal access to essential basic services and social insurance. These measures are needed to address both efficiency and growth, but also social cohesion. Effective measures to reduce high level corruption and unequal access to investment and market opportunities is an important complementary initiative that directly deals with social cohesion and support for growth-oriented policies.

To accomplish these major structural shifts, widespread, deep system reforms will be needed. Notwithstanding the stellar economic performance of the past decade, the general consensus is that these results came from critical reforms at several points in the 1980s and the 1990s. Of course the economy matured, expanded and deepened in the past decade. But again there is a widespread and correct view that to support the future income growth and structural changes in the middle-income transition, reform momentum will need to increase again. Put another way, the growth model that has served the country well for the past 30 years is reaching the end of its useful life. It needs adjustment in the direction of relying on the right kind of domestic demand, including consumption and the marketization of a broader portion of the economy.

To accomplish this, differences of opinion about the role of the state will need to be resolved internally as part of the preparation of a comprehensive package of reforms for fall 2013. As the economy has become richer, it has developed vested and sometimes powerful interests, as is the case in all economies. The political and policy-making processes need to be adapted to maintain a reasonable and fair balance among these various interests, some more powerful than others. The general interest, and in particular the welfare of those not already represented in an organized way, needs to be kept at the forefront, and the Chinese Communist Party (CCP) has a central role to play in that.

China is in the process of completing another successful leadership transition. The current leaders were participants in preparing the priorities embedded in the 12th FYP. It is a comprehensive roadmap that if implemented with reforms and policies appropriate to this stage of growth, has every reason to be successful. However, it needs to be said that the list of prior successful, high-speed middle-income transitions is rather short. None involve changes in the size and scale involved in the China case. And all were carried out in an easier and more benign global economic environment in which developed country shares of global GDP were larger and growing. Conditions now present more significant headwinds and risks.

In addition, China has become systemically important in multiple dimensions at a much lower level of per-capita income than its predecessors. China's growth, policies and growth patterns affect prices of raw materials and natural resources, manufactured goods, financial markets and financial stability, and the growth options for other developing countries. Thus unlike other cases, China will not only navigate a shift in the growth pattern and the role of government in the coming decade, but in doing so, it will need to balance the internal dynamics and external impacts of its policies. As time passes, the external impacts become ever larger, once again, the result of the combination of sustained high growth and scale.

Most people believe that critical elements in the evolution of the global economy in the coming decade will be the policies adopted by the two most important economies – China and the U.S. – and the presence or absence of cooperation and leadership in creating global public goods and a stable and open global economic environment. Europe will recover at a slower pace, but one hopes and perhaps expects that it will be a unified economy with appropriate policies and a unified (rather than fragmented) approach to global issues. When that happens there will be a third large economy with reasonably unified governance as a partner to China and the U.S. in leading global change and adaptation. But that is not an imminent development.

Cooperation and Collaboration

There are many areas in which this cooperation will be needed. One surely is the management of natural resources and the environment. The growth of China and the developing world will lead to a doubling of the global economy on a 10 to 15-year time scale and probably a tripling in another 15 years. The growth model that has underpinned both developed and developing country growth in the past will not work at two or three times this scale. Climate, food, water, energy and livability will not withstand this level of growth. In fact, the adaptation of the growth models is already underway, driven by deep concerns and changing values, including those related to our responsibility to future generations. This process of adaptation, innovation and learning needs to be accelerated. China and the U.S. need to be active participants and leaders. The size of their economies means that their own growth models have to adapt. The level of engagement between the two countries will also either motivate, or reverse, international collaborative efforts. Global problems are hard to solve, but a good starting point would be China-U.S. collaboration on energy efficiency and security, greener growth and the environment, including climate change.

Each country brings much to the table. China has ambitious goals in this area in the 12th FYP. Progress is somewhat more decentralized in the U.S., though there are new national policies including Corporate Average Fuel Economy (CAFE) fuel standards for automobiles. In addition, the U.S. is expected to become energy independent with shale oil and gas, which will have the side benefit of making the economy somewhat greener through the use of gas as an energy source. In fact, the per-capita carbon emissions are already coming down.

The fundamental complementarity between the two economies is shifting but does not make their relationship less significant. In the past, to a first approximation the U.S. brought a large open market, foreign direct investment and technology. In return it got a vast and growing labor pool supplying high quality, low cost, labor-intensive manufactured goods. In more modern terminology, China supplied low-cost labor-intensive components of key manufacturing global supply chains. This pattern is in the process of changing. China is now providing a large and equally important rapidly growing market for a wider array of goods that were formerly largely unaffordable. It will also contribute as well as absorb technology. It will shed lower value-added jobs in the tradable part of its economy and these jobs will move to earlier-stage developing countries. Some of these jobs as noted above may become vulnerable to labor-saving technology, even at relatively low wage rates. China may also become (depending on policies on both sides) an outbound foreign direct investor in the U.S. economy in a wide range of areas – including infrastructure. The U.S. will continue to provide a large open market, even as China's role in serving it will shift upward in the value-added spectrum and in global supply chains. The U.S. will also provide, share and absorb technology and human talent. It will continue to be an open center of excellence at the top end of the education spectrum and in basic research.

Of course, there is also a healthy element of competition. The sharp differences in comparative advantage that were apparent two decades ago are diminishing. They are not gone, and the full journey to high income status will not be completed by China in the next decade. But the differences between the two economies are narrowing, in terms of income, capital depth including human capital, and capabilities. Chinese multinationals with recognized brands will begin to appear just as they did in Japan and Korea. They will compete with multinationals from a wide range of countries, and become architects of global supply chains. But we need to remember that they will compete with firms from Europe, the U.S. and Japan in a vastly larger global economy. Healthy competition in a fair, rules-based environment in a rapidly expanding global economy is far from a zero sum game. There will be plenty of room for everyone who is on top of his or her game.

A direct corollary of these trends is that global supply chains and the network structure of the global economy are shifting. The older and at one time approximately accurate notion that global supply chains ran from east to west, or slightly more precisely, ran through the east on the way to final demand in the west is out of date. Demand will no longer be concentrated in the west and growth certainly won't, even in absolute increments.

There are, in addition, underlying forces pushing in the direction of a partial reversal of the trend toward delocalization. These include rising energy costs and declining shares of labor in total costs, increasing amounts of customization, and a move away from periodic large batch orders to continuous updating of orders and supply chain scheduling in response to real-time data on customer-buying behavior. This reduces demand-supply mismatches and increases efficiency. And it pushes firms to innovate in the direction of localization. In the old model, that would bring supply chain elements back toward the developed countries. Now and in the future, it will push them toward their respective markets including those in the developing countries.

Demographics and Aging

The U.S., China, Europe and Japan are all in the process of aging, a demographic shift to the upper end of the age distribution. The extent of this shift varies, with Japan at one extreme, followed by many European countries, China and the U.S. The U.S. immigration and immigration policy are a question mark at this point. If past trends continue, immigration will reduce the speed of the aging process in the US.

Aging in combination with public debt and large non-debt liabilities (entitlements in the U.S. parlance) in the social security systems (including health) has created serious challenges in the west and questions in China about calculating accurately the liabilities associated with expanded social security systems, and limiting these. The examples in the developed countries serve as a cautionary note.

In general, pension and social security systems were based on assumptions and parameters related to longevity and working lives that no longer hold. These systems will therefore require difficult adjustments – difficult in part because older cohorts have made life decisions based on the older models. Sudden shifts are neither politically feasible nor fair. But that then exacerbates the longer-term fiscal imbalances associated with outsized long-term liabilities. On the other hand, experts note that relatively small changes in these systems now can have dramatic beneficial effects on long-dated liabilities.

Undoubtedly, individual saving behavior will need to adjust also to the new realities. Changing these social security systems to create the appropriate incentives for saving and retirement will be an important part of the adaptation. In addition, it seems clear that working lives may be extended, raising questions about institutions that support multiple transitions during a working career.

These issues are related to the technologically driven employment issues discussed earlier. It seems fair to say that we are at the early stages of adjusting to a radically different technological and demographic environment compared with that in the past. It is possible that a fundamental shift in models of work will be part of the adjustment process.

Resilience in Developing Countries

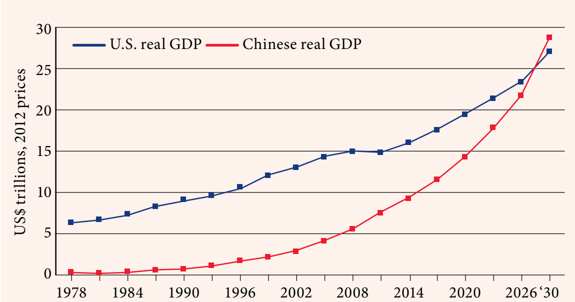
Growth in developing countries has demonstrated resilience in the post-crisis period. As noted earlier, this is the result of increasing scale, rising incomes, trade among developing countries especially in Asia, and a better match between demand and comparative advantage. Because of these factors, a declining fraction of trade flows pass through the filter of developed country final demand.

The pattern of rising resilience will continue, though the decoupling is not at all complete. Developed country demand is still a large fraction of the global total and a significant dip, as we are seeing in Europe, has the effect of slowing growth in the short and medium term in emerging economies.

Forecast Summaries for the U.S., China and the Global Economy

The coming decade will be characterized by substantial structural and policy change toward a more healthy and sustainable growth pattern, in individual countries and the global economy. The outlines of the structural changes in China are relatively clear. The remaining questions have to do with implementation of the policy and institutional development. These will be clarified in the course of 2013 as the new leaders take on their roles and then formalize and communicate reform priorities and direction.

Figure 1: Actual and Projected Real GDP of China and the U.S.



Source:

Figure 2: The Actual and Projected Rates of Growth of Chinese and U.S. Real GDP

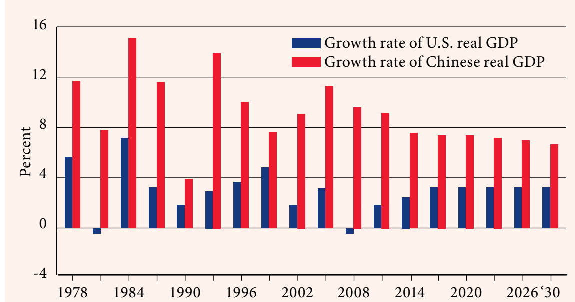


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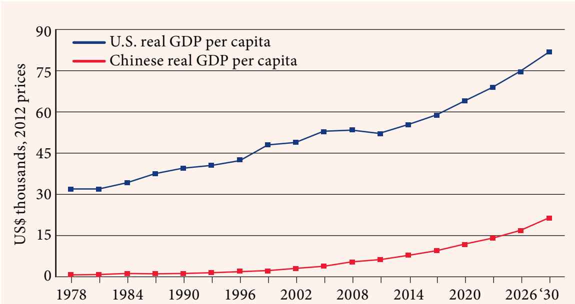
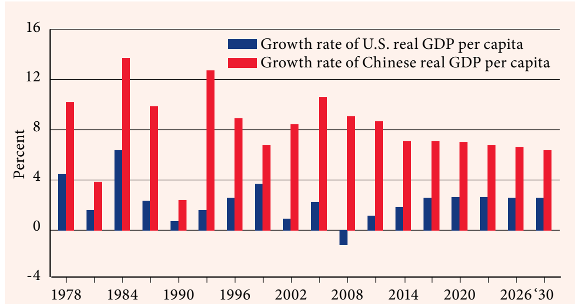
Figure 3: Actual and Projected Real GDP per Capita of China and the U.S.



Source:

Figure 4: The Rates of Growth of Actual and Projected Real GDP per Capita of China and the U.S.



Source:

The U.S. economy has many elements of dynamism and flexibility. It is recovering in terms of growth and that seems likely to continue. There are positive accelerators, including the progression of deleveraging, expanded energy resources, and delayed but real improvements in productivity and competitiveness. However, deficient aggregate demand will continue to be a drag for some time, especially in the large non-tradable part of the economy. Fiscal countermeasures to bridge the gap have been more limited than some advocate. Certainly the amount of fiscal flexibility to engage in countercyclical activities on both the demand and investment sides of the economy is more limited than anyone would like.

The U.S. Federal Reserve, as noted earlier, has used monetary policy to limit the impact of balance sheet damage, and possibly stimulate demand via asset prices and the wealth effect, but it has limited ability to restore demand in the short run. Polarization in the political process has created rather than reduced uncertainty. Many centrists agree that a credible policy of stimulus in the short run with a multi-year medium-term deficit reduction plan combined with measures to reduce long-term liabilities would be optimal, especially if the deficit reduction protected growth-oriented public-sector investments. But that is hard to achieve in the present political climate.

While growth seems to be in a process of slow return to potential, the recovery of employment and the residual secular shifts in the income distribution are more problematic. And the shift of income from those who save less to those who save more creates further uncertainty about the restoration of aggregate demand. While long-term growth potential is believed to be driven by the supply side, in particular by increases in total factor productivity, very few disagree with the proposition that in the short run, growth is mainly constrained by demand.

Europe's recovery will be slower with greater downside risk. Deleveraging is less far along. The structure requires coordinated and complementary policies by multiple players, in individual countries and at the center, with the result that outcomes will be difficult to achieve. Underlying the challenge of coordinated policy action is the ever present issue of burden sharing – who will pay what fraction of the cost of rebalancing.

If current trends continue, with the U.S. economy recovering slowly but steadily, the pattern of convergence will continue. East Asia as a whole will surpass the U.S. in terms of aggregate GDP with China contributing the highest proportion of the total by 2015. Chinese real GDP is projected to catch up to U.S. real GDP in approximately 16 years' time – around 2028 – at which time both Chinese and U.S. real GDP will exceed US$25tr (at 2012 prices), more than three times China's current GDP. In fact, this could happen sooner. (Bear in mind that in the meantime, the U.S. economy will also continue to grow, albeit at rates lower than those of China's economy.) By that time, China and the U.S. will each account for approximately 15% of world GDP.

China's population is projected to plateau by around 2045 and then become more or less stable. Some population projections suggest that it will reach a peak in 2035; however, this scenario does not appear likely as China's population policy is likely to be modified long before 2035.

By 2030, China's real GDP per capita is projected to be US$19,960, which will still only be slightly more than a quarter of the projected U.S. per-capita real GDP of US$76,750.

The Importance of U.S.-China Economic Cooperation in the Face of Global Uncertainties and Growth Challenges

At a time of substantial global economic challenges and uncertainties, U.S.-China economic cooperation is more important than ever. The two economies not only need to achieve bilateral economic benefits, but also disputes and frictions need to be resolved through cooperation. Beyond the bilateral benefits, the rest of the global economy is dependent on leadership from China and the U.S. in matters of global economic structure and cooperation, such as free trade, financial stability and regulation, energy security, environment, climate change and many other global issues. It is difficult to imagine successful global rebalancing and progress with either China or the U.S. missing from the process.

Appendix 1

Congressional Budget Office of the United States: Economic Forecasts

CBO's Economic Projections for Calendar Years 2012-23					
	Estimated	Forecast		Projected Annual Average	
	2012	2013	2014	2015-2018	2019-2023
	Fourth Quarter to Fourth Quarter (Percentage change)				
Gross Domestic Product					
Real	1.9	1.4	3.4	3.6	2.2
Nominal	3.7	2.9	5.3	5.7	4.3
Inflation					
PCE Price Index	1.5	1.3	1.8	1.9	2.0
Core PCE price index[a]	1.5	1.5	1.9	2.0	2.0
Consumer price index[b]	1.9[c]	1.5	2.0	2.2	2.3
Core consumer price index[a]	1.9[c]	1.8	2.0	2.2	2.3
GDP price index	1.8	1.5	1.9	2.1	2.0
Employment Cost Index[d]	1.9	2.2	3.3	4.0	3.6
	Fourth Quarter Level (Percent)				
Unemployment Rate	7.8[c]	8.0	7.6	5.5[e]	5.2[f]
	Year to Year (Percentage change)				
Gross Domestic Product					
Real	2.3	1.4	2.6	3.7	2.3
Nominal	4.1	2.9	4.4	5.9	4.3
Inflation					
PCE price index	1.7	1.3	1.7	1.9	2.0
Core PCE price index[a]	1.7	1.3	1.8	2.0	2.0
Consumer price index[b]	2.1[c]	1.6	1.9	2.2	2.3
Core consumer price index[a]	2.1[c]	1.7	2.0	2.2	2.3
GDP price index	1.8	1.5	1.8	2.1	2.0
Employment Cost Index[d]	1.8	2.1	2.9	4.0	3.6
	Calendar Year Average				
Unemployment Rate (Percent)	8.1[c]	7.9	7.8	6.1	5.4
Payroll Employment (Monthly change, in thousands)	157[c]	105	182	171	75
Interest Rates (Percent)					
Three-month Treasury bills	0.1[c]	0.1	0.2	2.2	4.0
Ten-year Treasury notes	1.8[c]	2.1	2.7	4.5	5.2
Tax Bases (Percentage of GDP)					
Wages and salaries	44.1	43.5	43.9	44.2	44.9
Domestic economic profits	9.6	9.3	9.7	9.7	7.7

Notes: Economic projections for each year from 2012 to 2023 appear in Appendix 2.
The numbers shown here do not reflect the values for GDP and related series released by the Commerce Department's Bureau of Economic Analysis on January 30 and the values released by the Labor Department's Bureau of Labor Statistics for the employment cost index on January 31 and for payroll employment on February 1.

PCE = personal consumption expenditures; GDP = gross domestic product.
a. Excludes prices for food and energy *b. The consumer prices for food and energy* *c. Actual value for 2012*
d. The employment cost index for wages and salaries of workers in private industry *e. Value for 2018* *f. Value for 2023*
Source: US Congressional Budget Office, Feb 2013 (Actual values for 2012 are from Department of Labor, Bureau of Labor Statistics; Federal Reserve.)

Appendix 2

Comparison of alternative GDP forecasts for the U.S. and China

Chart 1: Alternative Projections of U.S. GDP Level in 2022 (2012 US$ trillion)

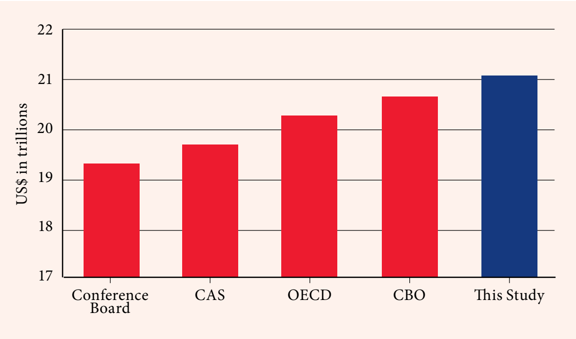


Chart 2: Alternative Projections of U.S. Annual Compound Real Growth Rate, 2012-2022 (%)

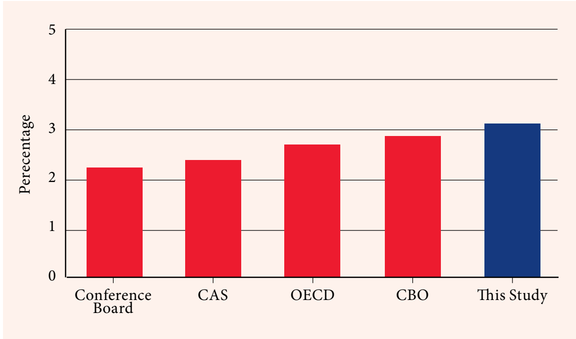


Chart 3: Alternative Projections of China's GDP Level in 2022 (2012 USD trillion)

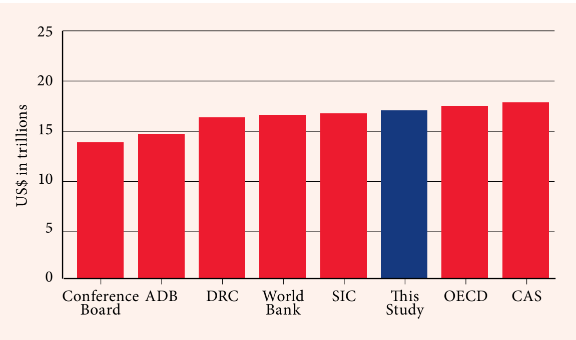
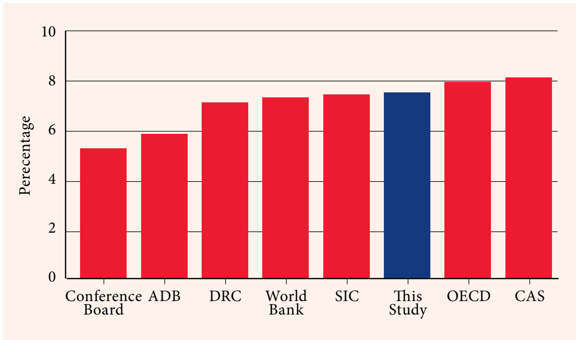


Chart 4: Alternative Projections of China's Annual Compound Real Growth Rate, 2012-2022 (%)



Notes:
ADB: Asian Development Bank
CAS: Chinese Academy of Sciences
CBO: U.S. Congressional Budget Office
DRC: Development Research Center of the State Council of the PRC
SIC: State Information Center, National Development and Reform Commission
OECD: Organisation for Economic Cooperation and Development

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Chapter 4

Prospects and Challenges for the Global and Chinese Economies in 2022

CHEN Wenling
China Center for International Economic Exchanges, Strategic Research Department, Chief Economist

WANG Peng
China Center for International Economic Exchanges, Strategic Research Department, Associate Research Fellow

Executive Summary

In the baseline scenario of the next decade, the momentum of the global economic recovery is strengthening, but still remains deeply imbalanced as well as unstable. It is anticipated that economic growth in developing countries will be faster than in the developed world and the pace of global growth will accelerate in the latter years. However, developed countries face the challenge of breaking out of economic weakness and averting the double dip. Emerging economies need to deal with imported inflation and the transformation of economic development model. International monetary system is required to be reformed but it will take a while to reach consensus. Aging population is picking up with a fall in the ratio of working population to total population. Global public issues such as food and energy security and climate change should be tackled by joint efforts to build an integrated and comprehensive institutional arrangement.

Facing the above challenges, the best hope to realize economic transformation, structural readjustments and the potential of economic development is changing the traditional mindset and seeking consensus on development. The contribution of emerging economies represented by the 'BRIC' countries to global economic growth is greatly improved, providing strategic space for the economic recovery and prosperity. Moreover, the wisdom of innovation that drives the industrial (post-industrial) society to the knowledge society provides significant potential for promoting future growth. It is also possible that low carbon technologies, circular economy and new energies will be the new engines for driving global economic growth. Finally, setting up global governance mechanisms and rebuilding new international economic orders and the confidence for future growth are important guarantees of sustainable development.

China will play a pivotal role in the global economy in the coming decade. Despite its economic growth rate being lower than that of the past decade, the quality will be considerably enhanced and thus ensure sustainable economic development. China's market will expand faster than others, and domestic consumption will overtake investment and exports to become a new force for economic growth. China has become the largest trading nation, undertaking industrial transfer, elements integration and capital inflows and is one of the most important investors in the world. China will develop into an innovative economy over the coming ten years, aiming to develop a modern educational system and more intellectual support for national development. China will continue to facilitate industrialization and urbanization in order to catch up to the present levels of developed countries and promote industrialization into the mid-to-late stage. China will maintain its focus on improving living standards and satisfy its peoples' expectations of a better life and building a harmonious society. Meanwhile, China is moving to a country with a more marketized and internationalized financial system. RMB will play a larger role in international trade settlement, international capital markets and international currency reserves. However, we need to note that China is facing serious problems and challenges. Transformation of its economic development pattern will be the principle line in the coming decade to maintain China's sustainable development

Prospects and Challenges for the Global and Chinese Economies in 2022

The Baseline Scenario[1] of the Global Economy in the Next Decade

The momentum of the global economic recovery is strengthening, but still remains deeply imbalanced as well as unstable. It is anticipated that economic growth in developing countries will be faster than in the developed world and thus set an upward trajectory.

As the level of household debt in the developed economies falls, consumer spending will return to normal on a gradual basis. In Asian countries export-led growth will rebound to previous levels. Emerging countries are working towards a balance between domestic and external demand and will switch to domestic consumption to drive up economic growth.

As such, the global economy will have a growth rate lower than that of the last 60 years. According to statistics put forward by the World Bank, gross domestic product (GDP) growth from 1973 to 2011 was 3.0% – based on the weighted average exchange rate – and was 2.7% from 2000 to 2011. It is estimated that in the next 10 years the global economy will grow by 2.5%.[2]

Across the globe, economic restructuring is gathering pace. In emerging economies consumption will play a bigger part in driving GDP growth rather than investment and the current account surplus will be reduced. The World Bank[3] projected that consumption will increase from 40% to 47% of GDP between 2010 and 2025 in East Asian economies, and anticipated that a similar trend will occur in India and Latin American countries. The same U.S. ratio over that period will fall from 70% to 63%. Meanwhile, investment will slip from 45% down to 37% of GDP in East Asian economies and a similar decline will occur in other emerging economies. European countries, however, will grow from 16% to 18%.

International trade will continue to increase and become one of the major forces in bolstering the global economy. By 2025 the ratio of trade to world output will increase from 49.9% to 53.6%. A sharp increase in trade of emerging economies is likely to happen thanks to the expansion of domestic demand. Imports will increase from 35% to 45% of total trade volumes and exports from 38% to 50%. The emerging economies' share of global trade will come closer to that of developed countries.[4]

New Economic Challenges in the Next Decade

Developed countries face the challenge of breaking out of economic traps and averting the double dip

In recent years, the global financial crisis has entered into a new phase. Sovereign debt has come out of crisis and the debt crisis in the private sec-

1 This overview is based on the assumption that there will be no large-scale wars or conflicts in the world; an open and liberal trade environment is maintained; the global financial system is relatively stable; there is no major breakthrough in the current global governance mechanism; economic cooperation is deepened although competition is intensified; the U.S. and China's current economic policies are implemented; economic restructuring is well underway; and there are neither breakthroughs nor major conflicts in Sino-U.S. trade relations.

2 "Evaluation and Projections on the US and China's Economic Trend in the Next Decade", Department of Economic Studies, National Information Center, Beijing, forthcoming, 2012.

3 "Global Development Horizons 2011 — Multipolarity: The New Global Economy", World Bank, 2011.

4 *Ibid.*

tor has spread to the public sector. Consequently, core developed economies, such as the U.S., Japan and some European countries, have been mired in debt which has spread to neighboring countries. At present, the amount of the global sovereign debt hit US$95tr , exceeding the global stock market value of US$55tr and global GDP of US$62tr. According to the International Monetary Fund (IMF) predictions[5], the top 10 external debt-issuing countries are developed nations, with overall debt totaling 80% of global debt. In 2014 the total debt of developed countries to GDP will be over 100%, reaching as high as 122% by 2015. Pre-crisis levels won't be restored until 2030.

Analysis of the status quo shows that the crisis is far from over. In the past, the economic cycle of developed countries were shorter, usually lasting six months to a maximum of one year. But the unstable recovery from the recent crisis has already lasted more than two years. Some European countries have even suffered a double-dip recession. The future growth of developed countries, either as a drag or a driver, is crucial to the global economy in the next decade.

Imported inflation and the transformation of economic development in emerging economies

In the aftermath of the 2008 financial crisis, there were wild fluctuations in food and commodity prices. Ballooning food prices have been mainly driven by the Consumer Price Index (CPI) increase in emerging economies. According to the 14 economic cycles tracked by the IMF since 1929, this round of recovery is the most sluggish to date with the fastest credit rebound. The assets held by the global central bank have amounted to US$18tr, accounting for 30% of global GDP, twice that the figure of a decade ago. Against this backdrop, developed economies with large debts opt for loose monetary policies for an indefinite period to sustain the debt cycle. Low long-term interest rates and excessive liquidity on a global scale will be normal. As the output gap is gradually reduced and prices of natural resources are stirred up, the global economy will face an upward pressure resulting in high inflation that may cause turbulence in the financial market.

Although emerging nations such as Brazil, Mexico and Argentina are still growing, their growth rates are slowing, impeded by an unsustainable development pattern, underdeveloped industrial structures, poor infrastructure, low productivity and capital output-input ratios. In this context, global economic growth is likely to stagnate or even head for double dip if the situation is dampened with high imported inflation and strong external shocks over the next decade.

Lack of consensus, joint efforts at international monetary reform and intermittent incurable financial upheaval

Currently, there is widespread consensus that the financial crisis has been caused by the irrationality of the international monetary system. After Lehman Brothers collapsed, the U.S. received more instead of less capital inflows as international investors regarded the U.S. currency as a safehaven. This reflected the fact that international investors were choosing the US$ as the reserve currency and trade settlement currency. Dominance of the US$, in some senses, demonstrates that it is the global investors' currency of choice. Global opinion, including the U.S. itself, advocates reforming the international monetary system while sticking to using the US$ as the global currency.

Major holders of US$s and US$ assets are reluctant to sell because of the fear of further devaluation. Alan Greenspan, former chairman of the U.S. Federal Reserve, acknowledged that the crises are a result of persistent loose monetary policy and low interest rates. However, despite this, such policies continue to be extended. Meanwhile, the 'zero interest-rate' and indefinite quantitative easing policies

5 Global Financial Stability Report, IMF, 2011.

in Japan – adopted more moderately by the U.K., Australia and India – and a tough stance on inflation adopted by some European countries led to an unstable global financial market, which embedded problems of stagnant manufacturing growth and excessive liquidity. The smooth reform of international monetary policies without creating shocks to the global economy is challenging all countries, in particular, the U.S. If substantial reforms are not taken, it will be impossible to contain global excessive liquidity of the US$ and the U.S.' overwhelming deficit. As a result, the US$ will depreciate further and global commodity prices will continue to rise. This will put the global economy, especially emerging economies, at great risk of a double-dip recession.

Aging population and a dwindling labor force

The recent census report[6] published by the United Nations (UN) indicates that the world population reached seven billion in 2011. It only took 12 years for the world population to grow by one billion. It is estimated that it will hit eight billion in 2025 and 10 billion by the end of this century. However, in developed countries such as the U.S., Japan, Italy and Germany, the proportion of the population aged over 60 will make up over 30% coupled with a low or negative birth rate.

The world's aging population has been a major concern of developing countries, some of which may face the problem of "getting old before getting rich" or "getting old while getting rich". By the middle of the 21st century, the aging ratio in developing countries will rise to 14% and the aging population will grow by 400%. The labor participation rate in Northeast Asia is currently high, but is forecast to drop from 64% in 2010 to 57% in 2050.

An aging society means the end of the demographic dividend and the demand for a new force to sustain economic expansion. It also urgently calls for reforms on the social welfare system, education, employment and provisions for the old. The UN projected that by 2050 the world population will peak at 9.15 billion, 16% of which will be over 65 years old. By then there will be only 3.9 working-aged people to support one 65-year old, while in 2010 the ratio was 8:7.

An aging society reduces both savings and investment. The consumption level will rise, but the real purchasing power is weakened. Countries, especially emerging countries, need to put corresponding polices into place as well as ensure their effectiveness to boost the consumption level and the purchasing power of the aged population. The improvement of financial sectors and social safety nets will also help by slashing precautionary savings that are used for the whole life cycle.

Food and energy security

Threats to food and energy security are exacerbated by the use of biofuels made from corn and grain. The report by the Food and Agriculture Organization of the United Nations[7] indicates that in the next decade international food prices will remain high and unstable. It is likely to be 16% to 40% higher than its average level between 1997 and 2006. According to statistics posed by the UN, one in seven people are currently suffering from hunger. After the recent food crisis another 44 million people will live in chronic hunger. It is predicted that by 2022, the U.S. will use 0.18 billion tons of corn – which could feed 0.58 billion people for one year – to produce biofuel. Plans for producing biofuel from agricultural products are also being implemented in other countries.

The gap between energy supply and demand is growing globally. In 2011 BP plc issued the "BP Energy Outlook 2030"[8]. It points out that global carbon

6 "Population seven billion: UN sets out challenges", United Nations Population Foundation, BBC, 26 October 2011, www.bbc.co.uk/news/world-15459643

7 *OECD-FAO Agricultural Outlook 2010-2019*, Food and Agriculture Organization, 2010.

8 "BP Energy Outlook 2030", London, January 2011, http://www.bp.com/liveassets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2008/STAGING/local_assets/2010_downloads/2030_energy_outlook_booklet.pdf

emissions – with a 20% increase compared to 2005 – will peak after 2020. There will be about a 40% increase in primary energy consumption in the next 20 years and non-members of the Organisation for Economic Co-operation and Development (OECD) – with an average annual rate of increase of 2.6% – will see a 68% increase in energy consumption by 2030, contributing to 93% of the world total. The International Energy Agency predicts that global oil production will fall by two thirds over the same period. It can be seen that with the development of the global economy, especially the world population increase and the intensification of emerging economies' industrialization, urbanization, modernization, marketization and internationalization processes, the balance between energy supply and energy demand will become more fragile.

Global challenges and global solutions of public products

• Global warming
A World Bank report[9] predicts that by the end of the century the global temperature will rise by 5°C compared to pre-industrialization levels. The Copenhagen Diagnosis[10] points out that by 2100 global temperatures will go up by 7°C and the sea level will rise by 1 meter compared to current levels.

• Poverty
One quarter of the total population of developing countries are still living in extreme poverty[11]. According to the World Development Indicators 2010 released by the World Bank, the economic meltdown triggered by the international financial crisis has put another 64 million people into extreme poverty.

9 World Development Report 2010: Development and Climate Change, World Bank, 2010.
10 *The Copenhagen Diagnosis 2009: Updating the World on Climate Science*, Bindoff, Allison N. L., Bindschadler R.A., et al, UNSW Climate Change Research Centre, Sydney, 2009.
11 According to the UN's definition, extreme poverty refers to a person receiving an average everyday income of less than US$1.25.

The global economy is threatened by a host of other problems, such as the population explosion, environmental deterioration, natural disasters, and the exploitation of resources, poverty, disease and terrorism, in addition to new rules on bio-technology, immigration, trade and investment. Innovative approaches are required to address these challenges. So far, institutional arrangements set up to tackle these challenges are far from reaching consensus and initiatives have been formulated, some of which have yet to get started. How to overcome these problems is likely to affect the quality of life for generations to come.

Promising Expectations and Opportunities in the Next Decade: Seeking Consensus and Making Constructive Solutions

The most we can hope for is to realize economic transformation, structural readjustments and the potential of economic development: Changing the mindset and seeking consensus
The U.S. put forward strategies for re-industrialization and new energy development. In an effort to return to the real economy, it gives a strategic role to manufacturing and aims to double its exports in five years. It hopes the new energy development strategy can provide an impetus to economic recovery and create more job opportunities.

In June 2010 the European Union (E.U.) 2020 Strategy was approved at the E.U. Summit. It set out to develop a smart, sustainable, inclusive economy and aims to promote employment, research and development (R&D), climate change mitigation, education and poverty reduction in the next decade.

The Japanese government issued its growth strategies. It strives to cultivate a new force for economic growth by releasing the country's domestic potential and opening up to the international market.

For emerging countries like China and Brazil, they are also working on transforming traditional economic development patterns.

In the next 10 years, international organizations, such as the IMF, UN, G20, World Bank, as well as regional organizations, should play more of a role in coordinating the various issues regarding the broader global issues. Further reform, innovation and development will become the common theme of most countries.

More contribution to global economic growth and the potential for future recovery and prosperity: Growth of emerging economies represented by the 'BRIC' countries

Studies by the China Center for International Economic Exchanges (CCIEE) indicate that the proportion of 'BRIC' countries' (high growth developing economies of Brazil, Russia, India and China) GDP to global GDP will rise from 17% in 2011 to 23% in 2015, 31% in 2020, 41% in 2025 and over 50% in 2030. The rise of emerging countries will make a great contribution to global poverty reduction and will become a major force in driving regional as well as international economic development. Furthermore, the emergence of these economies is an irreversible long-term trend of global development.

The most important variable in the next decade: The power of innovation drives the industrial (post-industrial) society to the knowledge society

The new tech-driven industrial revolution has breathed confidence into crisis-stricken countries and brought new hopes to the global economy plummeted by the recession. The U.S. drew up the National Innovation Strategy and the Planning for R&D of Year-Crossing Projects of Smart Grid 2010-2014; the E.U. came up with the Innovation Alliance, the Digital Agenda for Europe; Japan has formulated the largest investment plan ever for innovation and R&D, the draft for the Basic Plan (2011-2015) for the Fourth-Stage Development of Science and Technology; and South Korea put its National Strategy and Five Year Plan for Green Growth into implementation in 2010. BRIC countries have also quickened the pace for technological innovation and development. It can be seen that countries, developed or emerging, aspire to score a breakthrough via technological innovation and revolution in a post-crisis period for industrial overhaul and new industrial development. World Bank[12] estimates that highly productive emerging economies will grow by around 6% per year, while those with lower productivity will grow by only 3% on average.

New powers for future economic growth: low carbon technologies, circular economy and new energies

In retrospect, the circular economy and low carbon technology are directions for future development, and are some of the few fields that saw positive growth amid the crisis. More efforts should be made to build a low carbon economy in the process of economic structural adjustments. According to a study conducted by HSBC[13], by 2020 the annual income of the low carbon industry will exceed US$2tr.

Faced with the challenges brought by climate change, increasingly countries are looking to new energies. Low carbon technologies, clean energies and renewable energies have become new hot spots for scientific and technological innovation. According to the "BP Energy Outlook 2030", between 2010 and 2030 the proportion of solar energy, wind power, geothermal energy, biofuels and other renewable energies to total energy growth will increase from 5% to 18%. New energies, including nuclear power and renewable energies, will gradually replace petroleum, coal and other fossil fuels. The output of biofuels is predicted to increase from 1.80 million barrels per day in 2010 to 6.70 million barrels per day in 2030, which will be 125% of the liquid fuel supplied by non-members of the Organization of Petroleum Exporting Countries.

12 Global Development Horizon 2011- Multipolarity: The New Global Economy, World Bank, 2011.
13 The Climate Equity Opportunity List, HSBC, 2010.

Guarantee of sustainable development: Setting up global governance mechanisms and rebuilding new international economic orders and the confidence for future growth

An effective platform for global governance is required to deal with global economic upheavals. The international financial crisis shattered the old economic orders. In light of the new environment, international organizations, such as the UN, World Bank, IMF and World Trade Organization, have put global governance on the agenda. "The General Survey of Economy and Society of the World 2010" published by the UN calls for reforming the global reserve currency system, reforming the governance structure of the global economy and reforming the global governance mechanism. G20 has extended its discussions to issues other than economics and finance; the BRIC countries' summit has also made an appeal for a more inclusive world economy. The key to global economic governance is to improve risk management systems, enhance the stability of the global financial system and keep inflation in check. It is of equal importance to promote globalization and free trade and narrow the gap between the rich and poor.

Reviews of large international organizations should focus on adopting comprehensive, authentic, impartial and effective principles when tackling global issues. Such organizations, the largest public goods, could bring enormous benefits to the world. They could drive the way to a balance of interests and mutual benefits, and build a fair and inclusive economic order. A global consensus and a universal effort will shape the world in the next decade and the future for mankind.

Two Scenarios of the Global Economy in the Next Decade

The optimistic scenario[14]: Global economy enters into a new growth supercycle

Conference Board[15] forecast that under the optimistic scenario the average global economic growth rate will reach 5.4% in the next 10 years. The growth rate of advanced economies and emerging economies will be 3% and 7.4% respectively. The growth rates of the U.S., Europe, Japan, China and India will be 3.4%, 2.4%, 2.4%, 9.4% and 9.8% respectively. The global output will hit US$105tr, US$15tr more than under the baseline scenario[16].

The pessimistic scenario17: Sluggish recovery or a 'lost decade'

The possibility of the pessimistic scenario is quite small but it needs to be considered. It is given to urge countries to rise above differences and take immediate action. In the Conference Board's estimation[18], under the pessimistic scenario, the global growth rate will only be 2.6%: 1% in advanced economies and 4% in emerging economies. The growth rates of the U.S., Europe, Japan, China and India will be 1.3%, 0.6%, 0.1%, 5% and 5% respectively. The global output will be just US$80tr, US$10tr smaller than under the baseline scenario.

14 It is based on the assumption that as globalization has deepened, countries have reached consensus on certain issues and begun to take concerted action; they enhanced the cooperation between each other and achieved mutual beneficial outcomes; they complement each other and establish new orders; they are sparing no efforts to promote innovation and deal with slews of challenges; and they make concessions and strive for inclusive development.

15 Global Economic Outlook 2011, the Conference Board, 2011.

16 The estimation is based on global GDP of US$62tr in 2010 and will reach US$90tr in 2020 according to Asian Development Bank's forecast.

17 It is based on the assumption that large countries lack strategic consensus; the global economy is still suffering from the impact made by the financial crisis, debt crisis and the decline of the real economy; the fear of double dip is realized and caused social instability; the global economy remains deeply imbalanced and recovery is sluggish; the market is unstable and the environment further deteriorates; and the international relationship is unraveled.

18 Global Economic Outlook 2011, the Conference Board, 2011.

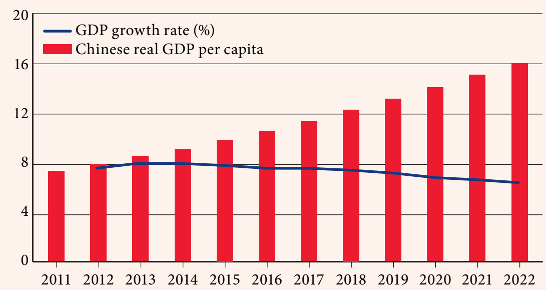
Outlook for China's economic development in the next decade

Since China adopted the reform and open policy, it has grown into an integral part of the global economy and later became an engine of global economic growth. It has reaped great benefits from its bilateral trade relations with the U.S. Not only that, China has borrowed experiences from developed countries such as the U.S. and set up the market economy that released its growth potential. Over the past decade, China's GDP grew by nearly 10% and to date its urbanization rate stands at 47.6%. From 2009 to 2011, RMB850bn was spent to establish a medical insurance system that covers 1.267 billion people. What is the vision for the next decade?

China will play a pivotal role in the global economy, despite its economic growth rate being lower than that of the past decade, the quality will be considerably enhanced and thus ensure sustainable economic development

China's 12th Five Year Plan (FYP) set a target of keeping the annual GDP growth in the five year period (2011-2015) at 7% and the goal of enhancing the quality and efficacy of economic development. The 18th Communist Party of China (CPC) National Congress also promised to double China's GDP by 2020 which translates into an annual growth rate of 7.1% during 2010-2020. If the economy grows by 7% on average, China's GDP will reach US$12.5tr[19]. The Chinese State Information Center estimates that China's average annual growth rate will reach 7.4% over the next decade with a total GDP of US$16tr in 2022[20]. The World Bank report[21] projects that China's economic growth rate will slow down in the next 30 years with an annual rate of 8.6% during 2011-2015, 7.0% during 2016-2020 and 5% in 2030. Even with a lower growth rate, China will still surpass the U.S. and become the world's largest economy by 2030.

Figure 1: **Outlook for China's GDP and Growth 2011-2022**



Source: Evaluation and Projections on the US and China's Economic Trend in the Next Decade, *Department of Economic Studies, National Information Center, Beijing*

In the next decade China will attach more importance to the well being of its citizens instead of focusing solely on GDP growth. GDP can be used as one of the indicators instead of the only one indicator to gauge a country's economic strength. At present, China's GDP per capita is less than half of the global level and ranks 93 globally. One of the main targets stated in the "18th CPC National Congress Report" is to double people's annual income in 2020 against the 2010 level and with GDP per capita of more than US$10,000[22], getting out of the 'middle income trap'. The State Information Center forecast that China's GDP per capita will reach US$11,517 in 2022[23] (see Figure 1).

China's market to expand faster than others, domestic consumption to overtake investment and exports to become a new force for economic growth

With the upgrade of consumption structures and further released domestic demand, China will be one of the world's largest consumer markets. In 2012, consumption contributed 51.8% of economic growth, replacing investment for the first time in six years. The World Bank report[24] forecast that by 2020 the ratio of investment to GDP will decline from 42% to 38%

19 Against an exchange rate of 1:6:38.
20 China's GDP in 2011 was US$7.3tr.
21 China 2030: Building a Modern, Harmonious and Creative High-income Society, World Bank, 2012.

22 China's per capita GDP in 2011 is US$5,414.
23 Evaluation and Projections on the US and China's Economic Trend in the Next Decade, Department of Economic Studies, National Information Center, Beijing, forthcoming, 2012.
24 China 2030: Building a Modern, Harmonious and Creative High-income Society, World Bank, 2012.

and the ratio of consumption will climb from 56% to 60%. Morgan Stanley's report "Chinese Economy Through 2020"[25], points out that in the next decade China will embrace a golden period of consumption. By then China's consumption will be two thirds that of the U.S. and 12% of the world total. Its newly cultivated consumer market has already outstripped that of the U.S. in 2008 and it is expected to double, accounting for 20% of global market by 2020.

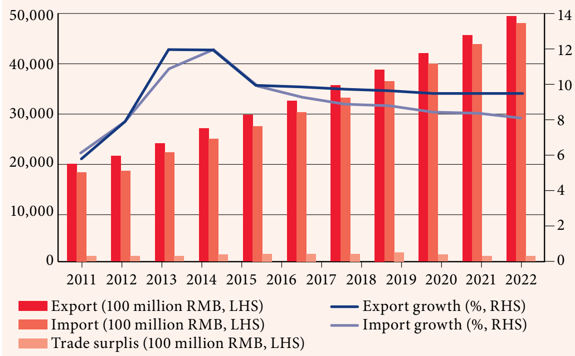
In addition, China's social security system has picked up steam in recent years. It has established the social safety net for its citizens in a country with the worlds' largest population, covering nearly all of Chinese urban and rural households. This will encourage spending and foster consumption-driven growth.

China to become the largest trading nation and one of the most important investors in the world while maintaining its focus on industrial transfer, elements integration and capital inflows

China is an important founder, participant and contributor of international economic systems. It is a member of more than 100 governmental organizations and has been actively involved in over 300 international conventions. China is also a strong supporter and practitioner of trade liberalization and investment facilitation. To date, it has set up bilateral mechanisms for economic and trade cooperation with 163 countries and regions, finalized 15 free trade agreements, and negotiated investment protection agreements with 129 countries, agreements on double taxation exemptions with 96 countries and 10 free trade agreements. In the coming decade, China will continue to establish more free trade areas, set up cross-border economic cooperation areas and actively facilitate the Doha Round of World Trade Talks.

According to China's State Information Center, considering the change in the global economic growth pattern, the decline of global imports, the shift of China's export structures, and the RMB annual appreciation of 2% vis-à-vis the US$, China's exports and imports are still likely to grow by 9.4% and 10% and its trade surplus to steady at around US$250bn during 2013-2022 (see Figure 2).

Figure 2: Outlook for China's Foreign Trade, 2011-2022



Source: Evaluation and Projections on the US and China's Economic Trend in the Next Decade, Department of Economic Studies, National Information Center, Beijing

China is bound to be a major investment destination as well. In recent years, the total stock of China's outbound investment has increased by an average rate of 44.6% per year. It has amounted to US$400bn in 2011, ranking 13th among major investment countries. The Asian Studies Center and Kissinger Institute on China and the United States[26] estimated that China's outbound investment will be US$1tr-2tr in the next 10 years. However, Chinese investors have been often discouraged by cultural differences, various rules and regulations, discriminatory policies and political pressures. It should thus be made clear that under current special circumstances, the inflow of Chinese investment is not only for the benefit of the investor but also for that of investees entrenched in high debt levels and lack of capital. In the future, stimulated by guidance and encouragement by the Chinese government and

25 Chinese Economy Through 2020, Morgan Stanley, 2010.

26 Daniel H. Rosen and Thilo Hanemann (2011), *An American Open Door? Maximizing the Benefits of Chinese Foreign Direct Investment*, Asia Society and Kissinger Institute on China and the United States

Figure 3: **Status Quo of China's Science and Technology Talent and Development Targets**

Year	R&D personnel (10,000/year)	R&D personnel (10,000/year)	R&D personnel per 10,000 members of labor force (persons/year/10,000 members of labor force)	R&D personnel per 10,000 members of labor force (persons/year/10,000 members of labor force)	Fund for R&D personnel per 10,000 members of labor force (RMB 10,000)	Fund for R&D personnel per 10,000 members of labor force (RMB 10,000)
2008	196.5	105.0	24.82	13.3	23..5	44.0
2015	280	150	33	18	38	71
2020	380	200	43	23	50	100

Source: Evaluation and Projections on the US and China's Economic Trend in the Next Decade, Department of Economic Studies, National Information Center, Beijing

through experience, China will be better equipped to invest abroad.

China to develop into an innovative economy: Aims to develop a modern educational system and more intellectual support to national development over the coming ten years

China has drawn up a host of long-term plans for talent development, educational reform and technological development. According to the plan, by 2020 the number of skilled people will rise by 58% from 114 million to 180 million. Human capital will account for 33% of overall economic growth and its large pool of talent will contribute 35%. Furthermore, investment into R&D will exceed 2.5% of GDP. It is expected that 60% of GDP growth will benefit from technological advancement. The protection of intellectual property rights has been and will continue to be improved to encourage innovation.

Improving the education system is essential to foster talent. By 2020, China's gross enrollment ratio will climb to 90% and the gross enrollment ratio of higher education will reach 40%. The average education years of China's working-age population will increase from 9.5 to 11.2 and the proportion of population that has received tertiary education will reach 20%, double that of 2009.

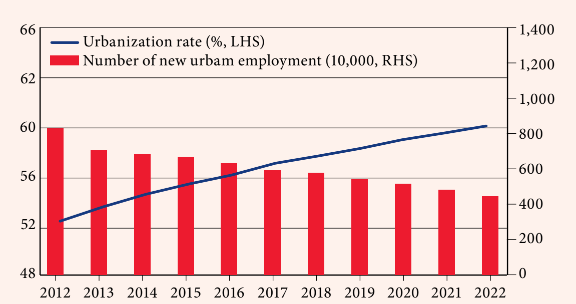
China to continue to facilitate industrialization and urbanization: Aims to match the urbanization level of developed countries' current level and industrialization to have entered into a new phase by 2022

Thirty years ago, 80% of China's population lived in rural areas. Now nearly half of the rural population has moved into cities. In 2011 the urbanization rate in China was 51.2%, realizing the target of the 12th FYP ahead of schedule. It will be 60% by 2022 if this momentum is maintained (see Figure 4). According to the World Bank report[27], in less than 20 years two thirds of China's population will be living in cities. Urban residents in China will pass the total urban population of the U.S., Japan and the E.U.. Such an urbanization process is unprecedented in scale and offers a tremendous impetus for China's economic growth.

The new industrial process will continue to accelerate supporting the country's move to industrialization. The pace of development is set to increase in such key areas as energy-saving and environmental-protection technologies, new information technologies, bio-technology, high-end equipment manufacturing, new energy, new materials and new energy fueled autos. It is stipulated in the 12th Five Year Plan that by 2015 the added value of strategic new industry to GDP will reach about 8%. By 2020 the ratio of non-fossil fuels will be 15% of total energy consumption. CO_2 emissions per GDP will be reduced by 40% to 45% than that of 2005.

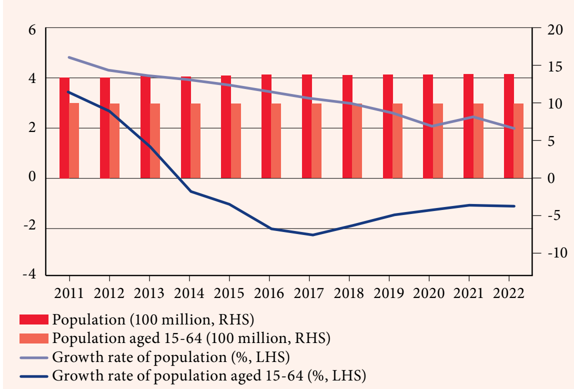
27 China 2030: Building a Modern, Harmonious and Creative High-income Society, the World Bank, 2012

Figure 4: **China's Urbanization Process, 2012-2022**



Source: Evaluation and Projections on the US and China's Economic Trend in the Next Decade, Department of Economic Studies, National Information Center, Beijing

Figure 5: **Forecast of China's Population Growth, 2011-2022**



Source: Evaluation and Projections on the US and China's Economic Trend in the Next Decade, Department of Economic Studies, National Information Center, Beijing, 2012

China to continue to maintain its focus on improving living standards, satisfy expectations of a better life and building a harmonious society

In 2022 GDP per capita in China will surpass US$10,000. In the next decade, the population growth rate will start to decline. By 2022, the total population will stay within 1.4 billion. There will be negative growth in the growth rate of the labor force aged between 15 and 64 (see Figure 5). Average life expectancy will increase by one year to 70.5 years old. Social security will be further enhanced. There will be a gradual improvement in basic medical insurance of urban households and increased subsidies for rural medical care, financed by the government.

A significant part of Chinese government policy will be to raise living standards of low-income and impoverished people and narrow the gap between the rich and poor. From 2011 to 2015 there will be an annual increase of over 30% of the lowest wage standard. In most areas the lowest wage standard will be over 40% of the average wages of urban workers. The minimum subsistence level for urban and rural residents will increase by over 10% annually. Thirty six million public housing facilities in urban areas will guarantee 20% of the housing needs of the impoverished. World Bank[28] projects that by 2030 the gap between the rich and poor will be reduced to 2.4:1 from 3.2:1 in 2010.

An 1% increase in China's GDP will provide jobs for about 1.3 million people in the cities. In the next decade, due to improved employment levels in the service industry and the upgrading of the manufacturing structure, job elasticity will be gradually reduced. The shrinking labor force and easing unemployment pressure will ensure the urban employment rate will remain stable.

China to become a country with a more marketized and internationalized financial system: RMB to play a larger role in international trade settlement, international capital market and international currency reserves

China is on course to the internationalization of the RMB. It started the reform on the exchange rate regime on 21 July 2005. Since then, the RMB has appreciated by over 30% vis-à-vis the US$ until May 2012. The RMB has become a convertible currency on current account and its convertibility ratio in capital account has exceeded 40%. At present, the share of China's trade settlement in RMB has over 10% of the total China has signed for currency swaps with over 10 countries and regions. The total currency exchange amount has reached RMB29.2bn. Hong Kong has become first RMB

28 Evaluation and Projections on the US and China's Economic Trend in the Next Decade, Department of Economic Studies, State Information Center, Beijing, 2012.

offshore trading center. Shanghai will follow Hong Kong and become another international financial center. There is no doubt that in 10 years China will continue to accelerate its financial reform to make it more market based. Currency exchange scale will be further expanded and Shanghai will play a predominant role in Asian financial transactions. International financial centers such as Singapore, London and New York will also become RMB offshore trading centers sooner or later.

Apart from facilitating the ongoing financial reform, China will also advance reforms of large state-owned financial institutions by establishing a modern corporation system and corporate governance structures. China will also raise the share of direct financing, deepen its reform on the initial public offering system and put in place a delisting system. To prevent financial risks, China is preparing the establishment of a counter-cyclical dynamic capital buffer and precautionary provisions, tightening the supervision and management of liquidity and leverage ratios so as to maintain the stability of the financial system.

China's continued problems and challenges: To maintain sustainable development, China will have to focus on the transformation of its economic development pattern in the coming decade

China has a large population and its resources are quite limited. It provides for nearly 20% of the world population with 7.9% of arable land and 6.5% of fresh water. There is a great disparity in the development between the urban and rural areas. Its economic growth relies excessively on the consumption of tangible resources. China is relatively weak in innovation and at the lower end of the global industrial chain. The living standards of Chinese people are relatively low and the social security system has yet to be improved.

China's economic growth will face a lot of pressure, such as inflation, resource shortages, environmental deterioration, an aging population and poverty. According to the UN's standard, China still has 150 million of its population below the poverty line. In accordance with international standards, China became an aging society in 1999[29]. In 20 years, it will come to an important turning point when population dividends might end. The contribution of labor quantity to economic growth will diminish.

At present, the shrinking of external demand exacerbates the over-capacity problem of the Chinese economy. The loss of comparative advantage has come into being. Against this background, massive export-oriented industries are in a state of over-capacity, including traditional industries such as textiles and new industries such as wind power equipment, silicon and solar panels. The higher labor cost deprives the comparative advantages of the labor-intensive manufacturing industry, while comparative advantages in technology and capital-intensive industries have yet to be set up.

Challenges in resources and environment are even more grave. Two thirds of cities have serious water supply problems. Almost one quarter of surface water is contaminated. Three hundred million rural people do not have access to safe water. According to the Morgan Stanley report[30], if China cannot solve its own problems successfully, it will inevitably encounter slow economic growth and persistent high inflation rate. Under these circumstances, China's average annual growth rate will only be 6.5% in the next 10 years. The report by the Carnegie Endowment for International Peace[31] also points out under the pessimistic scenario, in the first next five years China's average economic growth rate will be 7.1% and in the five years after that will only be 5.8%.

The risks of China's economic slowdown arises partly from the changes in the macroeconomic en-

29 Wang, Dewen, The Demand and Supply of Labor Force against the Backdrop of Low Birth Rate and China's Economic Growth, Chinese Journal of Population Science, vol 1, pp. 46-54, 2007.
30 Chinese Economy Through 2020, Morgan Stanley, 2010.
31 China's Economic Prospects 2006-2020, Carnegie Endowment for International Peace, 2007.

vironment, such as the fall in real estate prices, the contraction of domestic investment and the decline of exports induced by the global economic meltdown, and partly from economic structural problems of its own. The latter problems are more difficult to solve, requiring the government to further facilitate economic and structural reform, otherwise it is possible for China to fall into the 'middle-income trap'[32].

However, as the progress of China's urbanization, industrialization and agricultural modernization continues, China's huge domestic demand will be further released and propel the country's sustainable economic development. China is bound to make bigger strides in the next decade and will be better prepared to face up to every hurdle it comes across. It will shoulder more responsibility in dealing with global affairs and provide more public goods. A rising China will make its due contribution to the common progress of mankind.

32 Chinese Economy Through 2020, Morgan Stanley, 2010.

CHAPTER 5

THE STATE OF THE AMERICAN ECONOMY

Michael J. BOSKIN
Tully M. Friedman Professor of Economics and Senior Fellow, Hoover Institution, Stanford University, and Research Associate, National Bureau of Economic Research

Executive Summary

The American economy is making a slow recovery compared to recoveries from other deep recessions in the country's history. Americans are pessimistic about the future of their economy and concerned that their children's standard of living may be lower than their own. They are asking whether slow growth is the new normal.

While economic growth is projected to show marginal signs of improvement in the short run, this could incur risks from a number of domestic and international factors, including fiscal policy, Europe's recession, China's impact and an increasing array of regulation.

The polity is divided on issues of fiscal consolidations versus short-run stimulus, adjustments in taxes versus spending, and generally on the size and scope of government. As the baby boom generation continues to retire, labor force growth is slowing, gradually raising the ratio of retirees to workers prospectively exploding entitlement costs.

However, the U.S. still compares favorably to other developed economies – with less demographic pressure than in the E.U. and Japan, lower taxes and a less burdened welfare state than Europe's most prominent economies. Moreover, its strengths in technology, productivity and higher education, combined with a more flexible market economy, should pull it through the worst, especially if sensible policy reforms are enacted. But it will not be an easy ride.

The State of the American Economy

The Short Run

The American economy remains in an historically slow recovery from the financial crisis and the deep recession. Recoveries from deep recessions are usually sharp and swift, as in the 1970s and 1980s. Sometimes recoveries from financial crises are slow, though not always. The economy remains well below its potential (see Figure 1). Economic growth has averaged roughly 2% per year since the recession ended.

The good news is that the Blue Chip private forecasters project a modest pick up to of 2% to 3% – still far too low – for this year and the next. The Congressional Budget Office (CBO) has the economy growing at 1.4% this year and 3.4% the next; thereafter, 3.5% for a few more years. The U.S. government administration forecasts a more solid recovery of 2.6% in 2013 and over 3.4% in 2014.

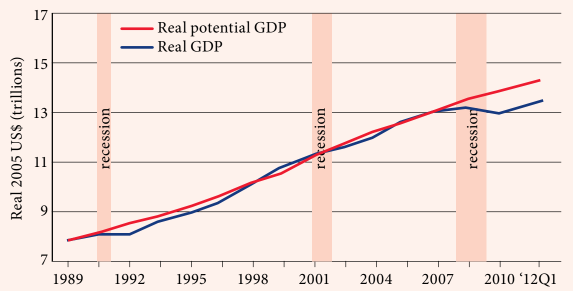
Of course, the U.S. economy, along with Canada's, is doing better than the other large advanced economies, some of which are contracting (see Figure 3).

While I am generally in agreement with the Blue Chip Consensus Forecast as a base case, I see considerable risk of economic growth getting worse over the next couple of years, along with some opportunities to do better.

The main risks in the short run stem from:

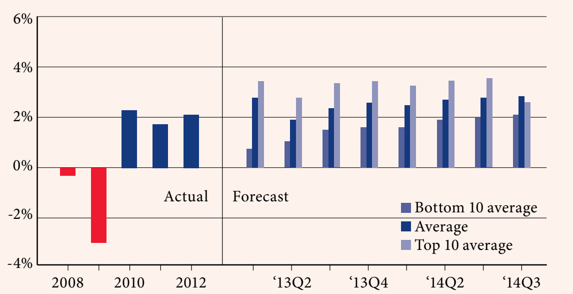
- Fiscal policy – especially any additional tax hikes – and the inability to agree on medium and long-run fiscal consolidation based primarily on slowing the growth of spending.
- Europe's deepening recession, which affects roughly 20% of U.S. exports. Its debt and banking crises remain a major problem, not just for Europe but for America and the global economy. Europe's banks are more thinly capitalized than American banks, but extend a larger share of credit in the economy as compared to credit markets.
- China – now the world's second largest economy and the first emerging market economy to be globally systemically important – is early in a political transition and must deal with a complex array of its own economic problems.
- Geopolitical issues – such as terrorism, nuclear proliferation confrontations (for instance, over Iranian oil) – a worst-case scenario could be severe enough to cause a recession.
- Continued deleveraging of the private sector is still in middle innings.
- There continues to be tight credit for small business.
- Additional regulation is continuing to raise the cost and uncertainty caused by the explosion of regulation in recent years. Wide swaths of the economy are being forced into non-commercial decisions by healthcare reform, the Dodd-Frank Act and Environmental Protection Agency regulation, whatever their non-economic benefits may be.
- Monetary-policy exit risk looms under current policy. The U.S. Federal Reserve (the Fed) is projected to have a balance sheet of US$4tr by 2014. Quantitative easing has hit the point of diminishing returns; still more excess reserves won't ease bank lending. Boosting asset prices risks bubbles that can burst and cause serious disruption. The Fed says it will raise interest on reserves to keep the banks from lending too rapidly, which would risk inflation. But especially given recent history, it is hard to imagine the public and the Congress sitting by while the Fed gives – not lends – tens of billions of dollars to the banks.

Figure 1: U.S. Real GDP, 1989-2012



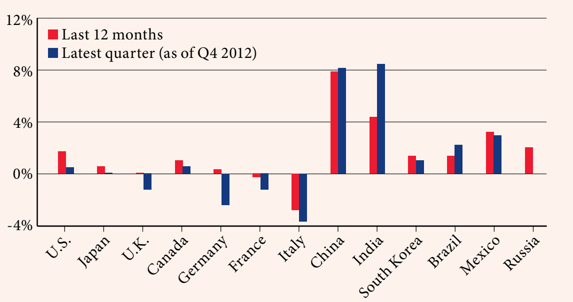
Source: BEA Web

Figure 2: Blue Chip Consensus U.S. Forecast, Quarterly 2013-14



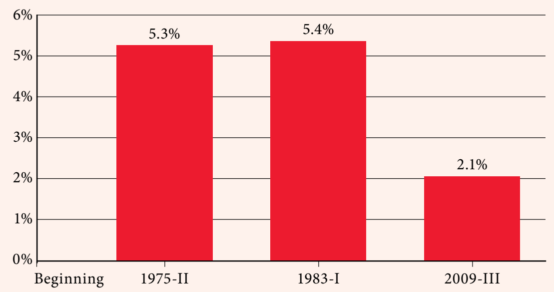
Source: Consensus forecast

Figure 3: GDP Growth Rates for Selected Countries (last 12 months and latest quarter, as of Q4 2012)



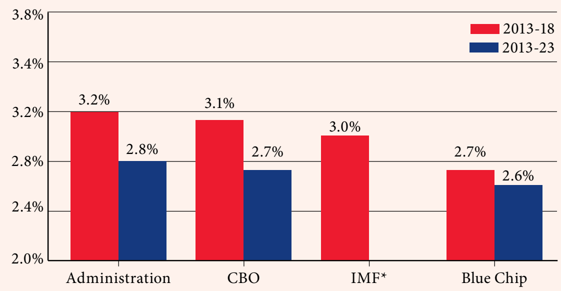
Source: The Economist

Figure 4: **Average U.S. Real GDP Growth, First 14 Full Quarters Since Severe Recession Trough**



Source: BEA Web

Figure 5: **Longer-Run Forecasts of U.S. Real GDP Growth, 2013-2023**



Source: White House, CBO, IMF, Consensus Forecast
** IMF's forecast only through 2018*

There is certainly lots of opportunity for the economy to do better than projected. Housing has finally begun to rebound. Although from a smaller base, it is now adding to – rather than subtracting from – growth. Fiscal drag from state and local tax hikes and spending cuts has likely peaked.

A technology revolution – 'fracking' – has created a boom in domestic oil and gas, which is generating jobs, incomes and government revenues. Combined with greater offshore drilling permits, Canadian oil and the once-unimaginable possible opening up of Mexico's oil industry to foreign investment – we have the opportunity to dramatically reduce the Organization of the Petroleum Exporting Countries' (OPEC's) strategic power. This is not just a potential economic revolution, at least, if policy or unsafe development doesn't kill it, but one of the most important geopolitical shifts in America's favor in decades.

Lots of cash is available on the sidelines, earning virtually nothing in relatively safe assets, on household and corporate balance sheets. Businesses are waiting for more favorable investment and hiring opportunities in a stronger economy and a more favorable expectation of the future tax and regulatory environment. In short, there is pent-up demand.

The recovery has been anemic compared to recoveries from the other two deep post-World War II (post-WW II) recessions. Those recoveries – in the mid-1970s and mid-1980s – were sharp and strong. As Figure 4 shows, gross domestic product (GDP) growth in the current recovery has been only 40% as strong. The jobs recovery has been running at only a 25% pace. In their first three and a half years, the earlier recoveries generated – adjusted for the growth in working age population – an average of 14.3 million jobs. The current recovery is 10 million jobs short. An unusually large number has left the labor force.

Turning attention to the long run, polls show Americans are more pessimistic than at any time since the stagflation of 1978-82. Record numbers are doubting that their children's and grandchildren's standard of living will be higher than their own. They wonder whether the economy will ever return to normal, or is stuck in a new normal of much slower growth or even Japanese-style long-run stagnation; whether the lurch toward a European-style social welfare state will stop; and whether some combination of monetary policy and exploding government debt will lead eventually to high inflation. They wonder if the depressed job market is primarily a cyclical problem or a permanent change in labor markets; and if high and rising government debt, due to the explosion of entitlement costs –perhaps following a few years of lower deficits and relatively stable debt-GDP ratios – will seriously erode their children's future prosperity.

Figure 5 presents alternative five and ten-year forecasts of U.S. economic growth. For the next five years, the average annual growth rate projections range from a low of 2.7% (Blue Chip) to a high of 3.2% (Administration), with the International Monetary Fund and CBO forecasts in between. In all cases, the ten-year forecasts are somewhat lower, reflecting two factors: first, the five-year forecasts reflect expectations of some catching up to potential GDP as the recovery from deep recession continues. Second, the projected growth of the labor force is slowing due to demographic factors, primarily the continuing retirement of the abnormally large post-WWII baby boom generation. (Note that the labor force participation rate of the non-elderly has fallen substantially and the extent of any rebound will reflect both an improving economy and changes promoting work incentives in the several major income support programs that have greatly expanded in the last several years.) As a result of this, projected slowing of labor force growth, real GDP growth at the end of the ten-year period in 2023 and presumably thereafter, is projected to slow further to 2.3% (Administration), 2.2% (CBO) or 2.5% (Blue Chip). With reasonable policy reforms providing greater incentives to work in government programs and the tax system and/or greater economically based immigration – no sure thing politically – the U.S. should be able to reach or exceed the high end of these forecasts.

The prospect for successful fiscal consolidation is at best mixed. Recent research reveals that fiscal consolidations in OECD countries since WWII which stabilize the budget without recession averaged US$5-6 of *actual* spending cuts per U.S. dollar of tax hikes. Spending cuts, especially in entitlements and transfers, were far less likely to cause recessions than tax increases and, in some cases, increased growth. A dozen recent studies in peer-reviewed journals, including one by President Obama's first Council of Economic Advisers' Chair, unanimously document the negative effects on the economy of higher taxes. Since the American economy differs in some ways from these other cases – it comprises over one-fifth of the world economy, interest rates are already low, the US dollar is the global reserve currency and many countries are consolidating simultaneously – we should be cautious about claiming too much for the short-run benefits of fiscal consolidation.

One successful example of spending control occurred in the mid 1990s under President Clinton and a Republican Congress, but more commonly, as in Washington and many states in the 2000s – the opposite occurs: a boom brings a surge in revenues and politicians are anxious to spread the spending far and wide. Ideally, spending reductions would be phased in as the economy recovers, but it is difficult to make a convincing case that they will indeed occur, given the political economy of the budget, the history of most previous budget agreements and the inability of one Congress to bind the next.

The Long Run

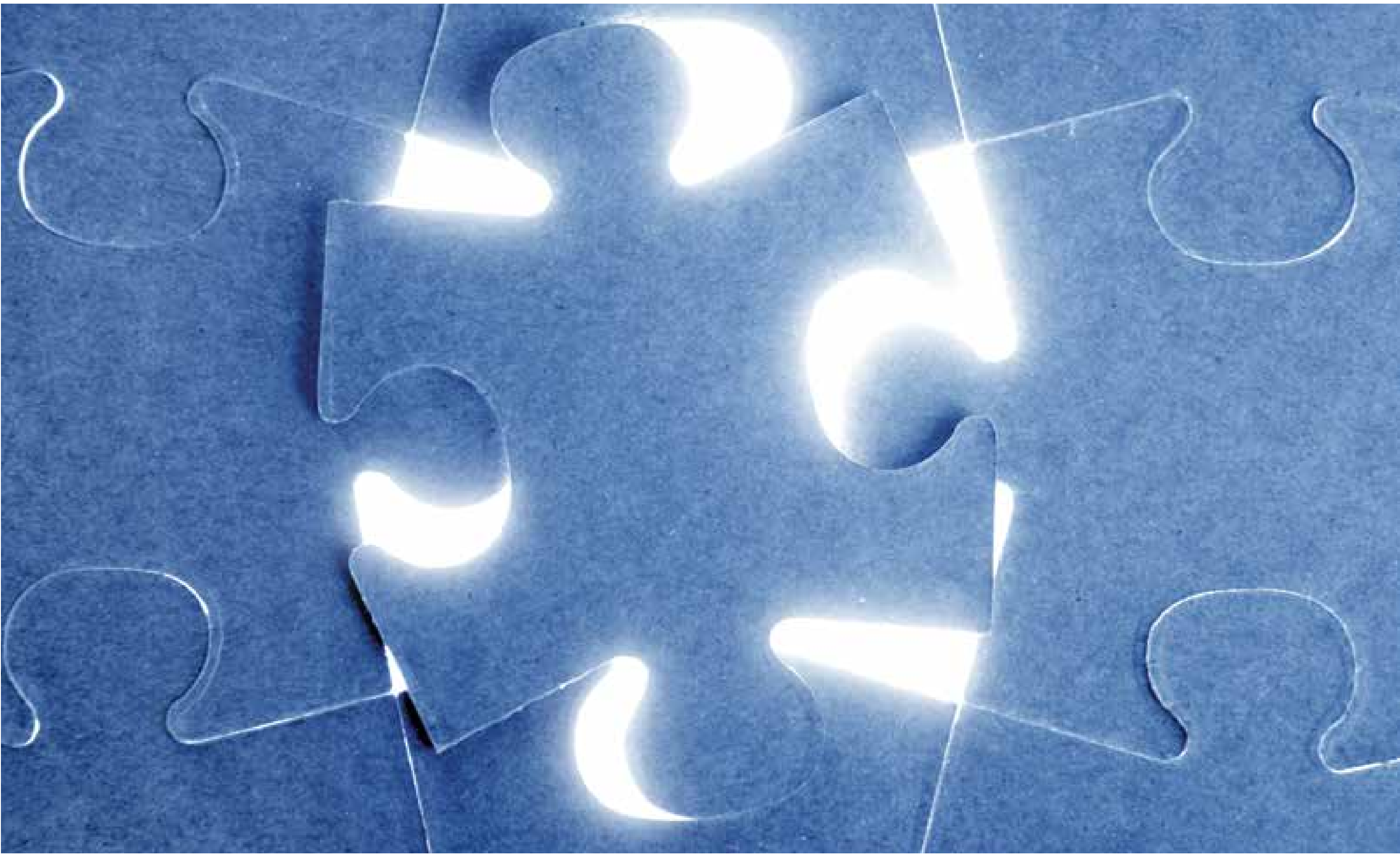
But the long-run prospects for the American economy are not nearly as bleak as much commentary suggests – the stock market hitting new nominal highs notwithstanding. These pessimists claim that the U.S. and the other major advanced economies face inevitable decline, given their fiscal, banking, trade, employment and demographic problems.

A more balanced view admits that these are all (partially) valid concerns and will be difficult to work through, especially European banking and debt and America's fiscal problems. But at any time in history, a similar list of allegedly insurmountable problems could be compiled – i.e. automation/structural unemployment in the 1960s; stagflation in the late 1970s to early 1980s; competition from Japan in the late 1980s – yet the innate flexibility and dynamism of a primarily market-based economy surmounted them all with waves of technology innovation and productivity enhancement, especially in the U.S.

The U.S. compares favorably to the other advanced economies because demographic pressure is less severe than in the E.U. and Japan (China too, eventually); taxes are lower and the welfare state less bloated in the U.S. than Europe. But America is currently expanding its welfare state and borrowing on an unprecedented scale (other than during WWII). Historically, the U.S. political system has swung the pendulum back to the center. Will it be too late this time? Close to half the population is receiving government benefits and only half are paying income taxes. That is not a healthy political economy of the budget to control entitlement costs.

Most importantly, the U.S. still leads in technology, productivity and higher education, and this strength extends far beyond IT. Fortunately, there are successful examples in recent history of the welfare state being rolled back to levels consistent with solid growth, for example, the U.S. in the mid 1980s-1990s and Canada in the mid 1990s-2000s.

In conclusion, I am cautiously optimistic about a continued, but too slow, recovery and decent long-run growth. But lots could go wrong.



Chapter 6

Difficulties and Impediments in the U.S.-China Economic Relationship

KWOK Kwok-chuen
Honorary Senior Research Fellow of the School of Economics & Finance,
University of Hong Kong
Former Government Economist of the Hong Kong SAR Government, 2004 to 2008.

Executive Summary

The U.S.-China economic relationship has developed rapidly during the past few decades. But given the vast difference between the two countries' economies, political systems, history, culture and values, major problems and disputes arise from time to time in their interactions.

In the commercial arena, U.S. businesses have often complained about China's unwillingness to open up its markets in a faster manner, about the unfair treatment foreign investors get in China, and the inadequacies of China's rules and regulations that put foreign investors at a competitive disadvantage. In recent years, the more important issues of concern include the inadequacies of China's intellectual property protection regime, cyber security problems, state-owned enterprises (SOEs) and market access issues.

China has defended its position by pointing out that while China has achieved very rapid development under the reform and opening-up policies for the past 35 years, the country as a whole is still a developing country with vast differences across geographies. China has also asked the U.S. to be patient as China is also keen to pursue further reform and modernization, but that these will take time, given the complexities of the issues involved and the need to introduce changes at a prudent pace.

Meanwhile, China also complains about the U.S.' restrictions on high-tech exports to China, the unwillingness of the U.S. to grant market economy status to China, and the politicization of events related to China's trade and investment dealings with the U.S., thus resulting in U.S. government actions that often appear arbitrary and protectionist.

Many of these problems and difficulties are legitimate concerns. They need to be taken seriously. Proactive attitudes in dealing with these grievances by the two governments should, in time, help to resolve some of them. But some of these disagreements will not be fully resolved in the short term. New issues will also arise in the future as the two countries engage with each other further in the coming years.

Notwithstanding these differences and arguments, the two countries have not allowed these difficulties to become impediments to the continued growth in the bilateral economic relationship, which has grown over the years to become one of the most important bilateral relationships in the world. Indeed, given that the two countries view each other with some degree of suspicion, a continued growth in the economic relationship will help to build mutual understanding and enhance mutual trust. Such growth in economic links will build the determination and common interests that will in turn enable the two countries to overcome the difficulties in their relations in the future.

Difficulties and Impediments in the U.S.-China Economic Relationship

Introduction

China decided to reform and open up its economy in 1978. Since then, China has followed a step-by-step approach to turn a centrally-planned and heavily government-controlled economy gradually into a 'socialist market economy'. Decentralization of economic decision-making power, introduction of market forces and the freeing up of controls over foreign trade and foreign investments are some of the key policy directions in the process. This reform and opening-up process takes place at varying paces in different localities and different sectors, depending on the readiness for reform of the regions or economic sectors concerned, and also depending on the development strategies of the government.

This step-by-step approach to reform has enabled China to develop rapidly in the past 35 years without going through a painful 'shock therapy' that marked the experience of many Eastern European economies in the 1990s. But this gradualist approach has also brought many difficulties and challenges. One such challenge is the co-existence of market-oriented and government-controlled elements in the economy for a prolonged period of time. For example, in the early days of reform, both government-controlled prices and free market prices co-existed, and this opened up opportunities for arbitrage opportunities to those in power and therefore also for corruption. Today, in many sectors in China's economy, government-owned enterprises compete with private enterprises, and this often leads to complaints about unfair competition, not only from foreign investors, but also from local entrepreneurs. Furthermore, some of these government-owned enterprises that enjoy preferential treatment would gradually become vested interests that would try to protect their privileges and post obstacles to further reform.

Another characteristic of China's development is that while some sectors and regions have developed very rapidly over the past 35 years, some other sectors and regions lag behind – sometimes far behind – the rest of the country. The need to take into account the needs of the less-developed sectors or regions often means that policies adopted by the government would be too conservative for investors who typically operate in the more developed sectors and regions.

China's economy has developed rapidly. But as with most societies, customs and practices, social values, cultural preferences and institutional capacity all change at a much slower pace. It takes a very long time to educate the people and to engineer changes in mindsets and behavior. The building up of the institutions and fabrics of an efficient, modern market economy will require not only new rules and regulations, new institutional structures and an abundant supply of experienced professionals in many professional services, but also the evolution of many unwritten codes of behavior, case laws and precedents, and a compliance culture.

Against the background of these complex issues, private enterprises in China have to overcome many unique challenges. While a rapidly growing Chinese economy offers many opportunities, the playing field is not always level and the rules of the game could change as the economy evolves and develops. It is understandable therefore that many foreign investors and private enterprises have complained about the difficulties and unfair practices when they do business in China.

Opportunities for and Difficulties Encountered in U.S.-China Economic Relations

The U.S. has played an important part in China's reform and development in the past 35 years. It has been the biggest final market for China's exports. American enterprises are a major group of foreign investor in China. In 2012, the bilateral trade in goods and services between the U.S. and China totaled about US$527bn. U.S. enterprises have cumulatively invested over US$70bn in China in the form of direct investment and Chinese enterprises have started to invest actively in the U.S. in recent years. The two countries also have a large amount of cross-border financial investment in each other's markets. Amongst all sovereign investors, the Chinese government is the largest investor in U.S. treasuries and agency securities.

Looking forward, basic economics predicts that bilateral trade will grow roughly in proportion to the sizes of the two economies, so it is not surprising that trade in goods and services between China and the U.S. is predicted to grow along with their economic growth. It has been projected that bilateral trade in goods and services could increase by two and a half times in the ten years to 2022[1]. Furthermore, as China's economy continues to develop, China's demand for high-tech products, high quality consumer goods and services, and professional, business and financial services, will all grow rapidly, and this will play into the strengths of U.S. enterprises.

Apart from trade, investment flows between the two countries are likely to enter a new phase of development[2]. While U.S. direct investment flows to China will continue, as in the past two decades, Chinese direct investments in the U.S. have entered a high growth phase. It has been projected that outbound foreign direct investments (FDIs) by Chinese enterprises could total more than US$1tr in the next 10 years, with a substantial proportion of these funds heading towards the U.S. The annual flow of FDI from China to the U.S. is expected to exceed FDI from the U.S. to China soon. Portfolio investment flows between the two countries have been restricted by China's foreign exchange and investment regulations in the past. But China is actively liberalizing such regulations in recent years, and as this process continues, the amount of portfolio investment flows between the two countries is likely to grow much faster.

The opportunities for further growth in U.S.-China economic cooperation, both in scale and in the range of possibilities, will be substantial. The cooperation has been of tremendous mutual benefit in the past and this will continue to grow significantly in the future. But it has to be recognized that the U.S. and China are two very different countries, in history, culture and values, as well as in economic and political systems. The development of the overall relationship between the two countries is often overshadowed by mistrust and differences on important global strategic issues. The two governments often view each other with some suspicion. In commercial relations, there are serious concerns and disputes raised from time to time by both sides, particularly from U.S. enterprises. Many of these concerns are – at least partially – valid, but some are exaggerated due to misunderstanding, politicization or misinterpretation of the facts.

The two nations must work cooperatively to address these issues seriously, but at the same time seek out new opportunities, if they are to continue to reap and enhance the mutual benefits of the relationship between them. It is therefore imperative that mutual trust be built-up and strategic differences be managed and addressed. Building mutual trust will take time; but the differences should not be allowed to stand in the way of closer economic cooperation between the two countries.

1 See Chapters 8 and 9 for further details.
2 See Chapter 13 for further details.

The business sectors of both countries have identified difficulties and impediments to expanding the economic relationship between them. These issues evolve over time as circumstances change. Recently, on the U.S. side, the major issues include the role of the SOEs in the Chinese economy – and state banks as providers of finance – market access into China, protection and enforcement of intellectual property rights and cyber security – and in particular, theft of commercial secrets. Chinese complaints include restrictions on U.S. exports of high-technology products to China, refusal by the U.S. government to grant market economy status to China, and U.S. government actions that often appear arbitrary and protectionist in the areas of both trade and investment.

These issues are real, and relevant to expanded economic engagement. In a commercial relationship as extensive and dynamic as that between the U.S. and China, there will be points of contention and concern. Candor in recognizing them, and a commitment to resolving them, is a sign of the maturing of the relationship. For these issues to be resolved, the two governments need to face them squarely. It is a difficult task, and will take time, but it must be done.

However, both sides should also realize that it is difficult to resolve some of these issues within a short time. Indeed, some issues may never be resolved directly as a standalone subject, but will have to be allowed to evolve through a dynamic and developmental process. It is therefore important to focus also on the future potential of an enhanced economic relationship through cooperation. Successful cooperation by the two countries will not only bring economic benefits to the two peoples, it will also help build the trust between them. The more the two countries are engaged with each other, the more mutual trust could be built and this in turn would help to narrow the differences between the two sides.

Grievances raised by the U.S. and Recommendations of this Study

Intellectual Property Rights Protection[3]

The U.S. side, and indeed international and domestic institutions in China, have pointed out that protection of intellectual property rights (IPR) – whether owned by foreign or Chinese nationals – has not been adequate in China in the past.

The Chinese side acknowledges the shortcomings in protecting IPR, but points out that, over the past decade, China has devoted enormous efforts to improve IPR protection. China's legal and other institutional arrangements are being strengthened, while entrenched cultures are being changed.

As China attempts to bolster its economic growth through science, technology and innovation, as provided for in the 12th Five-Year Plan, it is really in China's own interests to protect the intellectual property developed by its own citizens or enterprises. It should be noted that the Chinese government's commitment to eradicate the use of pirated software products in all central, provincial and municipal-level government units mark an important step in that direction. The proactive approach of the government to protect IPR nationwide is gathering momentum and support.

Recommendations

First, recognizing the need for a single cross-ministerial intellectual property organization within the State Council to fully implement government IPR policies, an organization called the "Leading Group for National IPR Protection" was formed in 2004. Now is the time to further strengthen the enforcement and coordination role of this organization to ensure full compliance.

Second, it may be useful for China to consider

3 See Chapter 14 for more details

establishing a special national court exclusively for intellectual property disputes. The court will have jurisdiction over the entire country and its decisions will be binding and enforced over the entire country. This will greatly facilitate the resolution and settlement of intellectual property disputes in China and strengthen the protection of IPR.

Third, both the U.S. and China should undertake to expedite the registration of approved patents by inventors from the other country upon their application. For example, the Chinese patent authority may consider accepting papers submitted to the U.S. patent authority in the process of approval of the U.S. patent, and vice versa, thus speeding up the process of approval in China and in the U.S.

Fourth, it is recommended that the Chinese government's commitment to eradicate the use of pirated software is applicable not only to the central, provincial and municipal governments, but also to the centrally owned and locally owned SOEs.

Finally, it is also proposed that there should be increased professional exchanges between the U.S. and China to raise the level of awareness and knowledge on the rights of owners of patents, brands and copyrights.

Cyber security[4]

Espionage by governments against one another is nothing new – it has been done from time immemorial and governments are likely to continue to use all means at their disposal, including through cyberspace. However, the use of cyberspace by individuals for commercial or industrial espionage – for theft or for disruptive activities – should be treated as a crime.

The U.S. alleges that the Chinese government has directly or indirectly organized such cyber attacks against the U.S. However, the Chinese government strongly denies this. In fact, China views itself as a victim of cyber attacks. Indeed, recognizing the enormous damage that can be done through cyber attacks, hacking has been made illegal in China. While the Chinese government denies its direct or indirect involvement in organizing such cyber attacks, the Chinese government acknowledges the possibility that individuals in China may be involved in hacking.

At this point in time, there is an urgent need for direct and open dialogue between the two governments. This could bring about better understanding and eventually an agreement to prevent cross-border cyber crimes and bring cyber criminals to justice.

There has been an ongoing "Sino-U.S. Cyber Security Dialogue" between two thinktanks, the Center for Strategic and International Studies (CSIS) in the U.S., and the China Institute for Contemporary International Relations (CICIR) since 2009. They issued a joint announcement in June 2012, summarizing their agreements and differences. Such dialogues are essential to improve trust and should be encouraged.

Recommendation:
Government-to-government dialogue between the two countries is essential to eventually bring about an agreement to prevent cross-border cyber crimes as defined above. Indeed, such dialogue should be held as soon as possible. The two countries should also take initiatives, together with the international community, to develop rules and regulations for international cyber space, which is lacking.

State-owned enterprises and market access[5]

The U.S. side has complained about the 'privileged' status of the Chinese SOEs and that competition with SOEs is not on a level playing field – either in China or overseas – because of their monopoly status and

4 See Chapter 14 for more details

5 See Chapter 16 for more details

their preferential access to credit. Moreover, there are also concerns that the SOEs are agents of the Chinese state and do not operate on purely commercial principles. These complaints are not limited only to the U.S. side. There are such complaints voiced internationally and by interested parties within China too.

The Chinese side pointed out that, from an historic point of view, the SOEs have been crucial in nation building in the last 35 years, and their work is not yet complete. In the meantime, they also point out that, after 35 years of reform and opening, and given the impact of the growing market economy, the influence of the SOEs is not as significant as before. Indeed, within China today, there are different views as to what the role of the SOEs should be going forward.

Today, the central government-owned SOEs are responsible for less than 15% of Chinese gross domestic product (GDP) and just over 8% of Chinese employment. They are particularly dominant in industries which are considered strategic and essential for national security. At the same time, the rapidly growing private sector in China is vibrant and has come to dominate the IT sector (Alibaba, Tencent, Huawei, Sina and Baidu) and the real estate sector (Dalian Wanda Commercial Properties, Vanke, Evergrande Group and Country Garden). Even in the energy sector, some private enterprises, such as ENN Energy and China Gas, are now providing domestic gas supply to hundreds of cities in China. There are now also private automobile manufacturers such as Geely and BYD in China which are playing increasingly active roles. Indeed, today China's private sector accounts for more than 50% of the country's GDP and 60% of the employment. The remaining 35% of GDP and 32% of employment that is not generated by the central government-owned SOEs and the private sector is generated by the agricultural sector, the self-employed, local cooperatives, local SOEs, etc.

On the question of market access, the U.S. side has asked for greater and easier market access, in terms of both exports of goods and services and direct investment in China. These complaints are in several areas. They are about the lack of transparency and a level playing field in government and/or SOE procurement, and about Chinese government restrictions on their acquiring controlling interest in a host of industrial and service sectors, in particular in the investment banking and the insurance sectors. Similar concerns have been expressed internationally and within China.

The Chinese side has responded by stating that – in terms of acquiring controlling interest – China's consideration of a step-by-step approach is in the interest of national security and social stability, and the need to protect infant industries. The Chinese side has asked the U.S. side to take a long-term view on their investments in China.

On government procurement, the U.S. side has appealed for a fair and open procurement process, as foreign companies and the Chinese private sector are sometimes excluded in this process. The Chinese side has made well known the government's direction that central and local SOEs should not be favored, and that all participants should be treated equally. However, enforcement needs to be strengthened.

Recommendation

Since the 18th Party Congress in November 2012 and the National People's Congress meeting in March 2013, the new leadership has repeatedly emphasized that, for China to succeed in the restructuring of its economy, continued deepening of its reform and changing the government's role to allow more competition in the marketplace is essential. As China further develops and reforms, it seems that U.S. businesses can play a constructive role in helping China's effort to develop its service sector economy.

Indeed, this restructuring will produce one of the largest marketplaces in the world. Overall, this is an opportunity for U.S. businesses. The American Chamber of Commerce in Shanghai's China Business Report 2012-2013 stated that, although U.S. businesses find China's regulatory and policy environment to be increasingly challenging, a record 91% of survey respondents have an 'optimistic' or 'slightly optimistic' outlook for their five-year business prospects.

Under these circumstances, we propose that thinktanks from both countries undertake a complete and total review of the subject of SOEs and market access from the U.S. and Chinese perspective. This will enhance understanding, and may even help develop recommendations to both governments on how the issues that are raised in the paragraphs above can be moved forward.

Grievances raised by China and Recommendations

Restrictions on high-tech exports

The restriction of exports of high technology products from the U.S. to China was introduced in 1989. Since then, U.S. exports of high-tech products to China have been declining as a share of China's total high-tech imports. Figures show that, in 2001, China's imports of high-tech products globally were valued at US$56bn, of which the U.S.'s share was 16.7%. By 2011, the value grew to US$461bn, with the U.S.'s share shrinking to only 6%. Ironically, over the years, China's demand for high-tech products has been met by imports from Europe, Japan, Israel and many other countries. It is estimated that Chinese demand for high-tech imports will continue to grow by over 20% per annum during the next decade.

It is recognized that certain high-tech products have military applications, and it is perfectly understandable that exports of such products should be restricted. However, export controls sometimes appear to be arbitrary and often result in the large Chinese market being left completely to non-U.S. competitors. Proposals were made to the U.S.' Bush administration as well as the Obama administration in the past, but the matter is still under review. Nothing has been forthcoming.

Recommendation
It is proposed that this review needs to be done with some urgency, and hopefully, a mutually beneficial outcome will emerge.

Market economy status

One recurring Chinese complaint is not being granted 'market economy status' by the U.S. (and the E.U.) despite the fact that market forces play a dominant role in determining almost all prices in China. Not having market economy status penalizes China in anti-dumping investigations because the domestic market price cannot be used to establish whether a country's exporter has been engaged in dumping or not. The use of an 'analog market price' in such investigations frequently biases the decision against the exporting country. China is such an exporting country.

According to China's World Trade Organization Accession Agreement, China will automatically be recognized as a 'market economy' by 2015. Thus, this issue will go away. It is China's view that there is justification to grant market economy status to China now. If this is done, it will be a great gesture of friendship as well.

Recommendation
As the market economy status of China will be recognized by 2015 anyway, we suggest the U.S. give China the market economy status as soon as possible.

Politicization of economic issues and other administrative actions

There are also Chinese complaints of the tendency in the U.S. to overly politicize economic issues on trade and investment between the two countries. Some U.S. government actions – including actions by the Committee on Foreign Investment in the United States – appear to Chinese enterprises to be arbitrary and protectionist in both trade and investment. This includes the imposition of special tariffs and duties on Chinese products, and the disapprovals of certain direct investments by Chinese enterprises, both private and state owned. Decisions based on national security grounds are understood and accepted, but they should be clearly explained and certainly not be based on political considerations.

Recommendation
We propose that clearer rules and regulations on investment approval processes be issued by the U.S. government.

Conclusion

China's economy is going through an important structural transformation process. To avoid falling into the 'middle income trap', the Chinese government understands the need to reform and open up further, to improve market structures and to promote fair competition, and to enhance innovative capabilities through strengthening IPR protection.

Both countries want to establish a pattern of secure, high-quality, sustainable growth and employment for their people. History in the past few decades has demonstrated that the bilateral relationship – built and adapted well over time – can make a material contribution to that shared goal.

U.S. President Barack Obama called Chinese President Xi Jinping in March 2013 to congratulate him on his new position and to discuss the future of the U.S.-China relationship[6]. President Obama underscored the importance of working together to expand trade and investment opportunities and to address issues such as the protection of IPR. In this context, the Chinese president highlighted the importance of addressing cyber-security threats, which represent a shared challenge. The two leaders agreed to maintain frequent and direct communication.

Similarly, in a meeting with U.S. Secretary of State John Kerry in Beijing in April 2013, China's President Xi said that the U.S. and China should work together to explore how to build a new relationship among major powers, and that both sides should insist on handling bilateral relations from a strategic and long-term perspective. President Xi hoped that the two nations would adopt a positive attitude and a vision for future development in promoting dialogue and cooperation, and in seeking common ground while respecting differences. He also pointed out that both sides should build further areas of cooperation that would build mutual engagement, take positive measures to address the concerns of both sides, and not to politicize trade and economic issues[7].

6 Refer to http://www.whitehouse.gov/the-press-office/2013/03/14/readout-president-s-phone-call-chinese-president-xi-jinping

7 Refer to http://www.gov.cn/ldhd/2013-04/13/content_2377091.htm (in Chinese)

Chapter 7

The Rise of the Middle Class in China and Its Impact on the Chinese and World Economies

Dominic BARTON
Global Managing Director, McKinsey & Company

"It is manifest that the best political community is formed by citizens of the middle class, and that those states are likely to be well-administered, in which the middle class is large."

Aristotle, 306 BC

Executive Summary

China is undergoing the most sweeping social and economic transformation the world has ever seen – and at a pace that is unprecedented. Rapid economic growth, accompanied by a huge and rapid shift to urban living, is rocketing incomes higher and creating a middle class with significant spending power. China's urban middle-class population alone, is larger than most of the countries in the world.

There are many strains associated with rapid urban expansion, including traffic congestion, pollution and chronic shortages of clean water and living space. China will need to manage these to sustain growth and accommodate the demand and aspirations of its new middle class. If it does, the rise of China's middle classes will have profound implications for its economy – and that of the world – and offer very significant opportunities for business in the U.S. Consider that China's middle class will be consuming goods and services valued at US$3.4tr by 2022 – or 24% of gross domestic product (GDP).

The Rise of the Middle Class in China and Its Impact on the Chinese and World Economies

The magnitude of China's middle-class growth is transforming the nation

As recently as 2000, only 4% of urban households in China was middle class[1]; by 2012, that share had soared to 68%. And by 2022, we expect China's middle class to number 630 million – that is, 76% of urban Chinese households and 45% of the entire population. China is fast becoming a middle-class nation.

Central to this huge surge in numbers of middle-class Chinese has been the country's industrialization and urbanization. China's middle-class expansion is largely happening in cities – and will continue to do so. Today, urbanites account for 52% of the entire Chinese population; by 2022, their share is likely to be 63%. There will be 170 million new urban residents between now and 2022. The average urban income per capita is roughly triple that in the countryside.

1 We have defined 'middle class' as those with annual household disposable income of between RMB60,000 and RMB229,000, a range that – in purchasing power parity terms – is between the average income of Brazil and Italy. Such of households are likey to spend 50% on necessities and have quite distinctive consumption pattens from other income segments.

Figure 1: The upper middle class will become the new mainstream

		Urban households – Millions			
Average annual household income (class) – US$		100% = 165 2002, %	100% = 256 2012, %	100% = 357 2022E, %	Change in number of households2002-22, millions
Affluent	>34,000	1	3	9	29
Upper middle class	16,000 to 34,000	2	14	54	188
Mass middle class	9,000 to 16,000	7	54	22	66
Poor	<9,000	90	29	16	-92

Source: McKinsey Insights China – Macroeconomic model update, April 2012

The expanding base of urban middle class is creating increasing numbers of skilled workers who are contributing to higher productivity. Their productivity is enabled, in turn, by urbanization – both 'hard' benefits in the form of infrastructure development and 'soft' benefits through higher provision of, for instance, education, healthcare and personal financial services. The enormous growth in China's urban infrastructure is well known. Perhaps less appreciated is the investment the government is putting into the soft enablers that will truly unleash the economic potential of the growing middle class. Take insurance, for example: as recently as 2005, fewer than 150 million people had basic medical insurance in China; today, this figure has mushroomed to more than 95% of the population. In the case of those urban citizens who have insurance, their out-of-pocket expenditure ratio has fallen from 59% to 35%. This is an example of the Chinese government recognizing that the quality of middle-class development is just as important as the number of middle-class citizens. A balanced urbanization approach will continue to be critical for robust middle-class growth.

The transformation of China into a country characterized by a productive middle class with a modern perspective will shape China's economic growth model over the next several decades into one in which productivity becomes an increasingly important growth engine. This will cement China's position as a core market for businesses.

The Structure of the Middle Class is Shifting

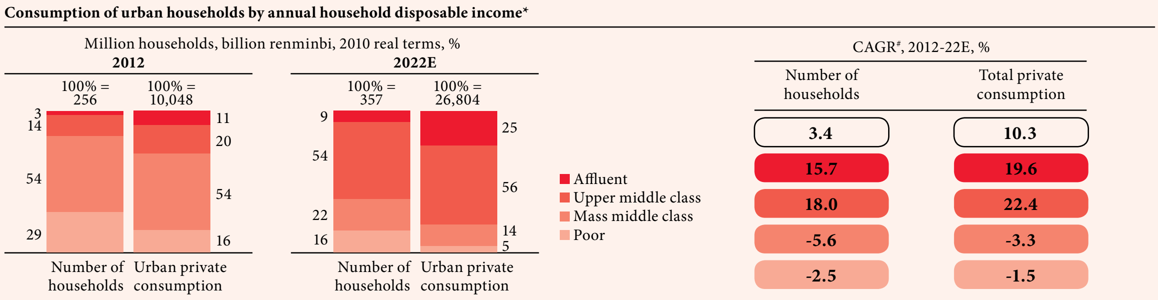
Apart from the sheer magnitude of the growth in the middle class, the pattern of that growth has changed and will continue to do so. Major shifts in the structure of the middle class are underway.

The 'upper middle class' will become the new mainstream

We have divided the Chinese middle class into two segments: the mass middle class – defined as those with annual household income of RMB60,000 to RMB106,000, equivalent to US$9,000 to US$16,000 – who in 2012 accounted for 54% of all urban households; and the upper middle class – with a household income of RMB106,000 to RMB229,000, equivalent to US$16,000 to US$34,000 – who accounted for 14 % of urban households in that same year (see Figure 1). The upper middle class already punches above its weight in terms of consumption, accounting for 20% of China's urban private consumption (see Figure 2).

This structure will look very different in ten years' time. By 2022, the upper middle class will account for 54% of total urban households and 71% of all middle-class households – becoming the

Figure 2: The Consumption Behavior of China's Middle-Class by Annual Household Disposable Income



** Brackets are defined by disposable income per urban household per year in 2010 real terms: affluent – more than $34,000 (equivalent to 229,000 renminbi; upper middle class – $16,000 to $34,000 (equivalent to 106,000 renminbi to 229,000 renminbi); mass middle class – $9,000 to $16,000 (equivalent to 60,000 renminbi to 106,000 renminbi); poor – less than $9,000 (equivalent to 60,000 renminbi)*
 # Compound annual growth rate
Source: McKinsey Insights China – Macroeconomic model update, April 2012

new mainstream. The upper middle class will account for 56% of urban private consumption and about 49% of total private consumption by 2022 compared with around 13% in the case of the mass middle class.

The structural shift toward upper middle class will naturally lead to a more mature and attractive market for businesses. Relative to the mass middle class, upper-middle-class consumers are more willing to pay a premium for quality products, have a high level of trust in well-known brands and are more likely to spend more of their income on discretionary products and services as opposed to basic necessities such as food, clothing and shelter (see Figure 2). They are also much more international in their outlook and open to – and even eager for – international brands.

Armed with higher incomes, the upper middle class are more-seasoned shoppers than their compatriots in the mass middle segment. Nearly 60% of upper middle-class consumers have bought digital cameras compared with just 40% of mass middle-class consumers. In the case of laptops, 51% of the upper middle bought this item, but only 32% of the mass middle. A similar pattern is evident in purchases of laundry softeners, where 56% of the upper middle bought this product compared with 36% of the mass middle class (see Figure 3).

Trends in the first-time purchase of basic product categories illustrate that the mass middle-class consumer is at an earlier stage of consumption behavior. Of this group, consumers who reported spending more on kitchen appliances, for example, 69% said this was the first time they had spent money on these products compared with only 24% of the upper middle class.

Stark disparities exist between the two middle-class segments in what makes a product attractive. Basic functional benefits appeal to mass middle-class consumers, two-thirds of whom mention 'durability' as one of their top five buying factors for a washing machine, compared with less than half of upper middle-class consumers citing this factor. In the case of smartphones, 62% of mass middle-class consumers cited durability in their top five considerations compared with only 36% of upper middle-class consumers. The mass middle-class are twice as likely to cite a low price as a factor in their purchase of products – including laundry detergent, smartphones and instant noodles – as are upper-middle-class consumers.

Emotional and social benefits are becoming increasingly important to upper middle-class consumers, who are more than 50% more likely than mass consumers to cite considerations behind their purchases of shampoo and mobile phones, such as

Figure 3: **There are stark differences in the characteristics of the upper middle and mass middle classes**

		Upper middle class	Mass middle class
Who they are	Household income	▲ 106,000 to 229,000 RMB	60,000 to 106,000 RMB
	% of consumers below age 35	▲ 45%	38%
What they buy	% of households own digital camera	▲ 58%	40%
	% of households using laundry softener	▲ 56%	36%
What they are looking for	Durability*	36%	▲ 62%
	Emotional benefits#	▲ 23%	16%
How they spend their money	Willingness to pay a premium†	▲ 49%	40%
	Trading up‡	▲ 39%	24%

** % of respondents who cited "durable" as one of the top five key buying factors in smartphone purchases*
 # % of respondents who felt emotional benefits (e.g., "shows my taste") were an important consideration in choosing a mobile phone
† % of respondents who say they "pay premium price for the best consumer electronic products, within bounds of affordability."
‡ % of respondents who spent more in real terms (i.e., for reasons other than inflation) by trading up for white home appliance
Source: McKinsey Insights China – McKinsey Annual Chinese Consumer Survey, 2012

'showing my taste' and 'makes me feel that my family is living a better life'.

China's expanding upper middle class is much more outward looking than the broad swath of Chinese citizens—a dramatic break from the past that has broad implications for their consumption behavior. This group is much more willing to buy foreign brands. In the case of personal digital gadgets, 65% of the urban upper middle class prefers foreign brands compared with 56% of the total urban population. Foreign-branded food and beverages are favored by 34% of upper-middle-class urbanites compared with 24% of all city dwellers. The upper middle class is much more likely to travel abroad—over the past year, 10% of the urban middle class has made trips overseas compared with 3% of all urban Chinese. In 2011, close to half of these consumers have increased their spending on traveling abroad by an average of 36%.

This international perspective reflects a number of factors. Upper middle-class citizens are better educated and more likely to be able to speak a foreign language – 34% of the upper middle class has a bachelor's degree or above and 26% can speak and understand English. Widespread adoption of the internet is another important ingredient in this new internationalism; 68% of the middle classes have access to the internet compared with 57% of the total urban population. Of these middle-class internet users, 80% have been using this medium for more than four years.

The Chinese market will continue to retain its own unique characteristics, but as the upper middle class becomes the new mainstream, we should expect it to bear an increasing resemblance to other international mature markets.

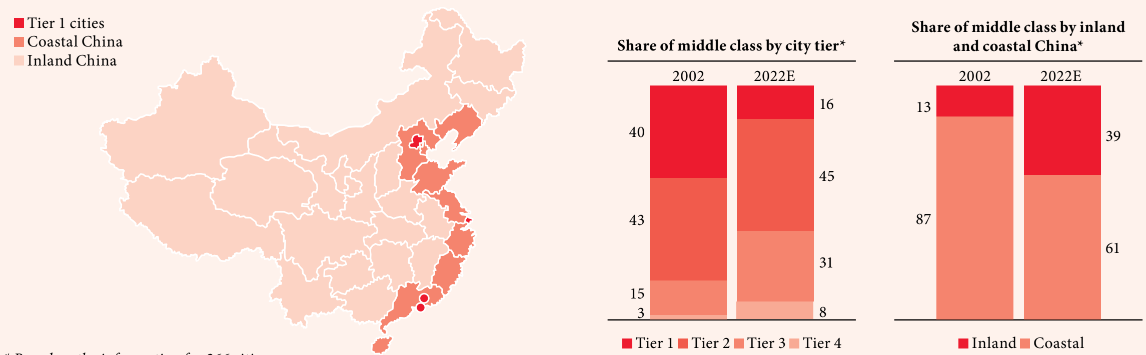
The geographic center of middle-class growth is shifting

Businesses looking to serve these consumers will need a granular understanding of where the greatest growth in middle-class numbers will be – and this is changing.

In 2002, 40% of China's urban middle class lived in the four tier 1 megacities of Beijing, Shanghai, Guangzhou and Shenzhen[2]. However, this share is expected to decline to 16% in 2022, and the share will rise in tier 2 and tier 3 cities. Tier 2 cities were home to 43% of the middle class in 2002, but that share should rise to 45% in 2022. Tier 3 cities host-

2 China's four tier 1 cities have GDP of more than RMB932bn and populations of 10 million or more. Tier 2 cities have GDP of more than RMB120bn and, on the whole, populations of between 2 million and 8 million. Tier 3 cities have GDP of more than RMB22bn and populations mostly between 400,000 and 1.5 million. Tier 4 cities have GDP of less than RMB22bn and largely have populations of between 100,000 and 900,000.

Figure 4: **The geographic center of middle-class growth is shifting**



** Based on the information for 266 cities*
Source: McKinsey Insights China – Macroeconomic model update, April 2012

ed only 15% of China's middle-class households in 2002; by 2022, that share should rise to 31% (see Figure 4).

This shift in the weight of the middle-class households from megacities to medium-sized cities means that there is also a movement from the huge urban centers of the coast to urban areas inland. In 2002, only 13% of the urban middle class lived in inland provinces, but that number is expected to rise to 39% in 2022.

Examples of two small cities illustrate the magnitude of this change. Jiaohe in Jilin province is a northern inland tier 4 city, which is growing quickly due to its position as a transportation center at the heart of the Northeast Asian economic zone. It is also abundant in natural resources such as Chinese forest herbs and edible fungi, and it is China's most important production base for grape and rice wine. In 2000, fewer than 900 households out of 70,000 were middle class; by 2022, the city is expected to grow to 160,000 households, and about 90,000, or nearly 60%, are predicted to be middle class. Another city, Wuwei in Gansu province, is an inland tier 4 city with the advantages of being within the Jinchang-Wuwei regional development zone; having rich sources of minerals – with nearby graphene and ilmenite reserves among the largest in the nation; and it is at the junction of two railways and several highways. In 2000, less than 900 of 87,000 households were middle class. By 2022, the city is expected to grow to 650,000 households, of which around 390,000, or 60%, will be middle class.

A historical transition to post-reform G2 middle-class consumers is taking shape

A new generation of middle-class consumers born after the mid-1980s is emerging. While their parents lived through many years of a shortage economy and are primarily concerned about building economic security for their families, members of 'Generation 2', (G2) were born and raised in relative material abundance. With a stronger sense of security, the emerging G2 consumers are more interested in 'living it'. Most of them are also the only child in the family due to the strict enforcement at the time of the one-child policy.

McKinsey & Company (McKinsey) research has found that members of G2 are much more confident consumers than their parents and are more willing to pay a premium for the best products; indeed, they regard expensive products as better products. They are happy to try new products and eager to experience new technologies. Compared with their parents, they are more loyal to the brands they trust and prefer niche over mass brands. Importantly, they take advantage of more sources of information than

Figure 5: **The consumption behavior of the G2 middle class is significantly different from that of the previous generation**

	G2 upper-middle-class consumers	Example of survey statement	G2 upper middle class	Non-G2 upper middle class
How confident they are	Confident about their financial future	"My household income will significantly increase in the next five years"	▲ 64	55
How they spend	Are willing to trade up	"Within a range of prices I can afford, I always pay a premium price for the most expensive and best products" – personal care example	▲ 41	34
How they value innovation	Happy to try new products	"I am typically the first or second person I know to try new things"	▲ 29	23
How important is brand to them	Are more brand loyal	"When I buy a variety of consumer electronics, I would prefer to purchase the products from the same brand"	▲ 46	42
How they collect information	Rely on the Internet more to conduct search	"Before purchasing new products, I always check the Internet for other people's usage experience/ comments/ feedback" – personal care example	▲ 21	12

Source: McKinsey Insights China – McKinsey Annual Chinese Consumer Survey, 2012

the previous generation, and they rely heavily on the internet for product information (see Figure 5).

This generation is becoming a crucial consumer group for the Chinese economy. In 2020, 35% of total consumption in China is expected to come from these young consumers who will be major purchasers of leisure, personal services, travel and high-end hospitality.

The Growth of China's Middle Class is Having a Profound Macroeconomic Impact

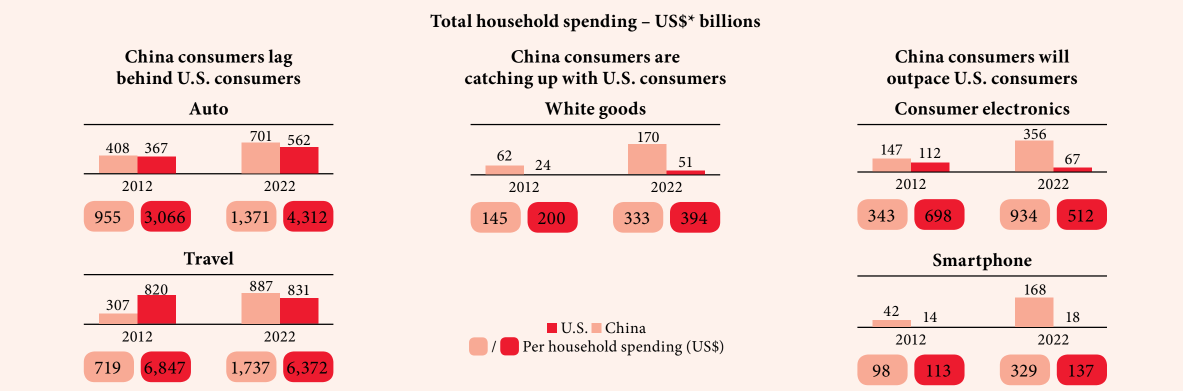
The rise of China's middle class has already been a powerful driver of economic growth, underpinning expanding domestic consumption and rising private investment, as well as serving as an incubator for innovation through improved educational attainment.

Today, the middle class already accounts for 74% of urban China's private consumption and 58% of the private consumption of China as a whole. In terms of its contribution to GDP, the middle class accounts for 24% of urban GDP and 20% of China's total GDP. By 2022, private consumption by China's middle class is expected to reach US$2.3tr, more than double the level of 2012, and represent 24% of GDP. The consumption of the upper middle class will grow more than sevenfold and contribute 49% of total private consumption of urban China.

The rise of China's middle classes will also influence the quality of China's growth in the years ahead by boosting productivity. They are already driving explosive growth of personal services. The service sector has contributed almost 40% of the economy's productivity growth over the last decade.

There is every reason to anticipate that the middle-class growth premium for China is only in its early stages. As the Chinese middle class receives better education and healthcare and broadens its perspectives through fuller global integration, it will form the largest pool of skilled talent in the world. This development will provide the basis for innovation and technological advancement in China, enabling industry to upgrade and climb the value chain. The growth of personal financial services will put middle-class consumers' massive collective wealth to use, creating a powerful, and likely more efficient, resource-allocation system to run in parallel with the state financing system, enhancing capital productivity. And as consumers close the gap with their Western counterparts – in their retail and restaurant purchases, visits to beauty salons, the use of private tutors and train-

Figure 6: **Consumer Market Size and Household Spending by Category**



** Based on the information for 266 cities*
Source: Euromonitor, IHS Global Insight, McKinsey analysis.

ers, and health service providers – there will be a considerable boost to the creation of new urban jobs and significant new opportunities for business. An increasingly prosperous and productive middle class will continue to be the key to China's sustainable growth in the long term.

Rising Numbers of Middle-Class Consumers offer Large Market Opportunities for Business

Strong, continuing growth in the size of China's middle class and its rising incomes will create exciting market opportunities for global consumer companies in a range of sectors that supply goods and services to these new consumers, as well as in all aspects of urban infrastructure construction. China's spending on white goods is catching up with that of U.S. consumers and is set to outstrip U.S. spending in the case of consumer electronics and smartphones by 2022 (see Figure 6).

Businesses Can Capture a Wave of Consumers Trading Up

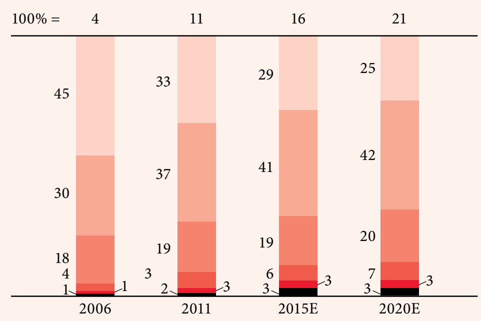
The penetration of most product categories has already increased significantly over the past five years. The penetration of high-tech products has soared, particularly in the upper middle class. For example, the penetration of flat-screen televisions in the upper middle class has jumped from 24% in 2007 to 68% in 2012. In 2007, 10 million flat-screen TVs were sold in China; by 2012, sales had jumped fivefold to 50 million – more than the 42 million units sold that year in North America (the U.S. and Canada). In the case of smartphones, penetration has soared from zero in 2007 to 50% in 2012.

A related development is an appreciable rise in the number of consumers expressing willingness to pay premium prices for good quality. Close to half of upper middle-class consumers claimed that they "always pay premium prices for the best product, within the bounds of affordability", compared with around 40% of all respondents.

A good case in point would be the auto market. China's passenger vehicle market is likely to continue its double-digit growth until 2015 before slowing down to a still healthy growth rate of around 6% from 2015 to 2020. Robust current growth is due to three major factors: urbanization, increasing household incomes and the fact that the penetration of autos is still rather low. The most prevalent price for autos is between RMB80,000 and RMB250,000 (US$12,000-40,000); about 60% of vehicles fall into this price bracket. At this price, growth is coming largely from first-time lower middle-class buyers.

Figure 7: **A pattern of trading up is clear in the auto market**

Price segment* share (sedan and sport utility vehicles combined) – Million units; %



Segment	CAGR# 2006-11	CAGR# 2011-15	CAGR# 2015-20
<80,000	16%	7%	3%
80,000 to 150,000	29%	13%	7%
150,000 to 250,000	25%	10%	8%
250,000 to 400,000	31%	11%	9%
400,000 to 600,000	49%	12%	9%
> 600,000	42%	12%	10%

** Already excludes the impact of inflation*
 # Compound annual growth rate
Source: Registration database; McKinsey Granularity of Growth analysis; McKinsey Insight China; McKinsey analysis

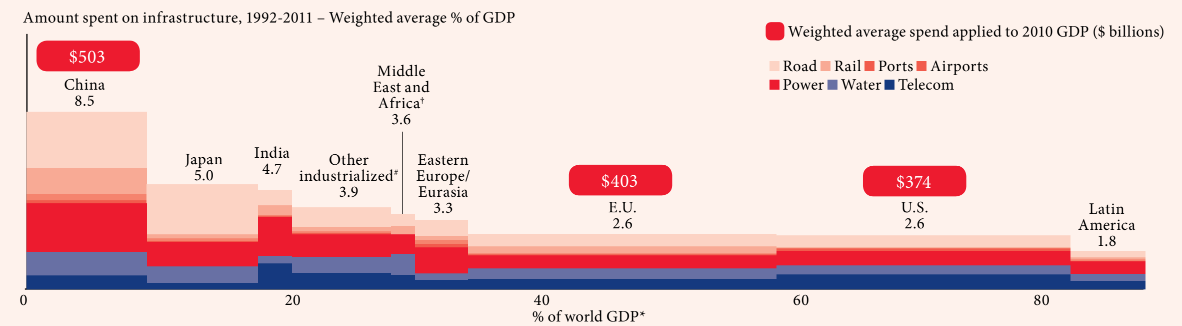
Over the next ten years, we anticipate a wave of 'trading up' as more consumers move into the upper middle class. During this period, sales of premium cars are likely to pick up. In 2011, the penetration rate of premium cars was 8%, overtaking Japan and South Korea. In 2016, McKinsey anticipates that China will overtake the U.S. as the world's largest market in terms of volume of sales of premium cars (see Figure 7).

While growth in penetration rates for a range of products and services will continue, trading up will become an ever more important theme of China's evolving consumer landscape as the middle class expands. In McKinsey's 2012 consumer research, around one-third of upper middle-class respondents said they spent more over the past year. Inflation, across the categories, explains around 60% of that increased spending, but around one-third of those reporting higher spending in real terms cited trading up as the main reason[3].

According to McKinsey's consumer research, Chinese people tend to associate good quality with well-known brands and high prices[4]. For that reason, they are more willing to trade up if affordability allows. In 2012, 39% of the upper middle class traded up on white home appliances, including refrigerators, air conditioners and washing machines, compared with 23% of the urban Chinese as a whole. Take washing machines as an example: the upper middle class spent an average of RMB2,100 for the latest purchase in 2012, RMB300, or 17%, more than in 2009 – yet during this period, the average price of this item rose by less than 5%. We can also observe trading up in the case of black home appliances, including flat-screen televisions and home theater systems – 52% of the upper middle class said they had traded up on such items in 2012, 23% higher than the total urban population. Further, a great deal of trading up has been seen in leisure and entertainment and, again, the upper middle class was at the forefront of this activity. Nearly one-third of those who reported higher real spending on leisure and entertainment said they had traded up in 2012, a significantly higher figure than the 19% who reported doing so in 2011.

3 "From Mass to Mainstream: Keeping Pace with China's Rapidly Changing Consumers", McKinsey and Company, "McKinsey Insights China 2012 Annual Chinese Consumer Report", September 2012.
4 "McKinsey Insights China 2012 Chinese Consumer Research" surveyed more than 10,000 Chinese households across 44 cities and covered around 50 product categories and 300 brands, to understand consumption habits, preferences and unmet needs.

Figure 8: China has overtaken the United States and the European Union to become the world's largest investor in infrastructure



** Percentage of 2010 world GDP generated by the 86 countries in our analysis*
 # Australia, Canada, Croatia, Iceland, Lichtenstein, New Zealand, Norway, Singapore, South Korea, Switzerland, Taiwan (Chinese Taipei), and the United Arab Emirates
† Excludes unusually high port and rail data for Nigeria; including these data brings the total weighted average to 5.7%
Source: Global Water Intelligence, International Energy Agency, International Transport Forum, McKinsey Global Institute analysis

A Window of Service-Sector Growth has Opened Up

The service sector is expected to account for half of China's GDP in 2022, up from 44% today, partly driven by the fact that China's upper middle class becomes increasingly willing to spend money on services such as entertainment, travel, leisure, care services for the elderly, security services and equipment (e.g. burglar alarms and security cameras), education and logistics. All these sub-segments are expected to grow more quickly as a result. Now is the time for global companies to consider creating a footprint or increasing their existing presence in these segments.

We are already beginning to see a rising trend in the consumption of services. In 2011, 41% of upper middle-class consumers spent, on average, around RMB70 more per month on dining out, for instance, than they did the previous year. This compares with only 15% of U.S. upper middle-class consumers who have increased their spending on dining out year-on-year. The same pattern appears in the case of travel. In 2012, 27% of China's upper middle-class consumers spent more than in the previous year on travel, compared with 22% of the lower middle class and 25% of the upper middle class in the U.S.

Also in 2012, China's upper middle class accounted for 18% of discretionary consumption – such as education, leisure, recreation, healthcare and financial services – which represented 35% of their annual household consumption. In 2022, the upper middle class is expected to account for 52% of discretionary consumption – that is, 42% of their annual consumption. In the case of education, 37% of China's upper middle class spent an average of 25% more in 2011 than in 2010. On healthcare, 68% of the upper middle class has purchased or used healthcare services or products, 7% higher than the average in the urban population as a whole.

Financial services are likely to see rising consumption, reflecting the fact that household financial assets are growing at an annual rate of around 20%. We expect such assets to rise from US$2.6tr in 2011 to US$17tr in 2022. In the case of insurance, the urban middle class may contribute to about 50% of insurers' gross premiums in 2022.

Huge Infrastructure Capacity Needs are Another Business Opportunity

Beyond consumer goods and services, we see huge opportunities in all aspects of urban infrastructure. Today, the challenges facing urban China are shifting. Cities can no longer rely on abundant land and migration to cities and need to focus on the quality and productivity of urbanization. Cities need to improve their resource productivity to slow the rising demand for water, energy and other resources. They need to control air and water pollution and reduce waste to make the cities livable for the middle classes, as well as environmentally sustainable. And they need to continue to raise the quality of urban transport, housing and public services to meet the rising expectations of increasingly wealthy citizens.

For businesses, these demands lead to opportunities in the area of construction, including the building of subways and related machinery, roads and bridges, and waste-water treatment systems. China has already overtaken the U.S. and the E.U. to become the world's largest investor in infrastructure (see Figure 8). Global companies with expertise in these areas now have the opportunity to help cities set a course for the next wave of urbanization.

To give an idea of the scope of these opportunities, one need only to look at the government's current plans. In the case of railways, for example, there are plans to construct eight passenger lines, a number of intercity rail traffic trunk lines, a double line of the Lan-Xin Railway and interregional trunk lines such as the Zhengzhou-Chongqing lines. China also plans to complete an express railway network of 45,000 km to link cities with populations of 500,000 and more, as well as trunk lines in western China including the Lhasa-Shigatse Railway. Other plans include building urban rail traffic network systems in Beijing, Shanghai, Guangzhou and Shenzhen, and completing urban rail traffic systems in Tianjin, Chongqing, Shenyang, Changchun, Wuhan, Xi'an, Hangzhou, Fuzhou, Nanchang and Kunming. In addition, China plans to construct backbone lines in Hefei, Guiyang, Shijiazhuang, Taiyuan, Jinan and Urumqi. Civil aviation is another area of huge planned expansion. Current plans include the construction of a new airport in Beijing and the expansion of airports in Guangzhou, Nanjing, Changsha, Haikou, Harbin, Nanning, Lanzhou and Yinchuan. The feasibility of new airports in Chengdu, Qingdao and Xiamen is being studied.

Cities will also need new buildings to house urban households and provide for their retail, restaurant and office space demands. We expect Chinese cities to need 30,000 sq km more residential and commercial housing floor space and 20 billion m^3 of municipal water in the largest cities alone – and almost 200 million 20-foot-equivalent units of additional container shipping capacity in China's ports just to meet the rising needs of urban consumers.

The opportunity for business is not just in building new infrastructure, but also in planning, operating and financing it. For example, Chile, the Philippines, South Africa, South Korea and Taiwan are developing frameworks that facilitate a greater role for private players in project and portfolio planning. The frameworks accommodate the growing number of unsolicited proposals these nations are receiving from private contractors and typically include bonus opportunities or special procurement processes that reward the proposer for laying the groundwork[5]. Another opportunity for business exists in financing infrastructure, including transportation and waste management. This is a time of huge global need for infrastructure, which coincides with a widening of interest-rate spreads on loans, particularly for greenfield projects that make up most of the project pipeline in developing countries, including China[6]. Furthermore, companies can work with cities to ensure that they have access to world-class information and communications technology (ICT) – a competitive requirement for successful cities. These include utilities and infrastructure with automated monitoring and controlling systems that reduce leakage, speed up response time to failures and dramatically improve overall

5 "Infrastructure productivity: How to save $1 trillion a year", McKinsey Global Institute and the McKinsey Infrastructure Practice, January 2013.

6 Ibid. McKinsey found that the world needs to spend US$57tr on transport, power, water and telecommunications between now and 2030, an increase of nearly 60% from the US$36tr spent over the previous 18 years.

system efficiency. The private sector is already involved in a number of initiatives in the energy-saving arena and in the search for green urban living solutions.

Conclusion

China's rapidly growing middle class is transforming the nation and will continue to do so for many years to come. Their spending power, coupled with an outward-looking and adventurous attitude toward new brands, including those from overseas, is potentially a huge new opportunity for U.S. companies. To make the most of new markets, those businesses need to get to know these new Chinese consumers and keep track of how their behavior is evolving. But it is not just consumer-facing companies that can tap new potential in China. As cities continue to grow, there are many opportunities in helping urban China to develop the infrastructure it needs to support that growth, and to develop all the services that characterize modern cities around the world.

Author Biography

Dominic Barton is the Global Managing Director of McKinsey & Company. In his 27 years with the firm, Dominic has advised clients in a range of industries including banking, consumer goods, high tech and industrial. Prior to his current role, Mr Barton was based in Shanghai as McKinsey's Asia Chairman from 2004 to 2009 and led the Korea office from 2000 to 2004. He leads McKinsey's work on the future of capitalism, long-term value creation and the role of business leadership in society. He is an active participant in international forums and has authored articles and books on his specialist subjects, with particular focus on China and Asia.

Chapter 8

Analysis and Forecasts for U.S.-China Trade to 2022

Xikang CHEN
Cuihong YANG
Kunfu ZHU
Yuwan DUAN
Lianling YANG
Li ZHENG
The Academy of Mathematics and Systems Science, Chinese Academy of Sciences

Executive Summary

Since China's reform and opening up, its economy has experienced 30 years of rapid growth. During the 34-year period from 1978 to 2012, the average annual gross domestic product (GDP) growth rate was 9.8% – much higher than other major world economies – and China's economy in aggregate now ranks second in the world, next to the U.S. Along with fast economic growth, China's foreign trade has also experienced rapid development: the total import and export of goods has increased from US$20.64bn in 1978 to US$3,866.8bn in 2012, at an annual average growth rate of 16.6% – much higher than the economic growth rate over the same period. The rapid growth of China's foreign trade has provided a significant boost to economic growth. With China as the largest developing country in the world and the U.S. as the largest developed country, U.S.-China bilateral trade has experienced rapid development. According to Chinese Customs statistics, in 2012 total U.S.-China trade reached US$484.68bn, of which US$351.79bn was China's exports to the U.S.; and China's imports from the U.S. was US$132.89bn. In the period 1978 to 2012, the average growth rate of China's total imports and exports to the U.S., imports from the U.S. and exports to the U.S. were 19.97%, 23.47% and 16.58% respectively. As such, China and the U.S. have become each other's most important trading partners[1, 2].

In the next ten years, from 2012 to 2022, the question will be whether China's rapid economic growth will continue as it has over the past three decades, or will the growth rate drop substantially? Will China's foreign trade and U.S.-China trade continue to see growth rates decelerating as seen in recent years? This article will consider the favorable and adverse factors affecting China's economic growth, foreign trade and U.S.-China trade from 2012 to 2022, in order to analyze the operating environment of the Chinese economy and foreign trade in the next decade, and make a quantitative forecast for the major economic and trade indicators. The research results show that for the period 2012 to 2022, China's economic growth will experience a slowdown, but will continue to maintain a steady and comparatively rapid growth rate, with the average annual GDP growth rate of about 8%; there will be a very significant decline in the growth rate of China's foreign trade and trade with the U.S. in the 2002 to 2012 period, with the average annual export growth rate of around 10%, and average annual growth rate for exports of goods to the U.S. of around 7%.

1 Unless otherwise specified, all references to China in this paper means Mainland China.
2 This data is soured from the General Administration of Customs of the People's Republic of China. http://www.customs.gov.cn/1

Analysis and Forecasts for U.S.-China Trade to 2022

Forecast for China's Economic Growth, 2012-2022

Since China's economic reform and opening up, the country has experienced rapid economic growth. In the 34-year period from 1978 to 2012, the average annual GDP growth rate was 9.8%, making China one of the fastest growing economies in the world. According to our forecast, in the next 10 years, i.e. in the period 2012-2022, there will be a substantial slowdown in the economic growth rate. The main reasons for the declining growth rate are as follows:

First of all, the increase in the size of the economy is likely to result in a slowdown in the growth rate. In 2012, China's GDP already reached RMB51.93 trillion (US$8.26 trillion), ranking second in the world. On the basis of such a large aggregate economic output, it will be very difficult to maintain the rapid growth of the past 10 or 30 years.

Secondly, with the slowdown in the growth rate and the aging of China's population, the demographic dividend will be gradually reduced. Surplus labor in the rural areas has reduced as compared with the past and the labor costs will rise significantly. The advantages of cheap labor that underpinned China's rapid economic growth over the past 10 or 30 years will gradually diminish.

Thirdly, changes in the economic structure aimed at the elimination of high-energy consumption and high-polluting industries, and the easing of social problems – such as the extremely wide income gap between the urban and rural population – will reduce the rate of economic growth.

Finally, from the perspective of the external environment, for the period 2012 to 2022, the world's major economies such as the E.U. and the U.S. will experience slow growth due to the impact of the debt crisis, financial crisis and fiscal austerity. This will have a knock-on effect on the growth in demand for Chinese exports. In the next 10 years, the U.S. and the E.U. will demand a further appreciation of the renminbi (RMB) and trade protectionism is likely to rise. These will have a serious impact on China's export growth and China's economy.

We forecast that, in the next 10 years, China's economy will maintain steady and fairly rapid growth. The main arguments are as follows:

Firstly, China's current level of economic development is still low. Although China's aggregate economic output has reached or exceeded the level of developed countries, in 2012, China's per capita GDP was only US$6,076, only one eighth of the per capita GDP in the U.S. (US$49,922), half of that in Russia (US$14,247) and one quarter of that in Greece (US$22,055)[3]. China's per capita exports and per capita imports are both very low, so there is a lot of potential for economic development and foreign trade development.

Secondly, urbanization will become one of the main driving forces of China's economic growth in the next two decades. According to the China National Bureau of Statistics, China's urbanization rate increased on average by 1.36% each year, rising from 37.66% in 2001 to 52.6% in 2012. With about half of the population living in rural areas, there is a great potential for urbanization. In the world's developed economies, the urban population usually accounts for over 75% of total population. It is expected that in the next 10 years, the urbanization rate will increase by about 1% every year, with

3 World Economic Outlook Database, International Monetary Fund, April 2013.

about 15 million people migrating from rural areas to cities or towns. This will generate a huge demand for urban infrastructure and housing construction, which will, in turn, boost growth in the Chinese economy[4].

Thirdly, in various regions of China, especially in the less economically developed areas, there exists a strong desire for development, as well as the drive to change their economic backwardness. At the time when the 12th Five-Year Plan was being formulated, there were 19 provinces – or cities or districts – in China that proposed to double their local GDP or per-capita GDP in five years; for example, Liaoning province stated in its provincial 12th Five-Year Plan that it aimed at an average annual GDP growth of 11% during the 12th Five-Year Plan period, as well as doubling the province's per capita GDP by 2016. Fujian province has proposed that, on the basis of optimizing the industrial structure, improving efficiency, reducing energy consumption and increasing environmental protection, it will achieve a local average annual GDP growth of more than 10% and thus doubling the GDP in 2010.

Fourthly, China will maintain steady growth in consumption because income of the population, particularly for the lower-income residents, increases rapidly. The government's continuous implementation of new measures to improve income distribution (such as the "income doubling plan" and increases in the minimum wage), and a series of government policies specifically focused on promoting consumption and improving citizen's livelihood, will raise the marginal propensity to consume, generate greater demand on the quantity and quality of consumer goods and services, and result in more consumption in society. This will boost the rapid development of the Chinese economy.

Fifthly, while China's savings rate has declined over the past years it is still maintained at a very high level. China's urban and rural population has a high level of savings. With the expansion of the social security system and the increase in health insurance coverage, the population is less worried about the future and this has helped to increase consumption and private sector investment.

Sixthly, in the period 2012 to 2022, China will continue to have its 'demographic dividend', although to a lesser degree. In view of China's rapidly aging population and the 'recruitment difficulties' encountered in some areas of China in the last two years, some scholars have concluded that China will soon lose its 'demographic dividend' and enter the stage of slow development. We believe that even though China's labor advantage has weakened, China will continue to have the 'demographic dividend,' at least in the next 10 years. There are two main reasons: firstly, China's labor force engaged in agricultural production was 279.31 million in 2010[5]. At the existing technical and organizational level, assuming there are 250 working days a year, a total of 210.44 million agricultural workers are needed, which means that there will be a surplus of 68.87 million agricultural workers[6]. Currently in the developed economies, the proportion of the agricultural labor force in the total labor force is less than 5%. If we take into account the technological advances in agriculture and the continuous improvement of large-scale agricultural operations, it would be adequate to have 15% to 20% of the labor force engaged in China's agricultural production. In 2022, the number of agricultural workers in China could fall to 115 million to 152 million people, which means a surplus labor of 127 million to 164 million labor force could shift from agriculture to non-agricultural production. Secondly, China's current labor retirement age for men is 60 years of age, for women it is 50 years of age, and for female cadres it is 55 years of age. Currently the overall average retirement age for China's urban popula-

4 Refer to http://www.stats.gov.cn/was40/gjtjj_nodate_detail.jsp?channelid=75004&record=83

5 China Statistical Yearbook 2011, National Bureau of Statistics of China

6 Huijuan Wang, Input-Occupancy-Output with Classified Employment and Its Applications, Dissertation of Graduate University of Chinese Academy of Science, 2012. (Available in Chinese only).

tion is 56.1 years old, with the average retirement age for males being 58.3 years old and females 52.4 years old[7]. This is the regulation formulated in the 1950s when the average life expectancy was over 50 years. Today, the average life expectancy in China is over 70 years, therefore, retirement age could be increased to correspond with the increase in life expectancy, and a significant number of people could be added to the workforce .

Finally, from the perspective of international competition, compared to developed economies, China still has a significant advantage of cheap labor; and compared to other developing countries, China has the advantages of a high level of skills, excellent infrastructure and high manufacturing productivity. For the period 2012 to 2022, China still has the export advantage and remains attractive to foreign direct investment (FDI). Therefore, China's foreign trade is expected to maintain its rapid growth rate in the run up to 2022.

On the basis of the aforementioned integrated analysis, we use econometric models to carry out the forecast for China's economic growth in the period 2012 to 2022. The forecast results show that in the next ten years, the average annual growth rate of China's economy would reach about 8%, and the RMB cumulative appreciation would likely reach 10.5% – an average annual appreciation of about 1%. In 2022, China's economic scale at the forecast 2022 exchange rate may reach, or be approaching, the level of the U.S.', however, the per capita GDP is only about one quarter of that of the U.S.

Assuming the absence of major unexpected events – such as a major war – it is expected that there will be three scenarios for China's economic growth:

First scenario, and the most likely one: The average annual real growth rate reaches 8%. For the ten-year period from 2002 to 2012, China's GDP average annual growth rate was 10.5%. For the ten-year period from 2012 to 2022, according to our forecast, China's GDP average annual growth rate will be 8%. China's GDP was US$8.26 trillion in 2012, with a per capita GDP of US$6,076 – and assuming that in this period the average annual natural population growth rate is 0.4% and the cumulative appreciation of the RMB to the US dollar reaches 10.5% – in this scenario, in 2022 China's GDP will reach US$19.7 trillion, and the per capita GDP will reach US$14,040.

Second scenario, a conservative estimation: Average annual real growth rate is 7.5%. In 2022, China's GDP will reach US$19.34 trillion, and the per capita GDP will reach US$13,780.

Third scenario, an optimistic estimate: The average annual real growth rate will reach 8.2%. In 2022, China's GDP will reach US$20.07 trillion, and the per capita GDP will reach US$14,300.

According to the estimates based on the statistics of the U.S. Bureau of Economic Analysis, for the period 2002 to 2012, the U.S. average annual economic growth was 1.65%[8]. The main reasons for the comparatively slow economic growth in the U.S. in the past decade include the U.S. subprime mortgage crisis in 2007 and the consequent international financial crisis in 2008. According to our forecast, the U.S. economy will improve in the period 2012 to 2022, as compared to the previous decade, and we have three scenarios for U.S. economic growth:

- First scenario, the most likely scenario: The U.S. average annual real growth rate reaches around 2.3% for the period 2012 to 2022. In 2022, U.S. GDP will reach US$19.68 trillion and the per capita GDP will reach US$57,410.
- Second scenario, an optimistic estimate: The U.S. average annual real growth rate reaches around 2.6% for the period 2012 to 2022. In 2022, U.S. GDP will reach US$20.26 trillion, and the per capita GDP will reach US$59,120.

7 Jiang Wu, Xiaobao Tian, Human Resources Development Report (2011-2012), Social Sciences Academic Press, 2012. (Available in Chinese only).

8 Refer to http://www.bea.gov/national/index.htm#gdp

- Third scenario, a conservative estimation: The U.S. average annual real growth rate reaches around 2% for the period 2012 to 2022. In 2022, U.S. GDP will reach US$19.11 trillion and the per capita GDP will reach US$55,750.

On the whole, China's GDP in 2022 will be close to or reach the U.S. level. However, the per capita GDP still lags behind by a large gap, which is only about a quarter of that of the U.S.

Forecast of the Growth Rate of China's Foreign Trade and Trade with the U.S., 2012-2022

Forecast of the growth rate of China's foreign trade, 2012-2022

Since joining the World Trade Organization (WTO), China's foreign trade has grown in leaps and bounds. According to the statistics of Chinese Customs, the average annual nominal growth rate of China's total import and export of goods for the period 2000 to 2011 was 20.4% and average annual growth rate of exports and imports was 20.3% and 20.5%, respectively. Of the total, China's total trade with, exports to and imports from the U.S. recorded average growth rates of 17.7%, 18.1% and 16.7% respectively.

Since the global financial crisis in 2008, the global economic situation remains in the doldrums. Affected by this, China's foreign trade growth fell sharply. Total imports and exports of goods increased by 6.2% in 2012, with exports increasing by 7.9% and imports increasing by 4.3%. These growth rates are much lower than the average growth rate in the period 2000 to 2011. China's foreign trade growth will be facing challenges in the next decade, especially given the difficult international economic situation expected. China's foreign trade growth rate will drop substantially. The main reasons for the declining growth rate are as follows:

First of all, the fast growth of China's foreign trade in the period 2000 to 2011 has its own peculiar background. In 2001 China joined the WTO and this ushered in a period of continuous rapid growth. In addition, China's cheap labor, relatively developed infrastructure, preferential policies and stable socio-economic environment underpinned the rapid growth of China's foreign trade. In 2012, China has become the world's largest exporter. Taking into consideration the scale of China's current foreign trade, it is nearly impossible to continue with such a rapid growth over the next decade.

Second, the global economy will remain in the doldrums for a long time. In the future, economic growth in China's major trading partners - the E.U., the U.S. and Japan - will remain slow. The E.U., in particularly, which is China's largest export market, will continue to suffer from recession and experience slow growth. Economic growth of other countries in the world will also decline to various degrees. For the period 2012 to 2022, the growth of China's external demand will slow down.

Third, there will be further RMB appreciation, affecting the competitiveness of Chinese goods and the incentives of Chinese enterprises to grow their exports. It is expected that in the period 2012 to 2022 there will be a slowdown in rate of RMB appreciation. Currently the prices of most commodities in the U.S. market are fairly close to those in the Chinese market. However, the prices of services in China are significantly lower than those in the U.S. We expect an average annual RMB appreciation during the next 10 years of around 1%, with the cumulative appreciation of 10.5%.

Fourth, trade protectionism will be further enhanced and trade frictions will increase. With the slowdown of the global economy – especially in the major developed economies – and the increased trade imbalances, trade frictions targeting China's exports will intensify. The U.S. has launched the most trade investigations against China in terms of both quantity and depth. Although presently the global trade friction has shown a downward trend, the trade investigation against China initiated by the U.S. – especially the investigations on anti-dumping and subsidies – are on the rise.

Fifth, the impact of international industrial transfer will affect growth. With the rapid growth of wages in China, its low-cost advantage has gradually weakened, and as a result, export product processing has gradually shifted to other regions with lower wage levels, such as India, Indonesia, Vietnam, Thailand and other developing countries. For the period 2012 to 2022, growth in the export processing industries, which accounts for half of China's exports, will be most affected.

Lastly, in the period 2012 to 2022, the decline in economic growth in China will directly affect its demand for imports of commodities. Growth in imports such as the iron ore from Australia, as well as the import of parts and components from many Asian economies will decrease significantly.

Taking aforementioned analysis as a whole, we forecast that, in the period 2012 to 2022, the average annual real growth rate of China's total exports of goods may reach about 9% to 10%, slightly higher than the real GDP growth rate. The average nominal growth rate of China's total value of exports of goods (in U.S. dollars) may reach around 11% to 12%[9].

China will continue to have trade surpluses. However, the ratio of the trade surplus to GDP will decline. The reasons are as follows:

First of all, China's favorable trade balance comes from the processing trade, whereas the general trade has a deficit. For example, in 2011 the exports of processing trade were US$835.4bn, whereas the volume of imports amounted to US$469.8bn, resulting in a surplus of US$365.6bn. General trade exports were US$917.1bn, imports amounted to US$1,007.5bn, and the deficit was US$90.4bn. The proportion of processing trade in China's foreign trade will continue to fall, and the proportion of China's processing exports to total exports of goods is expected to fall from 44% in 2011 to 30% in 2022. The decline in the proportion of processing trade will bring a decline in the proportion of the trade surplus.

Second, the trade surplus has brought a lot of problems, and the Chinese government has no intention to continue with huge trade surpluses. The sustained trade surpluses have accumulated massive foreign exchange reserves for the Chinese government. This has increased the country's money supply and currency in circulation, as well as the long-term inflationary pressures. At the same time, major trading partners, such as the U.S. and other countries, have sustained a long-term trade deficit. This has led to constant trade disputes and a lot of pressure on China to reduce its bilateral trade surpluses with these countries.

Finally, further RMB appreciation will stimulate growth of China's imports while seriously affecting the competitiveness of Chinese goods, which will have a negative impact on China's exports. From the beginning of 2005 to the end of 2012, the nominal exchange rate of RMB has appreciated by more than 30%, which has greatly affected China's foreign trade environment

It is expected that in 2022, the proportion of China's goods trade surplus to GDP will decline. The trade surplus in 2011 was US$155.1bn, equivalent to 2.1% of GDP in the same year. In 2022 this proportion is expected to fall to about 1%.

Forecast of the Growth Rate of China's Trade with the U.S., 2012-2022

It is estimated that for the period 2012 to 2022, the growth rate of exports from China to the U.S. will be significantly lower than exports to other countries. Judging from the data associated with China's export business partner in recent years, in the period 2006 to 2011, the average annual growth rate of China's total exports of goods was 14.4%. Among this, the rates of growth of exports of goods to the

9 Currently, export growth rates are in nominal terms. Assuming that U.S. inflation averages 2% per annum during 2011 – 2022, it could be roughly estimated that the nominal growth rate of China's exports would be around 11% to 12%.

U.S., E.U. and Japan were 9.8%, 13.4% and 10.1% respectively, each of which is lower than the average growth rate of China's exports of goods. Whereas the average growth rates of China's goods exports to India, Brazil and Russia were 28.2%, 33.9% and 19.7%, respectively, each of which is higher than the average growth rate of China's exports of goods. The main reason for the low growth rate of China's exports to the U.S. is as follows:

Firstly, due to the impact of the debt crisis, financial crisis, and fiscal austerity, the U.S., EU and Japan and other developed economies are experiencing a low economic growth rate, and as such there is a sluggish demand for the growth of imported goods.

Secondly, the proportion of processing exports is particularly high in China's exports of goods to the U.S. In 2002, the proportion of processing exports stood at 55.3% of the China's overall exports of goods, whereas the proportion of processing exports accounted for 66.9% of China's overall exports of goods to the U.S. In 2011, the proportion of processing exports stood at 44% of China's overall exports of goods, whereas the proportion of processing exports accounted for 54.1% of China's overall exports of goods to the U.S. Due to the higher cost of wages in China, some of the processing export production has shifted from China to countries with lower wage levels, such as Mexico, India, Indonesia and Vietnam, which has a greater impact on the growth rate of China's exports to the U.S.

Finally, due to the return of U.S. manufacturing and a series of policies to stimulate employment, the U.S. manufacturing sector – especially high-end manufacturing – will have a certain degree of development, which will have a greater impact on China's exports to the U.S., in particular, the processing exports.

According to the preliminary forecast, in the period 2012 to 2022, the annual average growth rate of China's exports of goods to the U.S. will be 7%, and the average annual growth rate of exports of services will be 10%. In 2022 China's exports of goods to the U.S. will be US$683.2bn and exports of services to the U.S. will be US$32.3bn. According to estimates, in 2022, China's exports of goods and services to the U.S. will be US$715.4bn (in U.S. dollars at 2011 exchange rate).

It is expected that for the period 2012-2022, the growth rate of China's imports from the U.S. will be greater than the average growth rate of China's exports to the U.S. And it is mainly based on the following:

First of all, it is expected that China's level of consumption in 2022 will be greatly improved; in particular, there will be a surging emerging middle class, whose annual income will be between US$30,000 and US$60,000. This middle class require high-quality and high-class consumer goods, which will provide the U.S. trade industry with tremendous business opportunities, and will greatly stimulate U.S. exports to China.

Among the U.S. exports of goods to China, resource-based products, high-end consumer and luxury goods, healthcare products, high-tech manufacturing and service products have a high competitive advantage, and it is estimated that in 2012 to 2022 China will expand imports in these sectors from the U.S.

The preliminary estimate shows that in 2012 to 2022 the average annual growth rate of U.S. exports of goods and services will reach 12%. In 2022, U.S. exports of goods to China are expected to reach US$424.9bn and the exports of services will reach US$92.9bn. In the same year, U.S. exports of goods and services to China are expected to reach US$517.8bn. China's trade surplus with the U.S. is expected to be US$197.7bn.

With respect to China's balance of trade with the U.S., due to the huge U.S.-China trade imbalance, the trade surplus with the U.S. will continue. It is expected that in 2022, China will also continue to maintain the trade surplus with the U.S., but the relative proportion of the surplus will be greatly reduced. And it is mainly based on the following:

Figure 1: **Non-Competitive IO Model**

Input \ Output			Intermediate use		Final use					Domestic output or Imports
			Production sectors 1,2, …, n	Total	Consumption	Gross Capital Formation	Exports	Others	Total	
Intermediate Inputs	Domestic intermediate inputs	1 — n	X_{ij}^{D}		F^{DC}	F^{DI}	F^{DE}		F^{D}	X
	Intermediate inputs from imports	1 — n	X_{ij}^{M}		F^{MC}	F^{MI}			F^{M}	M
	Total intermediate inputs									
Primary inputs	• Depreciation of fixed capital • Compensation of Employees • Net taxes on production operating surplus • Operating Surplus		V							
	Total value added									
Total inputs			X^{T}							

Note: The depreciation of fixed capital and operating surplus can be combined with gross operating surplus.

First of all, the proportion of export processing is comparatively high in China's exports to the U.S., and one of the important features of export processing is that the value of exports must be greater than the value of the imported parts and raw materials, because the processing costs must be positive.

Secondly, it is expected that in 2022, the cost of labor in China is only about one fifth of that of the U.S. In the U.S. market, the cheap consumer goods and industrial manufactured goods produced in China are still very popular among the majority of Americans; again, due to the U.S. government's trade restrictions, the U.S. cannot make a full play of its high-tech advantage in exports trade to China.

Lastly, the improvement in the calculation methods has also affected the figures. Presently, the calculation of the balance of trade between the two countries is based on the value of total exports. However, a country's total exports are not all of the products from that country, which includes the value of parts, raw materials and energy imports from other countries. With the ever-increasing development of the international division of labor, the total import coefficient of the exports will be increasingly high. At present, many experts advocate the use of trade value-added in the measurement of a country's actual level of exports and the measurement of the balance of trade between the two countries. China's exports is characterized by the high proportion of processing and assembly exports, with the total import coefficient of the exports being very high, and the total value-added share being very low, therefore, if the calculation is based on the value-added, the U.S.-China trade surplus will be significantly reduced compared with the calculation based on the total exports.

Value-added Trade Calculation Method

Value-added trade calculation method – non-competitive input-output model and Processing Exports and Non-Processing Exports model

When using the input-output (IO) technique to study the value-added exports and the impact of exports on employment, usually the non-competitive IO model is used (see Figure 1).

The economic assumptions of this model is that, taking the entire economy as a whole, it is assumed that the product of any given sector, regardless of its use, or whether it is for consumption, investment or export, the coefficients of the

Figure 2: **A Non-Competitive Input-Occupancy-Output Model capturing Processing Exports and Non-Processing Exports**

Output / Input				Intermediate use				Final use					Gross output or Imports
				Production for domestic use (D)	Processing Exports (P)	Non-processing exports and other production of FIEs (N)	Total	Consumption	Gross capital formation	Exports	Others	Total Final use	
				1,2, ..., n	1,2, ..., n	1,2, ..., n							
Inputs Part	Domestic intermediate inputs	Production for domestic use (D)	1 — n	X^{DD}	X^{DP}	X^{DN}		F^{DC}	F^{DI}	0		F^{D}	X^{D}
		Processing exports (P)	1 — n	0	0	0		0	0	F^{PE}		F^{P}	X^{P}
		Non-processing Exports and other production of FIEs (N)	1 — n	X^{ND}	X^{NP}	X^{NN}		F^{NC}	F^{NI}	F^{NE}		F^{N}	X^{N}
	Intermediate inputs from imports		1 — n	X^{MD}	X^{MP}	X^{MN}		F^{MC}	F^{MI}			F^{M}	X^{M}
	Total intermediate inputs												
	Value-added			V^{D}	V^{P}	V^{N}							
	Total inputs			X^{D}	X^{P}	X^{N}							
Occupancy Part	Capital of which: foreign capital			K^{D}	K^{P}	K^{N}							
	Employees			L^{D}	L^{P}	L^{N}							
	Natural resources etc.												

product's consumption of intermediate inputs and initial inputs are exactly the same. For example, the production of steel, regardless of its usage, whether for domestic production, increase of inventory or export, its input coefficient, in terms of the consumption of domestic materials and electricity, etc. are the same. It is also assumed that the product's total import coefficients, in terms of the intermediate input of imported goods, as well as the unit level cost of compensation of employees, net taxes on production, depreciation of fixed assets and the operating surplus, etc. are all assumed to be the same.

Currently this model has been widely adopted. Based on the "use table, make table", imports matrix and other information released by the U.S. Department of Commerce Bureau of Economic Analysis, we have prepared the U.S. non-competitive input-output tables for the year 1992, 1997, 2002, 2007 and 2010. We have also calculated the value-added and employment for each US$1,000 export for the period 1987 to 2011 (see Appendix to this chapter, "Summary Sheet of the Impact of Exports on the Value Added and Employment in China and the U.S. for1987-2011")[10].

The most important feature of China's exports is a high proportion of processing exports of total exports, and the input structure of processing export products is considerably different from that of the products manufactured to meet domestic demand. Therefore, we have proposed the non-competitive input-occupancy-output model to reflect the processing trade. Its format is shown in Figure 2.

In Figure 2, the domestic production in China is divided into three parts: production for domestic demand (D), export processing production (P) and

10 Refer to http://www.bea.gov/bea/dn2/i-o_annual.htm

non-processing exports and other production (N). In Figure 2, if the non-processing exports and other production (N) is integrated into the production for domestic demand (D), the DP Model (Model 3) will be generated.

We believe that the Processing Exports and Non-Processing Exports (DPN) model or DP model should be used to study the impact of China's exports on the value-added and the employment for the following reasons:

Firstly, about 50% of China's total exports are export processing. There is a big difference in the input structures of export processing production and the production of other products; for export processing production, there is a high proportion of imported materials and parts being used. For example, in 2007, the imported materials and parts used in the export processing production accounted for about 58.5% of total processing exports, whereas there is a small portion of value-added, only 17.4%. Among China's exports to the U.S., the export processing percentage is as high as 60%. Therefore, in the study of the impact of China's exports on the domestic economy, we must treat the processing trade separately.

Secondly, a large part of China's non-processing exports is produced by foreign-funded enterprises, and the amount of imports used per unit of output in the production of the non-processing exports in foreign-funded enterprises is much larger than what is used in the products for domestic demand produced in domestic-funded enterprises. At the same time, the domestic-funded enterprises that produce non-processing exports often have frequent contact with foreign countries, and as such, these enterprises tend to have more imports. Due to the fact that the products for exports generally have higher quality requirements, to ensure the quality of the export products, more imported raw materials will be adopted in the production.

In 2007, in the production of domestic demand products, export processing products and non-processing exports products, per unit of output, the proportion of direct intermediate imports were 58.5%, 13.7% and 3.1%, respectively. Among these three categories of products, per unit of output, the proportion of the value-added varied substantially. Among the domestic demand products, export processing products and non-processing exports products that were produced in 2007, per unit of output, the proportions of value-added were 17.4%, 27% and 34.7%, respectively.

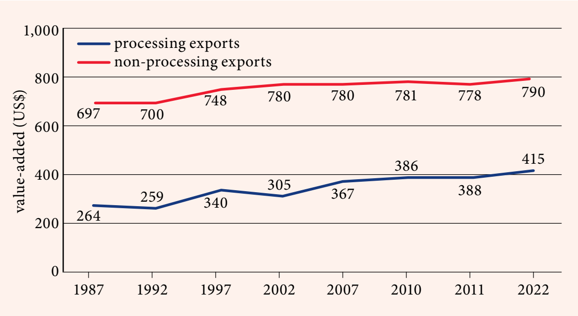
We believe that in the estimates of the impact of a country's exports on its economy, model 1 (see Figure 1) should be used for the U.S. and E.U. countries, whereas those countries with export processing – such as Mexico and China – model 2 or 3 should be used. Presently, for China, model 3 should be used, however, in the future it might be more appropriate to use model 2, should the import coefficients for domestic intermediate input become close to those for the non-processing export goods.[11]

Calculation results for the value-added content of exports

In this report, the non-competitive IO table for China that reflects the processing trade has been used in the forecast for the roles of both China's total exports and China's exports of goods to the U.S., to drive China's GDP and employment in 1987, 1992, 1997, 2002, 2007, 2010 and 2011 (see the Appendix to this chapter, "Summary Sheet of the Impact of Exports on the Value-Added and Employment in China and the U.S. for 1987-2011"). Presently, non-competitive IO tables for China that reflect the processing trade in 2002 and 2007 have already been compiled by the National Bureau of Statistics and the Chinese Academy of Sciences, based on the

11 Please refer to the following article on the calculation methodologies of input-output analysis and of the input-occupancy-output models of the non-competitive type (DPN model) that captures processing trade: Lawrence J. Lau, Xikang Chen, Cuihong Yang, Leonard K. Cheng, K.C. Fung, Yun-Wing Sung, Kunfu Zhu, Jiansuo Pei and Zhipeng Tang, 2010, "Input-occupancy-output models of the non-competitive type and their application – an examination of the China-US trade surplus", Social Sciences in China, Vol, XXXI, No.1, pp.35-54.

Figure 3: **Value-Added Arising from US$1,000 of Chinese Exports in Processing Trade and Non-Processing Trade 1987-2022**



survey data. On this basis, we further utilized 1987, 1992 and 1997 China IO table published by the National Bureau of Statistics, combined with the statistics from customs and other data, use the non-survey method and expanded the non-competitive IO table that reflects the processing trade to the year 1987, 1992 and 1997, and furthermore carried out the calculation for the impact of China's exports on China's GDP and employment over these years. At the same time, on the basis of 2010 non-competitive IO tables for China that reflects the processing trade, and by updating the value-added coefficient and employment coefficient, the research group has calculated the role of China's exports in boosting its GDP and employment in 2011.

See below for the development trend for the value-added by each US$1,000 export for the period 1987-2011, as well as the preliminary forecast for 2022 (see Figure 3).

Due to improved technology in China's manufacturing industry, some parts and components that were imported in the past have been replaced by domestic products that have the price advantage. For the period 1987 to 2011 there has been a steady increase in the value added of each US$1,000 export, which was US$264 in 1987, US$305 in 2002, US$367 in 2007 and US$388 in 2011. According to the forecast, in the period 2012 to 2022, this trend will continue. Also, in 2022, the value added per US$1,000 of export processing is approximately US$415.

The value added per US$1,000 of export processing is steadily on the rise. And there are two main factors: first, is the improvement in China's manufacturing level, with some of the imported parts and components used in processing production gradually being replaced with domestic products, which has increased the value-added in export processing; and second, is the increase in the level of wages of employees in China

The value-added of each US$1,000 non-processing export remains steady, but there is a slight upward trend. The main factors are: first, China has seen a steady increase in the value-added rate and an increasing wage level; second, through China's participation in global trade, the growth rate of exports was greater than the growth rate of output value, and the continuous rise of intermediate imports in non-processing export production offset the growth rate of value-added.

According to the forecast, the total value-added coefficient of China's exports will show a rising trend during 2012 to 2022. And this is mainly because of the following[12]:

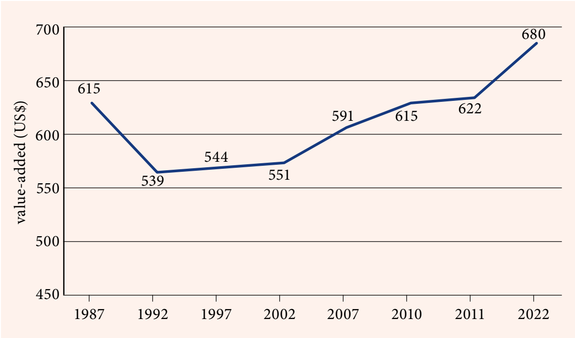
The first factor is the improvement in China's manufacturing level, with some of the imported parts and components used in processing production being gradually replaced with domestic products. For example, the direct intermediate imports per US$1,000 exports processing production was US$733 in 1992, US$633 in 1997, US$666 in 2002, US$585 in 2007 and US$564 in 2011, an obvious downward trend (see Appendix, Figure A1). This has led to a rising value-added rate, which will be maintained in the future.

The second factor is the current low wage level of employees in China, which has more room to rise, leading to a steady rise in the rate of value.

The third factor is that the proportion of processing exports is showing a downward trend. In

12 The total value-added coefficient of exports refers to the direct and indirect domestic value added induced by producing per unit of exports, it is also called value-added share of exports.

Figure 4: Value-Added Arising from US$1,000 of Chinese Exports, 1987-2022



2002, China's processing exports as a proportion of total exports peaked at 55.27%, after which, it dropped to 44% in 2011. During 2012 to 2022, the proportion of export processing will continue this trend, and it is expected that in 2022, the proportion of export processing of total exports will drop to 30%. There is a strong correlation between the export value-added rate and the proportion of processing exports. In 1987, due to the very low proportion of processing exports (22.34%), the non-processing exports accounted for 77.66%, resulting in a high non-processing exports value-added rate. Therefore, the overall export value-added rate is high. In 1992 and 1997, the proportion of processing exports increased rapidly, thus the overall export value-added rate similarly dropped rapidly. After 2002, the proportion of export processing has dropped gradually, and there has been an increasing rate of value-added in export processing production. Figure 4 shows the steady rise in the rate of value added in export processing production after 2002 in China.

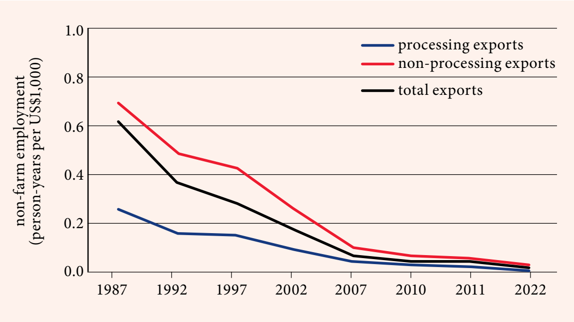
From the estimates, for the period 1987 to 1992, China's export value-added rate showed a downward trend, whereas in the period 1992 to 2011, there was a steady rise in value-added per US$1,000 exports (see Figure 4). According to the estimates, the export value added rate is 68%, i.e. the domestic value added per US$1,000 export is US$680.

It is estimated that during 2012 to 2022, the total import input coefficient of exports (vertical specialization share) is showing a downward trend, and there is an increase in the total domestic input coefficient. Based on the forecast, the total import input coefficient of exports production is 0.32.

Regarding the export processing value-added rate: according to the forecast, during 2012 to 2022, the proportion of processing trade exports in China's overall exports will show a downward trend, as will the proportion of processing trade exports in China's overall exports of goods to the U.S. Based on the estimates, in 2022 the proportion of exports processing trade in China's total exports is around 30%. The forecast for the period 2012-2022 shows that the direct input coefficient of imported goods in export processing production will show a downward trend, as will the total input coefficient of imported goods. Per US$1,000 export processing production, the total input of imported goods is US$633 in 2007, US$612 in 2011 and it is expected to be US$585 by 2022. According to the forecast, the total value-added coefficient of China's per US$1,000 exports processing products will show a rising trend during 2012 to 2022. It is expected that in 2022 the export processing value-added rate will be 41.5%, i.e. the total value-added per US$1,000 exports processing products will be US$415.

In light of the circumstances during 1987 to 2011, the non-farm payroll employment driven by China's unit export experienced a rapid decline (see Figure 5). With the substantial increase in China's labor productivity, it is expected that in the period 2012 to 2022, the coefficient of non-farm payroll employment in China's exports – the non-farm payroll employment directly driven by the unit export, or called the rate of non-farm payroll employment in export – will show a clear downward trend. It is expected that in 2022 non-farm employment driven by per US$1,000 export will be 0.0128 person-years, among which, non-farm employment driven

Figure 5: **Non-Farm Employment Generated by US$1,000 of Chinese Total Exports, Processing Exports and Non-Processing Exports**



by per US$1,000 processing export will be 0.0066 person-years, and non-farm employment driven by per US$1,000 non-processing export will be 0.0154 person-years (see Figure 5)[13].

Regarding non-farm payroll employment driven by total exports: in 2010, China's total export value was US$1,577.75bn, and non-farm payroll employment driven by per US$1,000 exports was 0.042 person-years, among which 0.019 person-years were directly driven by exports, and 0.023 person-years were indirectly driven by exports. Non-farm payroll employment driven by exports was 66.27 million person-years, among which non-farm payroll employment directly driven by exports and indirectly driven by exports were 29.98 million person-years and 36.29 million person-years, respectively. According to estimates, during 2012 to 2022, the overall number of non-farm payroll employment driven by China's exports will see a gradual rise. It is expected that in 2022 the overall number of non-farm payroll employment driven by exports will be 76.37 people, an increase of 12.1 people compared to 2010, with an annual growth rate of 1.3%.

The Impact of China's Exports to the U.S, on China's Economy and Employment and the U.S.-China trade surplus

Utilizing the DPN model and the non-competitive input-occupancy-output model, we have calculated the value-added per US$1,000 in exports in the period 1987 to 2011, for China and the U.S.

Analysis of the impact of China's exports of goods to the U.S. on China's GDP and employment

The U.S. is China's most important trading partner. According to the *China Statistical Yearbook 2011*, in 2010, China's exports to the U.S. accounted for about 17.96% of China's total exports of goods, much higher than China's exports to any other countries. Therefore, China's exports to the U.S. have an important impact on China's GDP and employment. Based on China's non-competitive input-output table which reflects the processing trade, this report estimates the role of China's exports of goods to the U.S. in driving China's GDP and employment (see Figures A2 and A3).

The impact of China's direct exports of goods to the U.S. on China's GDP and employment

As shown in the Appendix, in 2010, China's per US$1,000 direct exports of goods to the U.S. brought US$563 of value-added and 0.038 person-years of non-agricultural employment to China, which is lower than the value-added and non-agricultural employment brought by China's per US$1,000 total exports, which was US$615 and 0.042 person-years, respectively. One of the main reasons is that there is a high proportion of processing trade exports in China's exports to the U.S., which is 57.4% in 2010, about 10.5% higher than the proportion of processing trade exports in China's exports.

Over time, similar with China's unit exports,

13 This is the direct and indirect impact on non-farm employment per unit of exports, or termed non-farm employment rate of exports.

Figure 6: The Impact of China's Direct Exports of Goods to the U.S. on China's GDP and Non-agricultural Employment

Years	Exports of goods (0.5 bns of U.S. dollars)	Total added value driven (0.5 bns of U.S. dollars)	Percentage of GDP (%)	Non-agricultural employment (Thousand Persons-years)	The proportion in the total non-agricultural employment (%)
1987	47	28	0.87	265	1.26
1992	73	33	0.67	204	0.74
1997	327	144	1.51	657	1.88
2002	699	317	2.18	958	2.62
2007	2327	1226	3.51	1326	2.97
2010	2833	1595	2.69	1076	2.23
2011	3245	1869	2.55	1071	2.15

Source: The data on China's direct exports of goods to the U.S. is from the China Statistical Yearbook, *various years; other data are estimates from the research group.*

the value-added brought by China's per US$1,000 direct exports of goods to the U.S. is showing the U-shaped change (downward first then upward), which has first dropped from US$597 in 1987 to US$439 in 1997, and then risen to US$576 in 2011. With the continuous increase of China's labor productivity, the non-agricultural employment brought by China's per US$1,000 exports of goods to the U.S. continues to reduce over time.

Furthermore, we have estimated the impact of China's total direct exports of goods to the U.S. on China's GDP and agricultural employment (see Figure 6). The results show that China's exports of goods to the U.S. have a significant role in promoting U.S. exports of goods to China's GDP and non-agricultural employment. In 2010, the total value of China's direct export of goods to the U.S. was US$283.3bn, which has brought the value-added to a total of US$159.5bn, accounting for 2.69% of China's GDP; the non-agricultural employment to a total of 10.76 million people, accounting for 2.23% of the overall non-agricultural employment in China in the same year. Over time, during 1987 to 2011, China's total export of goods to the U.S. have experienced a rapid development, with the average annual nominal growth rate reaching as high as 19.28%, which has brought China ever-increasing value-added, from US$2.8bn in 1987, increasing to US$186.9bn in 2011, an average annual nominal growth rate of 19.10%. Relatively speaking, there has been a slow growth in nonagricultural employment brought on by China's direct exports of goods to the U.S., from 2.65 million people in 1987 to 107.1 million people in 2011, an average annual growth rate of only 5.99%. This is mainly due to the significant decline of non-agricultural employment driven by the unit goods export. In particular, after 2007, total non-agricultural employment driven by China's direct exports of goods to the U.S. have shown a downward trend, which has indicated that the growth rate of Chinese labor productivity is greater than the growth rate of China's exports of goods to the U.S.

The fourth and last column in Figure 6 shows the value-added by China's exports of goods to the U.S. and the proportion of nonagricultural employment in China's GDP and in the overall non-agricultural employment. These data have measured the degree of importance of China's exports of goods to the U.S. to China's economic and non-agricultural employment. The results show that since 1992, the importance of China's exports of goods to the U.S. to China's GDP and non-agricultural employment has shown a U-shaped change, i.e. the downward and upward trend, which has reached the peak value in 2007. This is mainly due to the rapid growth of China's total exports of goods to the U.S. before 2007. As noted earlier in this article, after 2007, affected by the financial crisis, China's exports to the U.S. sustained a shock to a certain extent, resulting in

Figure 7: **Impact of China's Direct Exports of Goods and Services to the U.S. on China's GDP and Non-agricultural Employment**

Years	The total value of exports of goods and services (0.5 bns of U.S. dollars)	Total value-added induced (0.5 bns of U.S. dollars)	Percentage of GDP (%)	Non-agricultural employment (Thousand Persons-years)	The proportion in the total non-agricultural employment (%)
2002	740	354	2.43	1096	2.99
2007	2433	1316	3.77	1433	3.21
2010	2932	1680	2.83	1142	2.37
2011	3358	1967	2.69	1139	2.28

Source: The data on China's direct exports of goods to U.S. is from the China Statistical Yearbook, *various years; data on exports of services are from U.S. Bureau of Economic Analysis (BEA); other data are from estimates from the research group.*

the slowdown in export growth, and as such its contribution to the value-added and non-agricultural employment has also declined.

Contribution of China's exports of goods and services to the U.S. to China's economy

The value-added and employment in China driven by per US$1,000 China's exports of goods and services to the U.S. is shown in A4 in the Appendix. It can be seen that after the exports of services are included, the value-added and employment in China driven by China's per unit exports to the U.S. are both showing some increase, which is mainly because of the higher coefficient of the total value-added of service products and higher coefficient of employment.

Over time, after 2002, the value-added driven by China's unit export to the U.S. has been rising over the years, and the non-agricultural employment driven by China's unit export to the U.S. has seen a steady decrease.

Furthermore, we have estimated the impact of China's total exports to the U.S. on China's GDP and agricultural employment (see Figure 7). The total value of China's export of goods and services to the U.S. was US$293.2bn in 2010, and it has brought China a total of US$168bn of value-added, accounting for 2.83% of China's GDP in the same year, which is 0.14% higher than when only the impact of exports of goods is taken into consideration; and it has also brought non-agricultural employment to a total of 11.42 million people, accounting for 2.37% of the overall nonagricultural employment in China for the same year. Over 2002 to 2011, the value added induced by China's export of goods and services has seen a rapid growth, from US$35.4bn in 2002 to US$196.7bn in 2011, an average annual nominal growth rate of 21.00%. There has been slow growth in nonagricultural employment induced by China's exports of goods and services to the U.S., with an average annual growth rate of 4.24%.

Contribution of China's total exports of goods to the U.S. (including entrepôt trade) to the Chinese economy

In U.S.-China trade, a considerable part of U.S.-bound Chinese exports have undergone entrepôt trade in the Hong Kong region first and then been exported to the U.S. This portion of the exports have not been included in Chinese Customs statistics as part of China's exports to the U.S. In order to more accurately reflect the influence of U.S.-China trade in Chinese economy and employment, and meanwhile preparing for the estimates of the U.S.-China trade surplus (including Hong Kong entrepôt trade), this study has simultaneously carried out the estimates of the effect of China's total exports of goods to the U.S. (including Hong Kong entrepôt trade) on the Chinese economy and employment. The total amount of China's exports of goods to the U.S. via Hong Kong entrepôt is from the statistics of Hong Kong Customs, which are based on FOB Hong Kong price and are inconsistent with the free on board (FOB) China port price used in the statistics of Chinese Customs.

So we need to convert the prices for this part of entrepôt trade goods. We first used the data supplied by Hong Kong regarding the shipping and distribution fees for mainland China's exports of goods to the U.S. via Hong Kong entrepôt, then deducted the shipping and distribution fees from the value of these entrepôt trade goods so as to convert these values to the cost, insurance and freight (CIF) Hong Kong prices. Thereafter, the shipping and distribution fees incurred while the goods were transported from China to Hong Kong are deducted (assuming that the shipping and distribution fees account for 8% of FOB China port prices), and at this point we can obtain the value of China's exports of goods to the U.S. via Hong Kong entrepôt, calculated on the basis of FOB China port price.

The Appendices indicate that in 2010 the value-added for China and non-agricultural employment induced by China's per US$1,000 aggregated exports of goods to the U.S. was US$561 and 0.038 person-years, respectively, which is US$2 and 0.0001 person-years less than their counterparts induced by China's per US$1,000 direct exports of goods to the U.S. This is mainly because of the high proportion of processing exports in China's exports of goods to other countries via Hong Kong entrepôt, which was 72.9% in 2010[14].

At the same time, we can estimate the effect of China's total exports of goods to the U.S. to China's GDP and employment (see Figure 6). The results show that in 2007, 2010 and 2011, the value-added for China induced by China's total exports of goods to the U.S. was US$139.1bn, US$178bn and US$209.1bn, respectively, accounting for 3.98%, 3% and 2.86% of China's total GDP in the same year respectively; and China's total exports of goods to the U.S. in the aforementioned three years brought China 13.9 million, 17.80 million and 20.91 million person-years of non-agricultural employment, respectively, accounting for 3.4%, 2.5% and 2.34% of China's total non-agricultural employment in the same year, respectively. Compared to the value-added and employment brought by China's direct exports to the U.S., we can see that if China's exports of goods to the U.S. via Hong Kong entrepôt is included in the calculation, the results show that the value-added and the non-agricultural employment induced by China's total exports of goods to the U.S., will increase by 11%-14% and 9%-14%, respectively. In addition, the results also show that even though the portion of China's exports of goods to the U.S. via Hong Kong entrepôt were included in the calculation, in recent years, there has been a steady downward trend of the proportion of China's GDP and non-agricultural employment in China's overall GDP and nonagricultural employment.

U.S.-China goods trade surplus

The issue of the U.S.-China trade imbalance has long been a source of concern for scholars. According to Chinese Customs statistics, in 2012, U.S.-China goods trade surplus – China's total exports of goods minus China's total imports from the U.S. – was US$218.9bn. According to the statistics of U.S. Customs, in 2012, U.S.-China goods trade surplus – U.S. total imports of goods from China minus U.S. total exports of goods to China – was US$315.1bn. However, due to the existence of intermediate goods trade, there has been a serious problem of double counting when using the total imports and exports as the basis of the trade statistics. Therefore, in the import and export trade, the amount of domestic value-added in each country should be used as a standard to measure the balance of trade. In this study, the value-added measure is utilized in the re-evaluation of U.S.-China trade surplus[15, 16].

In addition, as we have stated before, in U.S.-

14 Statistics show that in 1997, the proportion of processing exports in China's exports to the U.S. is not very different from that in Chinese exports to the U.S. via Hong Kong. Affected by the product structure of exports, the value added to China's GDP per unit of total exports from China to the U.S. is higher than that of direct exports from China to the U.S.

15 Refer to http://finance.china.com.cn/news/special/jjsj12/20130110/1230560.shtml

16 Refer to http://www.census.gov/foreign-trade/balance/c5700.html

Figure 8: **U.S.-China Goods Trade Surplus, 2007, 2010 and 2011**

Types of exports	2007		2010		2011	
	Calculated according to total exports of goods (US$100mn)	Calculated according to the value-added (US$100mn)	Calculated according to total exports of goods (US$100mn)	Calculated according to the value-added (US$100mn)	Calculated according to total exports of goods (US$100mn)	Calculated according to the value-added (US$100mn)
China's exports of goods to the U.S.	2662	1391	3173	1780	3649	2091
Direct export	2327		2833		3245	
Hong Kong entrepôt trade	335		340		404	
U.S. exports of goods to China	712	612	994	863	1119	952
Direct export	652		919		1039	
Hong Kong entrepôt trade	59		75		80	
Sino-U.S. trade surplus	1950	779	2179	917	2530	1139

Note: Goods imported from the U.S. published in China in 2007 amounted to US$69.4bn; the statistics published by the U.S. imports from China to CIF goods amounted to US$340.1bn. Goods imported from the U.S. published in China in 2010 amounted to US$102bn, the U.S. announced the goods imported from China amounted to US$383bn. In 2011 China announced imports of goods from the U.S. amounted to US$122.1bn; published by the U.S. on goods imported from China amounted to US$417.4bn.

Source: Direct exports of goods to the U.S., data from the China Customs; U.S. on China's exports of goods from data in to the USITC strobe; China and the U.S. through Hong Kong to the other side of the re-export data from the Customs and Excise Department statistics.

China trade, a considerable part of U.S.-bound Chinese exports have undergone entrepôt trade in the Hong Kong region. In order to more accurately reflect China's trade surplus with the U.S., this study has already taken into consideration the U.S.-bound Chinese exports and China-bound U.S. exports which have undergone entrepôt trade in the Hong Kong region – the part of exports with its transit route via Hong Kong port, but not included in Hong Kong Customs statistics. To avoid the effect of price on the U.S.-China trade imbalance, in this study, China's exports to the U.S. (including entrepôt) and the U.S. exports to China (including entrepôt) were calculated using FOB prices. After a series of data processing, it is known that according to the statistics of total volume of trade, U.S.-China trade surplus in 2007 was approximately US$195bn. According to our estimates (see Figure 6), in 2007 the value-added induced by China's per US$1,000 exports to the U.S. was US$522 for China, whereas the value-added induced by the U.S. per US$1,000 exports to China was US$860 for China, with the former being only 61% of the latter (see Figure 5). Therefore, from the calculation using value-added measures it shows that in 2007, the U.S.-China trade surplus was US$77.9bn, a more than 60% reduction from the results calculated using the value of total exports (US$195bn).

According to the statistics for total exports, the U.S.-China trade surplus of goods in 2010 was US$217.9bn, among which China's exports to the U.S. was US$317.3bn (including entrepôt via Hong Kong), and U.S. exports to China were US$99.4bn (including entrepôt via Hong Kong); in 2010 the value added for China induced by China's per US$1,000 exports to the U.S. was US$561, and the value-added for the U.S. induced by U.S. per US$1,000 exports to China was US$868, with the former being only 64.6% of the latter. In accordance with the value-added measure of calculation, in 2010 China's exports to the U.S. was US$178bn (including entrepôt via Hong Kong), and U.S. export to China was US$86.3bn (including entrepôt via Hong Kong), and the U.S.-China trade surplus in 2010 was US$91.7bn. The U.S.-China trade surplus results calculated using the value-added measure is 57.9% less that the figure calculated using the total export value. U.S.-China goods trade surplus was US$253bn in 2011. The value-added for China induced by China's per US$1,000 exports to the U.S. (including entrepôt via Hong Kong) was US$573, and the value-added for the U.S. induced by the U.S. per US$1,000 exports to China (including entrepôt via Hong Kong) was US$851, with the former being only 67.7% of the latter. The results show that the U.S.-China trade surplus estimated using the value-added measure is 55% less than the estimates calculated using the total value of exports.

For expected bilateral trade in 2022, the value-added rate of China's exports to the U.S. would be 64.1%. In other words, for every US$1,000 of Chinese exports to the U.S., US$641 of domestic value-added and employment of 0.015 would be generated. The value-added rate of U.S. exports to China would be 86%. This means that for each US$1,000 of U.S. exports to China, US$860 of domestic value-added and employment of 0.0048 would be generated. Overall, in 2022, the U.S.-China bilateral trade will give the Chinese domestic value of US$456.5bn, accounting for 2.3% of China's GDP (US$19.7tr), and 10.68 million jobs. In 2022 bilateral trade would bring a domestic value-added to the U.S. of US$357.8bn, accounting for 1.8% of the U.S. GDP (US$19.68tr), and about two million jobs.

Chinese tourism in the U.S. domestic value-added and employment

In recent years, there has been a surge in the number of visitors to the U.S. and a rapid growth in tourism in the U.S. According to the U.S. Department of Commerce, in 2004 there were only 20.3 million visitors to the U.S., which increased to 108.9 million in 2011, an increase of 438%. Chinese tourism to the U.S. increased from US$1.115bn in 2004 to US$7.74bn in 2011, an average annual increase of 31.9%. China has become the fastest growing country in the development of the tourism market in the U.S. The Tourist Office of the U.S. Department of Commerce report shows, in 2011, Chinese mainland tourists in the U.S. spent more than any other overseas group[17].

In 2011, the number of tourists from China to the U.S. was 1.089 million. Total tourist expenditure was US$7.74 bn and per capita consumption was US$7,107.4. The consumption pattern of Chinese visitors to the U.S. is different from visitors from other countries, with shopping by Chinese tourists accounting for a larger proportion of expenditure. We estimate the Chinese tourists' consumption structure as follows: retail purchases account for 40% of expenditure; accommodation 15%; air transport 17%; food and meals 10%; and other expenditure 18%. Estimation results using the 2010 U.S. non-competitive IO table are as follows:

On the basis of a per capita consumption of US$7,107.4, according to our calculations, for every 1 million increase in Chinese visitors to the U.S., the total value-added value to the U.S. economy would be US$6.46bn, of which direct value-added is US$4.02bn. The total employment impact would be 78,000 persons per year, of which the direct employment impact is 59,000 persons per year.

Since the value added and employment impact arising from tourists' spending would not fully be captured in the year of impact, we have also estimated the time lag effect. The results show that the proportion of value-added and employment generated in the first year account for about 85% and 91% of the full impact. The indirect effects generated in the second year would account for 14% of the total value-added and 8% of the total employment. The remaining value-added and employment is less than 1% of the full effect. One could consider therefore that the indirect effects are quite weak after the first year.

For the forecast period 2012 to 2022, there was average annual growth of 15% of Chinese visitors traveling to the U.S. Chinese travel to the U.S. in 2022 generated about US$35.9bn in revenue for the U.S., pulling the US$32.3bn to U.S. domestic value-added, which directly increased the value to US$19.7bn for the U.S. and provided about 294,000 jobs.

Impact of U.S. exports of agricultural

17 Refer to http://tinet.ita.doc.gov/outreachpages/download_data_table/2011_China_Market_Profile.pdf

products to China on U.S. domestic value-added and employment

The U.S.-China agricultural trade has experienced a rapid development. From 2001 to 2010, the agricultural trade volume between the two countries increased from US$4.1bn to US$24.5bn, an increase of nearly five times in nine years, and an average annual increase of up to 22%. In 2010, China imported agricultural products from the U.S. for a total of US$18.6bn, accounting for 13% of total U.S. agricultural exports, making China the No. 1 destination for U.S. agricultural exports.

U.S. agricultural exports to China are mainly beans, cotton and corn. In 2011 the ratio of these three kinds of agricultural exports was: beans 61.1%; 15% for cotton; and 5% for corn. The three categories of products account for 81.1% of the total value of agricultural products exported from the U.S. to China.

According to our calculations, for every US$10bn agricultural products directly exported from the U.S. to China, a total of US$8.84bn of total value-added generated, among which the direct value-added was US$4.21bn, and 67,000 persons per year total employment can be generated, among which the direct employment will be 32,000 persons per year.

Due to the different lengths of the production process of various departments (an average of about two to three months), it is assumed that the time lag for each effect is around a period of three months. Assuming that export demand occurred in the middle of the year, it will have direct impact on the first round of indirect effects in the same year; and the second to fifth rounds of indirect effects will occur in the second year; and the sixth round of indirect effects in the third year. If it is believed that the value-added from the U.S. agricultural exports to China (employment), and the value-added generated in the first round of indirect effects (employment) occurred in the first year, they will account for about 75% of the total impact. The second year's indirect effects on the value-added in the fifth round value will account for 24%, and the remainder of the value-added will be less than 1% (about 0.8%). We believe that the indirect impact in the last two years will be very weak.

It is expected that in the period 2012-2022, the average annual growth of the U.S. agricultural exports to China will reach 10%, and as such in 2022, the U.S. agricultural exports to the China will reach US$58.4bn, driving a total of US$51.4bn U.S. domestic value-added, among which US$29.2bn is the direct value-added, and 0.292 million jobs will be generated for the U.S.

Appendix

Summary Sheet of the Impact of Exports of Goods by China and by the U.S. on the Value-added and Employment, 1987-2011

Figure A1: Domestic Value-added Induced by US$1,000 of China's Exports

Year	Types of exports	Domestic value-added per US$1,000 China's exports (US$)			Direct and indirect imports per US$1,000 China's exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	237	385	622	291	87	378
	Processing	194	194	388	564	48	612
	Non-Processing	266	512	778	109	113	222
2010	Aggregate	235	380	615	308	77	385
	Processing	190	196	386	568	46	614
	Non-Processing	268	513	781	117	102	219
2007	Aggregate	226	365	591	342	67	409
	Processing	174	193	367	585	48	633
	Non-Processing	270	510	780	137	83	220
2002	Aggregate	204	347	551	406	43	449
	Processing	166	139	305	666	29	695
	Non-Processing	240	540	780	166	54	220
1997	Aggregate	191	353	544	410	46	456
	Processing	154	186	340	633	27	660
	Non-Processing	229	519	748	188	64	252
1992	Aggregate	196	343	539	439	22	461
	Processing	142	117	259	733	8	741
	Non-Processing	228	472	700	270	30	300
1987 Estimates	Aggregate	232	383	615	360	25	385
	Processing	147	117	264	729	7	736
	Non-Processing	251	446	697	274	29	303

Employment Induced by US$1,000 of China's Exports

Year	Types of exports	Employment per US$1,000 China's exports (Person-year)			Non-agriculture employment per US$1,000 China's exports (Person-year)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	0.016	0.035	0.051	0.016	0.020	0.036
	Processing	0.008	0.014	0.022	0.008	0.010	0.018
	Non-Processing	0.022	0.048	0.070	0.021	0.026	0.047
2010	Aggregate	0.019	0.043	0.062	0.019	0.023	0.042
	Processing	0.009	0.018	0.027	0.009	0.013	0.022
	Non-Processing	0.027	0.060	0.087	0.026	0.031	0.057
2007	Aggregate	0.026	0.070	0.096	0.026	0.038	0.064
	Processing	0.014	0.031	0.045	0.014	0.022	0.036
	Non-Processing	0.037	0.101	0.138	0.036	0.052	0.088
2002	Aggregate	0.095	0.160	0.255	0.091	0.082	0.173
	Processing	0.045	0.068	0.113	0.045	0.045	0.090
	Non-Processing	0.142	0.245	0.387	0.134	0.116	0.250
1997	Aggregate	0.159	0.242	0.401	0.150	0.136	0.286
	Processing	0.067	0.120	0.187	0.067	0.074	0.141
	Non-Processing	0.250	0.363	0.614	0.233	0.197	0.430
1992	Aggregate	0.218	0.449	0.667	0.199	0.167	0.366
	Processing	0.100	0.170	0.270	0.099	0.057	0.156
	Non-Processing	0.287	0.610	0.897	0.257	0.230	0.487
1987 Estimates	Aggregate	0.438	0.636	1.074	0.409	0.205	0.615
	Processing	0.188	0.152	0.340	0.186	0.064	0.250
	Non-Processing	0.496	0.749	1.245	0.461	0.238	0.699

Note, Exchange rates of US$100 to RMB (period average): 1987: 372.21; 1992: 551.46; 1997: 828.91; 2002: 827.70; 2007: 760.40; 2010: 676.95; 2011: 645.88

Figure A2: **Domestic Value-added Induced by US$1,000 of Chinese Exports to the U.S. (including re-exports from Hong Kong)**

Year	Types of exports	Domestic value-added per US$1,000 China's exports (US$)			Direct and indirect imports per US$1,000 China's exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	220	353	573	350	77	427
	Processing	192	205	397	554	49	603
	Non-Processing	254	535	789	99	112	211
2010	Aggregate	216	345	561	370	69	439
	Processing	191	207	398	555	47	602
	Non-Processing	252	537	789	110	101	211
2007	Aggregate	203	319	522	411	67	478
	Processing	176	199	375	577	48	625
	Non-Processing	250	540	790	111	99	210
2002	Aggregate	177	241	418	544	38	582
	Processing	168	152	320	647	32	680
	Non-Processing	210	554	764	177	58	236
1997	Aggregate	172	279	451	511	38	549
	Processing	156	177	333	642	25	667
	Non-Processing	212	534	746	184	70	254
1992	Aggregate	152	229	381	604	15	619
	Processing	140	93	233	760	7	767
	Non-Processing	172	470	642	329	29	358
1987 Estimates	Aggregate	227	303	530	449	21	470
	Processing	151	44	195	802	3	805
	Non-Processing	264	427	691	280	29	309

Employment Induced by US$1,000 of Chinese Exports to the U.S. (including re-exports from Hong Kong)

Year	Types of exports	Employment per US$1,000 China's exports Person-year			Non-agriculture employment per US$1,000 China's exports Person-year		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	0.014	0.033	0.047	0.014	0.018	0.032
	Processing	0.008	0.016	0.024	0.008	0.011	0.019
	Non-Processing	0.022	0.052	0.074	0.022	0.027	0.049
2010	Aggregate	0.017	0.039	0.056	0.016	0.022	0.038
	Processing	0.010	0.020	0.030	0.010	0.013	0.023
	Non-Processing	0.026	0.066	0.092	0.025	0.033	0.058
2007	Aggregate	0.023	0.061	0.084	0.023	0.034	0.057
	Processing	0.016	0.032	0.048	0.016	0.022	0.038
	Non-Processing	0.035	0.113	0.148	0.034	0.057	0.091
2002	Aggregate	0.062	0.110	0.172	0.062	0.065	0.127
	Processing	0.047	0.073	0.121	0.047	0.049	0.097
	Non-Processing	0.114	0.237	0.352	0.113	0.121	0.234
1997	Aggregate	0.110	0.182	0.291	0.108	0.110	0.218
	Processing	0.068	0.113	0.181	0.068	0.072	0.140
	Non-Processing	0.214	0.353	0.567	0.209	0.206	0.414
1992	Aggregate	0.133	0.321	0.454	0.122	0.111	0.233
	Processing	0.099	0.135	0.234	0.098	0.047	0.145
	Non-Processing	0.194	0.648	0.842	0.165	0.223	0.388
1987 Estimates	Aggregate	0.380	0.535	0.915	0.376	0.195	0.570
	Processing	0.162	0.098	0.260	0.162	0.048	0.210
	Non-Processing	0.440	0.657	1.097	0.435	0.235	0.670

Figure A3: **Domestic Value-added Induced by US$1000 of Chinese Direct Merchandise Exports to United States (excluding re-exports from HK).**

Year	Types of exports	Domestic value-added per US$1,000 China's exports (US$)			Direct and indirect imports per US$ 1,000 China's exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	220	356	576	346	78	424
	Processing	193	206	399	553	48	601
	Non-Processing	253	532	785	102	113	215
2010	Aggregate	216	347	563	366	71	437
	Processing	190	208	398	555	47	602
	Non-Processing	251	534	785	113	102	215
2007	Aggregate	204	323	527	404	69	473
	Processing	176	198	374	577	49	626
	Non-Processing	250	533	783	117	100	217
2002	Aggregate	180	273	453	507	39	547
	Processing	166	145	311	658	31	689
	Non-Processing	211	553	764	178	58	236
1997	Aggregate	170	269	439	525	35	561
	Processing	155	180	335	641	24	665
	Non-Processing	212	535	747	184	69	252
1992	Aggregate	156	289	445	536	19	555
	Processing	140	105	245	748	7	755
	Non-Processing	173	480	653	315	32	347
1987 Estimates	Aggregate	251	346	597	379	24	403
	Processing	155	89	244	750	6	756
	Non-Processing	277	418	695	276	29	305

Employment Induced by US$1000 of Chinese Direct Merchandise Exports to United States (excluding re-exports from HK).

Year	Types of exports	Employment per US$1,000 China's exports (Person-year)			Non-agriculture employment per US$1,000 China's exports (Person-year)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	0.014	0.032	0.046	0.014	0.019	0.033
	Processing	0.008	0.016	0.024	0.008	0.011	0.019
	Non-Processing	0.021	0.052	0.073	0.021	0.028	0.049
2010	Aggregate	0.016	0.039	0.055	0.016	0.022	0.038
	Processing	0.010	0.019	0.029	0.010	0.013	0.023
	Non-Processing	0.025	0.066	0.091	0.025	0.032	0.057
2007	Aggregate	0.022	0.061	0.083	0.022	0.035	0.057
	Processing	0.015	0.032	0.047	0.015	0.022	0.037
	Non-Processing	0.034	0.108	0.142	0.034	0.055	0.089
2002	Aggregate	0.067	0.122	0.189	0.067	0.070	0.137
	Processing	0.046	0.070	0.115	0.045	0.047	0.093
	Non-Processing	0.115	0.236	0.351	0.113	0.121	0.234
1997	Aggregate	0.098	0.179	0.277	0.096	0.105	0.201
	Processing	0.063	0.118	0.181	0.063	0.072	0.135
	Non-Processing	0.204	0.358	0.562	0.193	0.204	0.397
1992	Aggregate	0.139	0.393	0.532	0.136	0.141	0.277
	Processing	0.103	0.151	0.254	0.103	0.052	0.155
	Non-Processing	0.178	0.645	0.823	0.170	0.233	0.403
1987 Estimates	Aggregate	0.397	0.487	0.884	0.391	0.171	0.562
	Processing	0.204	0.055	0.260	0.204	0.024	0.228
	Non-Processing	0.490	0.695	1.184	0.480	0.242	0.722

Source: The data for China's exports of goods to the U.S. with the transit route via Hong Kong are from the customs statistics of the Customs and Excise Department of Hong Kong and the Hong Kong Census and Statistics Department.

Figure A4: **Domestic Value-added Induced by US$ 1000 of Chinese Exports to the U.S. (including both direct merchandise exports and service exports)**

Year	Types of exports	Domestic value-added per US$1,000 China's exports (US$)			Direct and indirect imports per US$1,000 China's exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	226	360	586	336	78	414
	Processing	193	206	399	553	48	601
	Non-Processing	261	529	790	98	112	210
2010	Aggregate	221	352	573	356	71	427
	Processing	190	208	398	555	47	602
	Non-Processing	260	530	790	108	102	210
2007	Aggregate	212	329	541	390	69	459
	Processing	176	198	374	577	49	626
	Non-Processing	265	523	788	112	100	212
2002	Aggregate	190	288	478	481	41	522
	Processing	166	145	311	658	31	689
	Non-Processing	231	544	775	167	58	225

Employment Induced by US$ 1000 of Chinese Exports to the U.S. (including both direct merchandise exports and service exports)

Year	Types of Exports	Employment per US $1,000 China's exports Unit: person-year			Non-agriculture employment per US $1,000 China's exports Unit: person-year		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	0.015	0.033	0.048	0.015	0.019	0.034
	Processing	0.008	0.016	0.024	0.008	0.011	0.019
	Non-Processing	0.023	0.051	0.074	0.023	0.027	0.05
2010	Aggregate	0.017	0.04	0.057	0.017	0.022	0.039
	Processing	0.01	0.019	0.029	0.01	0.013	0.023
	Non-Processing	0.027	0.064	0.091	0.027	0.032	0.059
2007	Aggregate	0.024	0.061	0.085	0.024	0.035	0.059
	Processing	0.015	0.032	0.047	0.015	0.022	0.037
	Non-Processing	0.037	0.105	0.142	0.037	0.054	0.091
2002	Aggregate	0.076	0.125	0.201	0.075	0.073	0.148
	Processing	0.046	0.069	0.115	0.045	0.048	0.093
	Non-Processing	0.129	0.225	0.354	0.128	0.119	0.247

Figure A5: Domestic Value-added Generated by U.S.' Exports

Year	Types of exports	Domestic value-added per US$1,000 U.S.' exports (US$)			Direct and indirect imports per US$1,000 U.S.' exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011 *	Aggregate	434	402	836	104	59	164
2010	Aggregate	475	387	862	87	51	138
2007	Aggregate	451	410	861	84	56	139
2002	Aggregate	470	422	892	69	40	108
1997	Aggregate	489	411	900	62	38	100
1992 **	Aggregate	533	388	921	46	32	79
1987 ** Estimates	Aggregate	550	382	932	40	28	68

Employment Generated by U.S.' Exports

Year	Types of Exports	Employment per US $ 1,000 United States' exports (person-year)			Non-agriculture employment per US $ 1,000 United States' exports (person-year)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011 *	Aggregate	0.0030	0.0029	0.0059	0.0028	0.0028	0.0056
2010	Aggregate	0.0032	0.0029	0.0061	0.0031	0.0028	0.0059
2007	Aggregate	0.0035	0.0034	0.0069	0.0034	0.0033	0.0067
2002	Aggregate	0.0049	0.0046	0.0095	0.0048	0.0044	0.0092
1997	Aggregate	0.0050	0.0053	0.0103	0.0049	0.0051	0.0099
1992 *	Aggregate	0.0059	0.0062	0.0121	0.0058	0.0060	0.0117
1987 * Estimates	Aggregate	0.0077	0.0077	0.0154	0.0075	0.0074	0.0149

2011 IO table has not been released, nor the export data broken down by IO sectors. Therefore this article has used the HTS export data, and the IO table used is a 2010 non-competition table. The approach is: assign the HTS-10-digit code to the corresponding IO67 sector, convert the purchasers' prices of the export data into the producer prices using the export transformation matrix, and allocate the remaining exports to the corresponding service sector (including rail transport, waterway transport, air transport, pipeline transport, wholesale trade, etc.). Since all HTS are being applied to the exports of goods, as a result, the export driving effect calculated using this method is comparatively low;

** The sector classification of the 1992 and 1987 IO tables are based on Standard Industrial Classification (SIC). Using the matching of SIC to NAICS sectors available on the website of the Ministry of Commerce (http://www.census.gov/), , the 97 SIC-based sectors are matched to NAICS 67 sectors. Because many sectors have crossed-over features, the merged result has only 46 sectors. The calculation results here are based on the IO table using NAIC's 46 sectors.*

Figure A6: Domestic Value-added Induced by US$1,000 of U.S.' Merchandise Exports to China (including re-exports from Hong Kong)

Year	Types of exports	Domestic value-added per US$1,000 U.S.' exports (US$)			Direct and indirect imports per US$1,000 U.S.' exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	460	406	866	77	57	134
2010	Aggregate	469	399	868	76	56	132
2007	Aggregate	430	430	860	81	59	140
2002	Aggregate	433	448	881	76	43	119
1997	Aggregate	399	482	881	74	45	119
1992	Aggregate	460	444	904	58	38	96
1987 Estimates	Aggregate	478	448	926	42	32	74

Employment Induced by US$1,000 of U.S.' Merchandise Exports to China (including re-exports from Hong Kong)

Year	Types of exports	Employment per US$1,000 U.S.' exports (Person-year)			Non-agriculture employment per US$1,000 U.S.' exports (Person-year)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	0.0034	0.0030	0.0064	0.0030	0.0028	0.0058
2010	Aggregate	0.0033	0.0030	0.0063	0.0030	0.0028	0.0058
2007	Aggregate	0.0036	0.0036	0.0072	0.0034	0.0034	0.0068
2002	Aggregate	0.0048	0.0048	0.0096	0.0046	0.0047	0.0093
1997	Aggregate	0.0051	0.0060	0.0111	0.0048	0.0058	0.0106
1992	Aggregate	0.0064	0.0069	0.0133	0.0061	0.0068	0.0129
1987 Estimates	Aggregate	0.0080	0.0087	0.0167	0.0075	0.0081	0.0156

Note: The exports include exports of goods only (exports of service not included).

Figure A7: **Domestic Value-added Induced by US$1,000 of U.S.' Direct Merchandise Exports to China (excluding re-exports from Hong Kong)**

Year	Types of exports	Domestic value-added per US$1,000 U.S.' exports (US$)			Direct and indirect imports per US$1,000 U.S.' exports (US$)		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	455	409	864	78	58	136
2010	Aggregate	464	403	867	76	57	133
2007	Aggregate	428	431	859	81	60	141
2002	Aggregate	435	446	881	76	43	119
1997	Aggregate	396	487	883	71	46	117
1992	Aggregate	452	452	904	57	39	96
1987 Estimates	Aggregate	469	458	927	41	32	73

Employment Induced by US$1,000 of U.S.' Direct Merchandise Exports to China (excluding re-exports from Hong Kong)

Year	Types of exports	Employment per US$1,000 U.S.' exports Person-year			Non-agriculture employment per US$1,000 U.S.' exports Person-year		
		Direct	Indirect	Total	Direct	Indirect	Total
2011	Aggregate	0.0034	0.0031	0.0065	0.0030	0.0028	0.0058
2010	Aggregate	0.0033	0.0030	0.0063	0.0030	0.0028	0.0058
2007	Aggregate	0.0036	0.0036	0.0072	0.0034	0.0034	0.0068
2002	Aggregate	0.0048	0.0048	0.0096	0.0046	0.0047	0.0093
1997	Aggregate	0.0051	0.0060	0.0111	0.0047	0.0058	0.0105
1992	Aggregate	0.0064	0.0070	0.0134	0.0061	0.0068	0.0129
1987 Estimates	Aggregate	0.0078	0.0089	0.0167	0.0072	0.0082	0.0154

Note: The exports include exports of goods only (exports of service not included).

Chapter 9

The Long-Term Outlook for U.S.-China Trade

Gary Clyde HUFBAUER
Reginald Jones Senior Fellow, The Peterson Institute for International Economics

Dean A. DEROSA
Principal Economist of ADR International Ltd., and a Visiting Fellow, The Peterson Institute for International Economics

With contributions from Cathleen CIMINO, Research Analyst at The Peterson Institue for International Economics

Executive Summary

This report draws on gravity model analysis and other sources to forecast the growth of U.S. and Chinese bilateral trade, and the global trade positions of the two countries to 2022 – a decade into the future. Merchandise and services trade are distinguished, and exports and imports are separately identified.

Over the period 2000 to 2011, U.S. growth has averaged around 2%, while Chinese growth has often exceeded 10%. The U.S. has experienced a persistent global current account deficit, while China has experienced a persistent surplus. And while the U.S. has recorded a large global deficit in merchandise trade, it has also recorded a significant global surplus in services trade. China has experienced the opposite. Bilateral trade between the U.S. and China has followed these patterns. In 2010, the U.S. had a bilateral merchandise deficit of US$280bn with China and a bilateral services surplus of US$11bn. Since 2005, the renminbi (RMB) has appreciated both in real effective terms and in real bilateral terms against the U.S. dollar (US$). Over the entire period, the US$ has generally declined in real effective terms. (See Figures 1, 2 and 3 which provide historical data, starting in 2000, on U.S. and Chinese gross domestic product (GDP), global trade, current account balances, bilateral trade in goods and services, and real effective and bilateral exchange rates.)

Our core analysis draws on gravity model coefficients for bilateral trade – separating merchandise and services – between the U.S. and China. We calculated coefficients based on bilateral merchandise data from 2008 to 2011 for all-country trade, U.S.-only trade and China-only trade. We used a short time span for the merchandise calculations because the very rapid growth of Chinese merchandise exports following the country's accession to the World Trade Organization (WTO) in 2001 and the end of the Multi-Fiber Agreement in 2005 will probably not be repeated in the decade ahead[1]. Even so, some of the findings and forecasts are startling; others are mundane. A strong finding that nevertheless confirms common wisdom is that Chinese merchandise exports to the U.S. dramatically exceed any norm, no matter what set of coefficients are applied (see Table A4 in the Appendix to this chapter). As is well known, China has become the Asian assembly point for merchandise sold in America. Accordingly, if trade values were stated in value-added terms rather than sales terms, Chinese exports to the U.S. would be substantially reduced[2]. Our analysis, however, is based on conventional trade data, expressed in terms of bilateral exports and imports between countries.

Everyone expects U.S.-China bilateral trade – as conventionally measured – to grow over the next decade. However, if China's GDP expands at an average 7.5% annually (our medium forecast), and trade expansion springs from the 2011 base, the growth is immense, even after we dampen the projections to take into account economic features not captured in the standard gravity model. In 2011, two-way U.S.-China trade in goods and services totaled about US$570bn; starting with this base, in

1 We used a longer time span – 2000 to 2010 – to calculate gravity coefficients for services trade. Chinese services exports are small compared to merchandise exports, and a longer time span substantially enlarges the number of bilateral trade observations.

2 The Organization for Economic Co-operation and Development and WTO estimate that if measured in value-added terms, China's bilateral trade surplus with the U.S. would be 25% lower in 2009: US$131bn in value-added terms compared to US$171bn in gross sales terms. This is due both to the high level of foreign content in Chinese exports and the high level of U.S. value-added in Chinese imports.

2022, we forecast two-way trade of US$1.6tr (valued at 2011 prices). In 2011, two-way services trade was 5% of total two-way trade; in 2022, two-way services trade is forecast to reach 10% of the total.

Our baseline forecasts – while smaller in magnitude than those recently made by the International Monetary Fund (IMF) in its report "World Economic Outlook" (WEO) – project a large Chinese current account surplus, both globally and bilaterally with the U.S. in 2022. The baseline forecasts assume practically no change in the real effective exchange rate for the RMB, and no unilateral reduction by China in its tariff barriers. However, if the RMB is allowed to appreciate significantly over the next three years – continuing a trend in the real effective rate for the RMB since 2005 – our baseline forecasts envisage that China's present global current account surplus turns into a deficit, and a sharp shrinkage in China's bilateral surplus with the U.S. If China unilaterally abolishes its tariff barriers on merchandise imports (now averaging about 8% ad valorem), but did not allow the RMB to appreciate, the Chinese current account surplus would be narrowed, but still remain large – at around 2.5% of China's GDP in 2022.

Figure 1: U.S. and China Output, Growth and International Trade and Payments, 2000-11 (US$ billions at current prices)

	U.S.						China					
	International trade						International trade					
	Gross domestic output*	Growth (%)	Goods and services		Current account balance	CAB/ GDP (%)	Gross domestic output*	Growth (%)	Goods and services		Current account balance	CAB/ GDP (%)
			Exports	Imports					Exports	Imports		
2000	9,951	4.1	1,073	1,450	-416.3	-4.2	1,198	8.4	280	251	20.5	1.7
2001	10,286	1.1	1,008	1,369	-396.6	-3.9	1,325	8.3	299	271	17.4	1.3
2002	10,642	1.8	981	1,398	-457.2	-4.3	1,454	9.1	365	328	35.4	2.4
2003	11,142	2.5	1,024	1,515	-519.1	-4.7	1,641	10.0	485	449	43.1	2.6
2004	11,853	3.5	1,163	1,769	-628.5	-5.3	1,932	10.1	658	607	68.9	3.6
2005	12,623	3.1	1,287	1,996	-745.8	-5.9	2,257	11.3	837	712	132.4	5.9
2006	13,377	2.7	1,460	2,213	-800.6	-6.0	2,713	12.7	1,062	853	231.8	8.5
2007	14,029	1.9	1,655	2,351	-710.3	-5.1	3,494	14.2	1,342	1,034	353.2	10.1
2008	14,292	-0.3	1,843	2,541	-677.1	-4.7	4,520	9.6	1,582	1,233	420.6	9.3
2009	13,974	-3.1	1,575	1,956	-381.9	-2.7	4,991	9.2	1,333	1,113	243.3	4.9
2010	14,499	2.4	1,838	2,338	-442.0	-3.0	5,930	10.4	1,744	1,521	237.8	4.0
2011	15,076	1.8	2,105	2,665	-465.9	-3.1	7,298	9.2	2,087	1,898	201.7	2.8
2022	20,869[#]	…	…	…	…	…	16,170[#]	…	…	…	…	…

** For the gravity model estimations, we use real GDP at purchasing power parity (PPP) exchange rates. For our purposes here, we present GDP at current prices and market exchange rates.*
 # 2022 GDP figures (at 2011 prices) assume real medium growth projections for China (7.5% annually) and the U.S. (3.0% annually).

Source: International Monetary Fund; World Economic Outlook (October 2012); World Bank, World Development Indicators, December 2012

Figure 2: U.S. and China: International and Bilateral Trade in Goods and Services, 2000-11
(US$ billions at current prices)

	U.S. trade with World and China								China trade with World			
	Goods				Services				Goods		Services	
	World		China		World		China		World		World	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
2000	787	1,231	22	108	285	218	5.0	3.2	249	215	30	36
2001	734	1,153	26	109	273	216	5.4	3.6	266	232	33	39
2002	701	1,173	27	134	280	226	5.8	4.1	326	281	40	47
2003	733	1,271	34	163	290	243	5.7	3.8	438	394	47	55
2004	825	1,486	45	211	338	282	7.3	5.6	593	534	65	73
2005	916	1,693	49	260	372	303	8.4	6.2	762	628	74	84
2006	1,043	1,876	59	306	417	337	10.5	9.3	970	752	92	101
2007	1,168	1,984	70	340	487	367	13.0	10.7	1,220	904	122	130
2008	1,312	2,139	82	356	531	402	15.1	9.4	1,435	1,074	147	159
2009	1,074	1,576	78	310	501	380	16.0	8.2	1,204	954	129	159
2010	1,293	1,936	103	383	544	402	21.2	10.0	1,581	1,327	162	193
2011	1,502	2,237	123	417	604	428	…	…	1,904	1,660	183	238

	Payment balances on goods and services trade								
	Goods			Services			Goods and services		
	U.S.	China	U.S.-China	U.S.	China	U.S.-China	U.S.	China	U.S.-China
2000	-444	34	-85	67	-6	1.8	-377	29	-83
2001	-419	34	-83	57	-6	1.9	-362	28	-81
2002	-472	44	-106	54	-7	1.8	-417	37	-104
2003	-538	44	-129	47	-9	1.9	-491	36	-127
2004	-661	59	-166	55	-8	1.7	-605	51	-164
2005	-778	134	-211	69	-10	2.2	-709	125	-209
2006	-833	218	-246	80	-9	1.2	-753	209	-245
2007	-816	316	-271	119	-8	2.3	-697	308	-268
2008	-827	361	-275	129	-12	5.7	-698	349	-269
2009	-503	250	-232	121	-29	7.8	-381	220	-224
2010	-642	254	-280	142	-31	11.1	-500	223	-269
2011	-735	244	-294	175	-55	…	-560	188	…

Source: Organization for Economic Cooperation and Development; Statistics on International Trade in Services (December 2012); Peterson Institute for International Economics; Gravity Model Data Set (June 2012); World Bank, World Development Indicators (December 2012)

Figure 3: **U.S. and China International Merchandise Trade, Import Tariffs and Exchange Rates, 2000-11 (US$ billions at 2011 prices)**

	U.S.						
	International trade				Average import tariff (%)	Real effective exchange Rate	Real RMB/US$ exchange rate
	Goods and services		Goods imports				
	Exports	Imports	World	China			
2000	1,073	1,450	1,231	108	3.6	107.8	107.3
2001	1,008	1,369	1,153	109	3.5	113.9	105.0
2002	981	1,398	1,173	134	3.5	113.6	102.5
2003	1,024	1,515	1,271	163	3.4	106.4	101.4
2004	1,163	1,769	1,486	211	3.2	101.4	102.6
2005	1,287	1,996	1,693	260	3.2	100.0	100.0
2006	1,460	2,213	1,876	306	3.1	99.4	95.6
2007	1,655	2,351	1,984	340	2.9	94.7	93.0
2008	1,843	2,541	2,139	356	3.2	91.0	86.9
2009	1,575	1,956	1,576	310	3.0	95.1	85.1
2010	1,838	2,338	1,936	383	2.9	91.4	85.8
2011	2,105	2,665	2,237	417	...	86.9	83.8

	China						
	International trade				Average import tariff (%)	Real effective exchange Rate	Real US$/RMB exchange rate
	Goods and services		Goods imports				
	Exports	Imports	World	U.S.			
2000	280	251	215	22	16.4	108.5	93.4
2001	299	271	232	26	15.4	113.2	95.4
2002	365	328	281	27	...	110.6	97.6
2003	485	449	394	34	10.7	103.3	98.7
2004	658	607	534	45	9.8	100.5	97.5
2005	837	712	628	49	9.2	100.0	100.0
2006	1,062	853	752	59	8.9	101.6	104.5
2007	1,342	1,034	904	70	8.6	105.6	107.6
2008	1,582	1,233	1,074	82	8.4	115.3	115.5
2009	1,333	1,113	954	78	8.2	119.2	117.9
2010	1,744	1,521	1,327	103	7.7	118.7	117.0
2011	2,087	1,898	1,660	123	...	121.9	119.9

Sources: International Monetary Fund; Peterson Institute for International Economics; Gravity Model Data Set (June 2012); World Bank, World Development Indicators (December 2012).
Note: Real bilateral exchange rates calculated by the authors.

The Long-Term Outlook for U.S.-China Trade

Assumptions and Scenarios

Within the gravity model framework, GDP levels are the dominant driver of bilateral trade flows. Hence the projected annual growth of real GDP in the U.S. and China is the most important factor in forecasting two-way trade in 2022. Our GDP growth projections are based on three different assumptions: low growth (U.S. 2.5%, China 6.5%); medium growth (U.S. 3.0%, China 7.5%); and high growth (U.S. 3.5%, China 8.5%). Population levels are another important driver, but population growth is subject to less uncertainty than GDP growth. We assume annual population growth rates of 0.9% for the U.S. and 0.5% for China.

We model two scenarios for the Chinese RMB: first, that it will stay the same in real terms over the next decade; second, that the RMB will appreciate in real terms through 2015 at the same pace experienced since 2005, about 3.4% per year. In the second scenario, real appreciation could be achieved by an unspecified combination of nominal appreciation of the RMB in trade-weighted terms and by faster inflation in China than in its principal trading partners. Side calculations illustrate the impact of the RMB value on China's global current account position and its bilateral trade surplus with the U.S.

In terms of trade policy, we consider three alternative scenarios. In the first scenario, there is no appreciable change in U.S. or Chinese tariff or non-tariff barriers. In the second scenario, China unilaterally eliminates its tariff barriers on merchandise imports on a most-favored-nation (MFN) basis. In the third scenario, the U.S. and China move towards the extent of preferential liberalization envisaged in a Free Trade Area of Asia and the Pacific (FTAAP) through mutual accommodation, eliminating both tariff and non-tariff barriers on goods and services trade and, in effect, establishing a basic free trade area (FTA) between the two countries. We use the adjective 'basic' because we do not envisage the extensive range of investment, intellectual property, environmental, labor or dispute settlement provisions contemplated in the Trans Pacific Partnership (TPP). Accordingly, in assessing this scenario, we start with partial equilibrium analyses of tariff and non-tariff barrier elimination and then, more ambitiously, examine the consequences if gravity model FTA coefficients are assumed for U.S.-China trade a decade hence.

Gravity Model in Brief

The dominant workhorse for our projections is the gravity model. For interested readers, DeRosa and Gilbert (2005) spell out the structure of the gravity model in detail and contrast the gravity model results with those from a computable general equilibrium (CGE) model. In this report we skip lightly over the major features of the gravity model and its application to U.S.-China trade forecasts. The models used in this report are broadly similar in specification to most gravity models, but are distinguished by important features. They explain not only bilateral (two-way) and one-way merchandise trade (separating exports and imports), but also bilateral and one-way services trade based on flows from 2008 to 2011 for merchandise and 2000 to 2010 for services, selectively using annual data from 170 countries[3]. The trade data were

3 For the years 2010 and 2011, bilateral trade data may be missing for some country pairs.

censored to exclude bilateral or one-way flows under US$10m (at 2011 prices) because we want to estimate coefficients that best describe significant trade flows without the influence of thousands of smaller bilateral flows that are captured in the database. A two-stage least squares approach was used to estimate coefficients.

The models used for this report calculate coefficients separately using nine different data sets as dependent variables:

- Bilateral trade between all countries in the data base;
- Exports of merchandise by the U.S. to all its partner countries;
- Imports of merchandise by the U.S. from all its partner countries;
- Similarly, exports of merchandise by China;
- Imports of merchandise by China;
- Exports of services by the U.S.;
- Imports of services by the U.S.;
- Exports of services by China; and
- Imports of services by China.

As expected, the estimated coefficients on the explanatory (independent) variables show that greater distance between partners reduces trade, while greater joint GDP of partners expands trade. The individual influence of other core explanatory variables is also sensible and generally conforms to the results of other gravity models. A common language or border between countries tends to expand bilateral commerce; as does being an island economy; sharing a colonial relationship with a trading partner; or being a beneficiary of the Generalized System of Preferences (GSP)[4]. Besides distance, the principal trade-resistance factor – according to the gravity model – is being a landlocked country.

The all-country model incorporates indicator variables for over 500 FTAs, grouped into nine prominent individual FTAs and groups of FTAs worldwide, including the North American Free Trade Agreement (NAFTA) and FTAs undertaken by the E.U.[5] The FTA indicators are dichotomous (0,1) variables, often termed dummy variables. They take a value of 1 if trade or investment partner countries are FTA members and their mutual trade agreement is in force; they otherwise take a value of 0[6]. However, FTA indicators are not used for the U.S.-only model or the China-only model because there was little change in U.S. or Chinese FTA partners during the period used for estimating coefficients (2008-11 for merchandise and 2000-10 for services).

The figures in the Appendix to this chapter present the gravity model coefficients estimated from the different data sets, and then apply these coefficients to forecast trade flows in 2022. Examination of Figures A3 through A6 reveals that gravity model coefficients estimated from different data sets yield substantially different trade forecasts. Accordingly, for forecasting purposes, we used a three-step approach. First, we selected the set of coefficients that yield trade predictions closest to actual values since 2000. Second, we applied ad hoc adjustment factors to the selected coefficients so as to yield predicted trade values reasonably close to actual trade values in recent years (the ad hoc adjustment factors are presented in Figure A7 in the Appendix to this chapter). For example, Chinese merchandise exports to the U.S. are, in the initial instance, forecast by using the Chinese export coefficients multiplied by an ad hoc factor of 1.5. Third, for the purpose of making forecasts to 2022, we modified our adjust-

4 Under the U.S. General System of Preferences, advanced countries extend trade preferences to less developed countries on a non-reciprocal basis. For program descriptions, see United Nations Conference on Trade and Development (UNCTAD) (2005).

5 The FTAs and preferential trade agreements are grouped as follows: European Union (E.U.); European Free Trade Area (EFTA); E.U. bilateral free trade agreements (E.U. FTAs); North American Free Trade Agreement (NAFTA); Southern Cone Common Market (Mercosur); Chile, Mexico, Australia and Singapore (CMAS) FTAs, separately distinguished because these are truly free trade countries; Association of Southeast Asian Nations (ASEAN) Free Trade Area (AFTA); South Asia Free Preferential Trading Arrangement (SAPTA); and all other customs unions and FTAs.

6 To illustrate, the NAFTA indicator variable for U.S.-Mexico trade would take a value of 0 until 1994, and a value of 1 in 1994 and later.

ment factors in a rough attempt to reflect economic developments not captured in the gravity model.

As mentioned earlier, the period 2001 to 2008 was extraordinarily favorable to Chinese exports because China joined the WTO in 2001 and slashed its tariff rates, thereby turning itself into an assembly plant for all of Asia. Moreover, in 2005, the Multi-Fiber Agreement was terminated, thereby opening world markets to Chinese exports of apparel and textiles.

External current account balances necessarily reflect internal savings, investment and government fiscal balances[7]. It seems likely that China's extraordinarily high internal net savings balance – which translates into an external current account surplus – will diminish in the decade ahead as the Standing Committee gives a stronger push on household consumption and the public safety net, and as the Chinese population ages. Meanwhile, it seems likely that the U.S. fiscal deficit will shrink and household savings may rise in the decade ahead.

China's labor costs are rising rapidly, while U.S. wage levels are practically flat. Consequently, Chinese exports are becoming less competitive in world markets, especially relative to India, Indonesia and Vietnam, while U.S. exports are becoming more competitive, especially relative to Canada, Europe and Japan. These competitive shifts portend faster export growth for the U.S. and slower export growth for China.

The range of goods suitable for 'made in China' assembly for the U.S. market may be nearing saturation; instead, Chinese firms might concentrate on new markets for their existing range of goods in Latin America, Africa and Asia.

The gravity model projections of bilateral U.S.-China trade do not directly indicate either country's current account balance with the world. However, in recent years, rather stable relationships have emerged between the bilateral U.S.-China current account balance and each country's current account balance with the world[8]. We have used these relationships to generate gravity model projections of each country's current account balance with the world. In turn, as explained in the next section, those global current account balances are tested against projections made by the IMF.

Supplementary Sources

The gravity model is not good at forecasting the impact of exchange rate or trade barrier changes. The fundamental reason is that the gravity model identifies underlying forces that impact trade flows that differ in size over several orders of magnitude (e.g. US$10m to US$100bn). Across this immense range, exchange rate and trade barrier changes exert only a modest impact compared to distance, GDP levels and common borders. Yet changes in exchange rates and trade barriers are of great interest, for they are directly influenced by government policy and they clearly affect year-to-year trade performance and current account positions.

Accordingly, for this report, we have drawn on supplementary sources to assess the impact of exchange rate changes, tariff changes and non-tariff barrier changes on trade positions of the U.S. and China in 2022. We have used the IMF's 2012 WEO forecasts through 2017 as a benchmark for the trade balance implications derived from the gravity model. WEO forecasts are made in the context of constant real exchange rates, and in our baseline scenario we assume that the RMB real exchange rate

7 This follows from the basic arithmetic of national accounts in which the current account balance must equal the national (private plus public) investment-savings gap: (M-X) = (I+G) – (S+T), where (M-X) is the current account balance (M represents imports, X represents exports); I is investment expenditure (both households and business); G is all government expenditure; S is private savings (households and business); and T is all taxes.

8 From recent data on the external accounts of the two countries, we observe that the U.S.-China current account balance equals about 60% of the overall U.S. current account balance. At the same time, we find that the U.S.-China current account balance is nearly equal to the overall China current account balance with the world. These relationships may be seen, for instance, during 2009 and 2010, when the U.S.-China bilateral current account balance averaged 60% of the U.S. global current account balance and 100% of the China global current account balance (see Figure A8 in the Appendix to this chapter).

changes very little through 2017. We have extended the WEO forecasts on a straight-line basis to 2022. It turns out that the WEO forecasts – so extended for the U.S. global current account deficit and the Chinese global current account surplus in 2022, as well as the bilateral current account balances – are somewhat larger than those implied by the gravity model using the baseline medium GDP growth projections (U.S. 3.0% growth; China 7.5% growth). The WEO suggests a U.S. bilateral current account deficit with China of US$660bn in 2022; the gravity model suggests a bilateral deficit of US$412bn. Correspondingly, the U.S. global current deficit is projected at US$686bn in 2022 (somewhat less than the WEO forecast of US$734bn), and the Chinese global current account surplus is projected at US$412bn (markedly smaller than the WEO forecast of US$698bn).

As mentioned, the gravity model forecasts do not attempt to reflect exchange rate changes, a feature which puts them on the same footing as the WEO forecasts. Discussed in more detail later, our projections for the U.S. current account deficit with China and the U.S. global current account deficit with the world are cut very substantially if China continues to appreciate its real exchange rate by about 3.4% per year through 2015.

We have drawn on William Cline and John Williamson (2012) to calculate the impact of continued real appreciation of the RMB at 3.4% per year – the pace experienced since 2005. We assume this pace continues through 2015 and then stops. In other words, we assume that the RMB appreciates by 14.3% in real terms over a period of four years, starting in 2011 (1.034 raised to the power of four).

Our unilateral liberalization scenario for tariffs on merchandise imports draws on other sources. The World Bank – relying on trade protection data compiled by the World Trade Organization and United Nations Conference on Trade and Development (UNCTAD) – reports the average Chinese ad valorem tariff on imports is 7.7%[9]. We assume that the US$ value of Chinese imports of goods increases by 1% for each one percentage point decrease in the tariff rate. This impact reflects the assumption that the RMB *value* of Chinese merchandise imports does not change because the real quantity of imports rises by 1% for each 1% fall in their price in RMB terms (i.e. by the percentage of RMB appreciation). However the US$ *value* of Chinese merchandise imports increases by the percentage rise in the real quantity of Chinese imports.

Our unilateral liberalization scenario for non-tariff barriers on services draws on work by Hufbauer, Schott and Wong (2010). Conservatively, they estimate the tariff equivalent of non-tariff barriers on Chinese service imports as 68%. This is high, but the World Bank (2012) reports a slightly higher figure. Based on estimates summarized in Hufbauer et al. (2010), the demand elasticity for imported services is about -1.37. Eliminating service barriers – in the context of a mutual accommodation scenario – would challenge China politically as well as economically, but liberalization would both deliver huge gains to the Chinese economy and reduce China's bilateral trade surplus with the U.S. Prices for key services would drop in China – for example, finance, telecoms, health, education, retail – while U.S. exports would increase dramatically (see Figure 4).

Forecasts for 2022

We start by summarizing what the alternative growth projections imply for U.S. and Chinese GDP measured at 2011 prices. For our trade forecasts, we focus on the medium growth projections: U.S. GDP rises at 3.0% annually and China GDP rises at 7.5% annually. The trade forecasts are examined in four scenarios:

9 World Bank, World Development Indicators, World Databank, http://databank.worldbank.org/data/home.aspx, as of December 2012.

Figure 4: **Impact on U.S.-China Services Trade From Eliminating Tariff Equivalents of Services Barriers**

	Tariff Equivalent Barriers*	Price Elasticity	2022 projections of U.S.-China trade in services with no liberalization ($ bill)#			Trade gains from eliminating tariff equivalents of services barriers ($ bill)			2022 projections of U.S.-China trade with complete liberalization ($ bill)		
			Low	Medium	High	Low	Medium	High	Low	Medium	High
U.S. exports to China	67.9	-1.37	167.8	256.0	389.4	156.1	238.1	362.2	323.9	494.1	751.6
China exports to U.S.	6.0	-1.37	30.1	37.7	47.0	2.5	3.1	3.9	32.6	40.8	50.9

** TEBs come from Hufbauer, Schott and Wong 2010. The World Bank (2012) estimates TEBs of 3.8 percent for the U.S. and 76.2 percent for China. For our purposes we use the more conservative estimates from Hufbauer, Schott and Wong 2010.*
 # Low projections for U.S. service exports to China correspond to China GDP growth of 6.0 percent per annum; medium projections correspond to 7.0 percent per annum; high projections correspond to 8.0 percent per annum. Low projections for Chinese service exports to the United States correspond to U.S. GDP growth of 2.0 percent per annum; medium projections correspond to 2.5 percent per annum; high projections correspond to 3.0 percent per annum. See table 7.

Sources: The World Bank, 2012, http://iresearch.worldbank.org/servicetrade/; Hufbauer, Schott and Wong 2010.

Figure 5: **U.S.-China Trade and Payments, 2005-11 and Projections to 2022**
(US$ billions at 2011 prices)

Year and scenario	U.S.				China			
	Current account Balance	Trade with China			Current account Balance	Trade with U.S.		
		Goods and services balance	Goods exports	Service exports		Goods and services balance	Goods exports	Service exports
2005	-746	-209	49	8.4	132	209	260	6.2
2006	-801	-245	59	10.5	232	245	306	9.3
2007	-710	-268	70	13.0	353	268	340	10.7
2008	-677	-269	82	15.1	421	269	356	9.4
2009	-382	-224	78	16.0	243	224	310	8.2
2010	-442	-269	103	21.2	238	269	383	10.0
2011	-466	…	123	…	202	…	417	…
2022								
IMF WEO (October 2012)								
1. No RMB real appreciation	-734	-660	…	…	698	698	…	…
Gravity model-based projections								
1. No RMB real appreciation	-686	-412	508	104	412	412	964	60
2. RMB appreciation to 2015	-455	-181	580	119	-295	181	828	51
3. China trade liberalization	-650	-375	545	104	375	375	964	60
4. U.S.-China basic FTA	-442	-167	545	342	167	167	992	63

Source: Organization for Economic Cooperation and Development; Statistics on International Trade in Services (December 2012); Peterson Institute for International Economics; Gravity Model Data Set (June 2012); World Bank, World Development Indicators (December 2012)

Scenario 1: Business as usual

The first scenario is 'business as usual', which uses projections straight from the gravity model coefficients with adjustments, as explained in the Notes to Figure 4 and in the Appendix to this chapter in Table A7. In this scenario, there is no change in the RMB real exchange rate and no liberalization of Chinese or U.S. tariff or non-tariff barriers. The U.S. current account deficit in 2022 (at 2011 prices) is forecast at US$686bn, and the bilateral goods and services trade deficit with China at US$412bn, respectively 3.3% and 2% of U.S. GDP in 2022, somewhat higher than in 2011. In broad terms, global current account balances for the two countries – as projected by the gravity model with adjustments – are substantially less than the balances projected by the IMF in its WEO (see Figure 5). Moreover, there is a change in the composition of U.S. exports to

China in 2022: services exports are projected by the gravity model at US$104bn, about 20% of U.S. exports of goods, projected at US$508bn, as compared to just 17% of U.S. exports of goods in 2011.

Apart from the rapid growth of U.S. service exports, the standout feature of this and other scenarios is the huge amount of Chinese merchandise exports to the U.S., between US$800bn and US$1,000bn in 2022. This represents more than a doubling of China's outsized role as 'factory Asia' for the U.S. market – even after taking into account the adjustment factors mentioned earlier. To be sure, the U.S. bilateral trade deficit with new 'factory Asia' powers might well rise as they crowd into China's traditional export markets. Accordingly, it would be a mistake to equate a smaller U.S.-China bilateral trade deficit (smaller than the WEO forecast) with an equivalent shrinkage of the U.S. global current account deficit. In fact, while our baseline forecast shows a U.S. bilateral trade deficit (goods and services), almost US$250bn smaller than the WEO forecast for 2022, the U.S. global current account deficit only shrinks by US$50bn.

Scenario 2: RMB real appreciation

In the second scenario, we consider the consequences of continued RMB appreciation through 2015, to a point where China incurs a global current account deficit in 2022, calculated at US$295bn (about 1.8% of China's GDP valued at the market exchange rate). The pace of real appreciation is the same as allowed by the Chinese authorities since 2005, about 3.4% annually.

RMB appreciation exerts a strong impact on China's global current account balance, if one accepts (as we do) the Cline and Williamson (2012) coefficient[10]. According to their calculations, each 1% appreciation in the real effective exchange rate of the RMB diminishes China's current account surplus (measured at market exchange rates) by 0.31% of China's GDP.

According to our forecasts, even significant RMB appreciation leaves a U.S. current account deficit, both globally and bilaterally. However, among the scenarios we have modeled, the U.S. external deficits are smallest in the RMB appreciation scenario. Globally, the U.S. current account deficit shrinks from our baseline scenario projection of US$686bn to US$455bn in 2022, some 2.2% of U.S. GDP, and bilaterally the trade deficit shrinks from our baseline scenario projection of US$412bn to US$181bn, about 0.9% of U.S. GDP. As emphasized in the discussion in Scenario 1, if China sheds part of its role as 'factory Asia', that would shrink the U.S. bilateral trade deficit, but the U.S. global current account deficit would not shrink as much.

Scenario 3: Unilateral China tariff elimination

Both the U.S. and China maintain non-tariff barriers on merchandise imports. Scenario 3, however, assumes that China unilaterally eliminates just its merchandise tariffs over the next decade and does not reduce its barriers to service imports. China's current average ad valorem tariff is 7.7%. Like other analysts, we assume that a one percentage point reduction in the average Chinese tariff increases merchandise imports by 1% in volume terms; hence total elimination increases Chinese imports by almost 8%. This 'unitary coefficient', while widely assumed, may be too conservative. As the calculations in Figure 4 indicate, improvements in the U.S. current account deficit and bilateral trade deficit seem fairly modest by comparison with the baseline forecasts, under US$35bn in each case. Correspondingly, the calculated impact on China's current account surplus and bilateral trade surplus are also modest.

Again, as emphasized in Scenario 1, China's 'factory Asia' role makes a huge difference in the outcome. If 'factory Asia' migrates to other locations, China's external surpluses will decline. However, unilateral tariff elimination would, if anything,

10 Note the skeptical view as to the impact of exchange rate changes on trade flows, expressed by Edward P. Lazear in his op-ed, "Chinese 'Currency Manipulation' is Not the Problem", Wall Street Journal, 8 January 2012, p. A17.

work to China's advantage in retaining assembly plants, because exporting firms could more easily access the inputs they need from global sources.

Viewed from a political standpoint, unilateral tariff elimination would be a dramatic step, widely applauded by all China's trade partners. The trade impact would possibly be twice as large as we have calculated. In any event, the ratio between economic cost – viewed through a mercantilist lens – and political payoff appears quite favorable for China.

Scenario 4: Mutual accommodation

Our fourth and final scenario is more speculative than the others. We label the scenario a 'basic FTA' or 'mutual accommodation': both China and the U.S. eliminate – on a preferential basis – tariffs on merchandise and non-tariff barriers on services. The service barriers are critical to this scenario; in political terms, however, elimination might be very difficult for China. Service exports are America's comparative advantage, and China's service barriers, expressed in tariff equivalent terms, are very high – almost 70%. Our calculations on the possible enlargement of U.S.-China trade suggest that the U.S. global current account deficit might drop to US$442bn in 2022 in this scenario, and the bilateral trade deficit could decline to US$167bn. In terms of shrinking U.S. external deficits, Scenario 4 is as powerful as Scenario 2, which envisages RMB appreciation. However, and we emphasize this point again, Scenario 4 critically depends on dramatic liberalization of China's barriers to U.S. service exports. Moreover, in Scenario 4, U.S. service exports to China are three times as large as in baseline Scenario 1 – US$342bn annually versus US$104bn.

While we think it is a stretch to project a trade agreement between the U.S. and China with the depth and coverage of the U.S.-Korea FTA, an agreement that eliminated barriers to merchandise and services trade on a preferential basis does not seem impossible. Accommodation might be achieved within the framework of an FTAAP by bringing together members of the Trans Pacific Partnership (TPP) with Asian countries linked to China through the ASEAN Free Trade Agreement (AFTA) and other arrangements. We picture the 'accommodation scenario' through partial equilibrium calculations of bilateral trade created by eliminating tariff barriers on merchandise and non-tariff barriers on services.

Perhaps these calculations are too conservative. Therefore, we also consider the expansion of bilateral trade if accommodation between the U.S. and China reached the same level of ambition as a number of recent FTAs. In fact, our gravity model estimates for several prominent bilateral and regional trading agreements (see Figures A1 (merchandise trade) and A2 (trade in services) in the Appendix to this chapter) imply much larger trade impacts than we find using the simple partial equilibrium calculations. Based on the array of coefficient estimates that we find for the several FTAs represented in the gravity model, a conservative coefficient estimate for a basic U.S.-China FTA would be 0.25 for trade in both merchandise and services between the two countries. Such an estimate implies that bilateral trade between the U.S. and China should be expected to expand by 28% (explained in the first section of text in the Appendix to this chapter). This magnitude is much greater than the modest trade gains found by our main side calculations for goods trade between the two countries and for China's service exports to the U.S. (less than 10%).

But it must be emphasized that the magnitude of trade expansion implied by our gravity model coefficients for the experience of past FTAs falls considerably short of the huge gain in U.S. service exports to China projected by our side calculations. The reason is straightforward: even the most ambitious FTAs implemented so far fall far short of eliminating barriers to services trade. Hence the gravity model coefficients in figure A2 in the Appendix to this chapter reflect much less liberalization than we contemplate in a U.S.-China accommodation scenario.

Figure 6: Trade Expansion and Growth Rate Scenarios U.S.-China Merchandise and Service Exports, 2000-22

Year and scenario	U.S.				China			
	U.S. merchandise exports to China		U.S. service exports to China*		China merchandise exports to the U.S.		China service exports to the U.S.*	
	End to beginning trade expansion	Compounded growth rate (%)	End to beginning trade expansion	Compounded growth rate (%)	End to beginning trade expansion	Compounded growth rate (%)	End to beginning trade expansion	Compounded growth rate (%)
Actual trade, 2000-11	4.4	14.5	3.5	13.2	3.1	10.9	2.6	9.9
Predicted trade, 2011-22								
1. No RMB real appreciation#	4.1	13.8	4.8	14.0	2.3	7.9	5.8	15.8
2. RMB appreciation to 2015	4.7	15.1	5.5	15.3	2.0	6.4	5.0	14.4
3. China trade liberalization	4.4	14.5	4.8	14.0	2.3	7.9	5.8	15.8
4. U.S.-China basic FTA	4.4	14.5	15.9	25.9	2.4	8.2	6.1	16.3

** Trade expansion and growth rate calculations for bilateral service exports based on the time periods 2000-10 for actual trade and 2010-22 for predicted trade.*
 # 2022 projection assumes medium-growth scenario for the U.S. and China.

Alternative GDP Growth Projections

We conducted some sensitivity analysis under alternative growth projections for the U.S. and China (the results are shown in Figures A3 through A6 in the Appendix to this chapter). In addition to the medium-to-medium (M-M) growth rate assumption used in our baseline trade projections for 2022, trade forecasts were also calculated for low-to-low (L-L) and high-to-high (H-H) growth scenarios for the decade ending 2022, and also a low-to-high (L-H) scenario in which the U.S. grows at 2.5% and China grows at 8.5%.

As might be expected, trade forecasts for merchandise and service exports by China and the U.S. increase incrementally as growth projections are revised upwards. Yet the alternative growth scenarios collectively confirm the core findings of our baseline Scenario 1: a sustained U.S. current account deficit, both globally and bilaterally with China in 2022, and conversely sustained Chinese current account surpluses, both globally and bilaterally. Within a fairly wide range, varying the growth assumptions does not alter the tenor of our findings.

Figure 7: Growth Scenario Assumptions, 2012-22 (% per annum)

Growth scenario	Real GDP		Population	
	U.S.	China	U.S.	China
Low	2.5	6.5	0.9	0.5
Medium	3.0	7.5	0.9	0.5
High	3.5	8.5	0.9	0.5
Low U.S./High China	2.5	8.5	0.9	0.5

Trade Expansion and Export Growth Rate Scenarios

The forecasts in the four main scenarios confirm an expected expansion of U.S.-China bilateral trade. The detailed breakdown of growth rates of U.S.-China merchandise and service exports highlights the patterns and drivers of projected trade expansion. Figure 6 shows the trade expansion and growth rate scenarios for U.S.-China exports for actual trade from 2000 to 2011 and projected trade from 2011 to 2022. Two observations are particularly illustrative. Overall, across the four scenarios, projected Chinese merchandise exports to the U.S. will grow at a slower pace than in the past decade, while projected U.S. merchandise exports to China will maintain the pace of past growth. However, projected U.S. and China services export growth rates in the decade ahead outpace growth rates in the decade past: in nearly all scenarios, services trade expansion from 2010 to 2022 more than doubles the extent of services trade expansion from 2000 to 2010. Projected U.S. service exports to China in the first three scenarios show an average compound growth rate in the decade ahead that is only 1% to 2% faster than the 13% growth rate experienced in the decade past. However, annual growth of U.S. service exports to China is particularly rapid in Scenario 4, the 'mutual accommodation' scenario, exceeding 25% annually. Across the scenarios, projected Chinese service exports to the U.S. will grow at an average compound rate of around 16%, compared to 10% in the last decade.

Restrictions on High-Tech Exports

Chinese trade specialists commonly assert that U.S. export restrictions are an important factor limiting U.S. merchandise exports to China. On the face of it, this assertion has merit. The U.S. export control apparatus historically divided trading partners into four tiers: Tier 1 – 'highly trusted', illustrated by NATO allies and Japan; Tier 2 – 'trusted', illustrated by Estonia and Romania; Tier 3 – 'risky', illustrated by China, India and Russia; and Tier 4 – 'threat', illustrated by Cuba, Iran and North Korea. In 2001, Tiers 1 and 2 were consolidated for export control purposes, but China remains in the Tier 3 category of 'risky' or 'moderate threat' countries, a designation which entails more restrictive export controls. From this cursory survey, it appears plausible that the U.S. is losing high-tech exports to China and other Tier 3 destinations.

In their Working Paper, Asha Sundaram and J. David Richardson (forthcoming 2013) have deployed a gravity model to estimate U.S. high-tech export shortfalls compared both with other advanced countries (France, Germany, Japan and the U.K.) and emerging export powers (Brazil, China, India, Israel and Mexico). For their analysis, Sundaram and Richardson focused on seven three-digit harmonized tariff system (HTS) categories, illustrated by chemical products (352), electrical machinery (383) and scientific equipment (385).

Surprisingly, for 2004 the authors found that the U.S. enjoyed 'over-exports' to Tier 3 countries, in the aggregate amount of US$25bn for all seven HTS categories. In particular, U.S. high-tech exports to China in 2004 were US$10bn *higher* than the gravity model norm. There was no high-tech export shortfall. Instead, the U.S. did well, both compared to its advanced rivals and to emerging export powers. What explains these surprising results?

Sundaram and Richardson believe that U.S. export success – despite the apparatus of U.S. controls – can be explained by two factors. First, while the control system has a Byzantine character, it has been liberalized considerably since the Cold War years, and further liberalization is underway. For example, in December 2012, Congress enacted legislation that could liberalize satellite exports through a presidential waiver of the statutory prohibition[11]. Second, U.S.-based multinational corporations (MNCs) are extremely energetic in developing new high-tech products and marketing them at home and abroad. Exports of most high-tech products are not, in fact, restricted and U.S. MNCs are often a step or two ahead of their European and Japanese rivals.

Based on the findings presented by Sundaram and Richardson, we conclude that U.S. controls are a minor factor in limiting U.S. exports to China. Very probably, their aggregate impact is close to zero; at most the export shortfall induced by controls does not exceed US$5bn annually. In the context of mutual accommodation, further relaxation of U.S. export controls would make a great deal of sense, but it should not be expected to yield a big jump in U.S. exports.

11 See Jon Ostrower, "Satellite-Export Rule to Ease", *Wall Street Journal*, 21 December 2012, p. B4. Unfortunately, the new presidential waiver authority does not extend to China. The original prohibition was enacted in 1996, following the crash of a Chinese rocket carrying a satellite built by Loral Space Communications (Loral was acquired by Boeing in 2000). Search of the wreckage uncovered a secret encoded circuit board, which in turn prompted a wave of accusations.

Conclusions from the Scenarios

The trade forecasts of the four scenarios collectively imply sustained current account deficits for the U.S., both bilaterally and globally, and reciprocally, current account surpluses for China. The U.S. bilateral deficit is projected at US$400bn in 2022, while the global deficit could reach US$700bn. A major contraction of the U.S. external deficit appears to require significant structural changes by comparison with the coefficients estimated from our gravity equations for the period 2000 to 2011 (see Figures A1 and A2 in the Appendix to this chapter).

What structural changes might change the picture? One possibility is more RMB appreciation, as contemplated in Scenario 2. Another possibility is faster and more drastic liberalization, especially of services, as contemplated in our Scenarios 3 and 4.

Still another possibility – outside the scope of this study but very likely – is a dramatic shift of the U.S. position as net energy importer in 2011 (energy deficit of US$331bn) to zero net energy imports, or even net energy exports in the mid-2020s[12]. This could be the big payoff from the revolution in shale gas and oil, now underway across the U.S. A simple calculation translates this change in U.S. energy outlook into potential shrinkage of the U.S. global current account deficit. Assuming the U.S. eliminates its 'energy deficit' by 2022, and assuming no other changes, our calculations for the U.S. global current account deficit follow: baseline Scenario 1 (business-as-usual) drops from US$686bn to US$355bn; Scenario 2 (RMB appreciation) drops from US$455bn to US$124bn; Scenario 3 (unilateral liberalization) drops from US$650bn to US$319bn; and baseline Scenario 4 (mutual accommodation) drops from US$442bn to US$111bn. While eliminating the U.S. energy deficit does not eliminate the U.S. global current account deficit in our models, it would shrink the deficit dramatically.

The foregoing discussion emphasizes trade deficits and surpluses because of their salience in political relations between the U.S. and China. However, no one should lose sight of the tremendous gains in GDP and living standards that result from an expansion in trade, whether or not it is 'balanced' on a bilateral basis. According to our baseline (Scenario 1) estimates, in 2022, two-way trade in goods and services between China and the U.S. will reach US$1.6tr, up from US$0.6tr in 2011. Research summarized elsewhere indicates that, through multiple channels, national GDP increases by at least US$4 for every US$10 increase in two-way trade[13]. An expansion of bilateral trade by US$1.0tr over 10 years could deliver GDP gains of US$400bn each to the U.S. and China in 2022, compared to the GDP levels that would otherwise be reached. Gains of this magnitude amount to 2.0% to 2.5% of projected U.S. and Chinese GDP levels ten years from now – a huge payoff by any standards.

Appendix

Technical Background

This appendix summarizes the technical apparatus used to estimate the gravity model coefficients, and additional sources we used to supplement the gravity model in order to evaluate three other scenarios: RMB appreciation, unilateral tariff liberalization and mutual accommodation.

Gravity Model Coefficients

Our analysis starts with Figures A1 and A2 which show, respectively, the regression coefficients estimated (using the two-stage least squares approach) for merchandise trade and services trade. The alternative dependent variables, shown at the top of columns, are logarithmic values – all-country exports, U.S. exports to all partner countries, U.S. imports

12 The U.S. Energy Information Administration (EIA) provides the most recent projections in its "Annual Energy Outlook 2013", finding U.S. production of natural gas will likely outpace domestic consumption by 2020 and spur net exports. Much the same could happen with oil.

13 See Figuring Out the Doha Round: Policy Analyses in International Economics 91, Gary Clyde Hufbauer, Jeffrey J. Schott and Woan Foong Wong, Peterson Institute for International Economics, 2010.

from all partner countries, China exports to all partner countries and China imports from all partner countries. To avoid giving excessive weight to small trade values when estimating regression coefficients, trade values less than US$10m were excluded from the data set. The data set comprises trade and other values for the period 2000 to 2010/11, depending upon the availability of the most recent observations on bilateral trade and national explanatory variables. All monetary values are expressed in US$ in real terms: GDP levels are evaluated on a purchasing power parity basis at 2005 prices and exchange rates, while bilateral trade values are deflated by the U.S. consumer price index and, for these projections, are presented at 2011 prices.

Independent variables are shown in the rows in Figures A1 and A2. The basic structure of the regression equation combines logarithmic and semi-logarithmic independent terms. Continuous variables, such as distance and joint per capita GDP, are expressed in logarithmic terms. On-off variables, such as the existence of a common colonizer between two partner countries or the presence of an FTA between the partners, are expressed as two dummy variables – 0 for off, 1 for on. The character of landlocked or island partner countries are expressed as three dummy variables – 0 for none, 1 for one, 2 for both.

When the independent variable is continuous and therefore expressed in logarithmic terms, the coefficient can be interpreted as an elasticity value. For example, a coefficient of 0.086 on joint per capita GDP means that, if the product of per capita GDP increases by 10%, trade between the partners – or exports from one partner to the other – increases by 0.86%. When the independent variable is on-off, a small transformation is needed to derive the impact. For example, the coefficient of 0.277 for E.U. member country merchandise exports to other E.U. members implies that the existence of the E.U. increases member country exports to one another by 32% in exports, calculated as [100*{exp(0.277) – 1.00} = 32%]. In this expression, exp (0.277) means the natural number *e* raised to the power of 0.277.

The all-country export coefficients for merchandise are based on nearly 23,000 observations, and for services on 25,000 observations. However, the export and import coefficients for the U.S. and China with their respective partners are necessarily based on much smaller data sets, around 400 observations for merchandise and 200-to-400 observations for services trade.

Alternative Export and Import Projections

Figures A3 through A6 present alternative gravity model projections to 2022, assuming the alternative growth projections (low, medium and high – see note 2 in Figure 6) and different coefficient sets (all-country, U.S. and China). Readers will quickly see that different coefficient sets generate very different trade projections for 2022. We chose the coefficient set that most closely mirrors actual trade in recent years (2000-11), and then we applied ad hoc adjustment factors to more closely reflect actual trade flows. The adjustment factors are spelled out in the notes to Figure 4 and in Figure A7 in the Appendix. From this work we generated the baseline U.S.-China trade projections that appear in figure 4 (Scenario 1) for merchandise trade and services trade. Table A7 shows the actual to predicted ratios of bilateral U.S.-China merchandise and services trade to illustrate how the adjusted coefficients approximate actual trade flows from 2000 to 2011.

Comparison with WEO Projections

Figure A8 explains the International Monetary Fund (IMF) World Economic Outlook (WEO) past data and projections for the U.S. and Chinese current account balances and bilateral trade deficits and surpluses, and provides a side-by-side comparison with our gravity model past data and projections. The WEO projections only extend to 2017; accordingly we extrapolated the WEO figures to the gravity model end date, 2022. The WEO projections do not indicate bilateral merchandise and service trade flows; however, the WEO projections for current account and bilateral balances are in the same ball park as the gravity model projections. The WEO projections assume near-constant real effective exchange rates while the baseline gravity model projections do not have an exchange rate term (nor do they have terms for tariff and non-tariff barriers). Accordingly the baseline gravity model projections should be viewed as assuming no change in the RMB exchange rate, or in Chinese or U.S. trade policy.

Calculations of Alternative Scenarios

Alternative gravity model scenarios reflect assumed RMB appreciation and two versions of trade liberalization. These scenarios require supplementary calculations, because the gravity model is not suited to identify the impact either of exchange rate changes or the reduction of trade barriers. Figures A9, A10 and A11 show the calculations used to generate, respectively, Scenario 2 (RMB appreciation), Scenario 3 (unilateral Chinese tariff elimination) and Scenario 4 (mutual trade accommodation between the U.S. and China).

The Scenario 2 calculations rely on the RMB exchange rate impact parameter estimated by William Cline and John Williamson (2012). The Scenario 3 calculation adopts a conventional unitary response coefficient for Chinese tariff rate reduction (one percentage point ad valorem tariff reduction increases imports by 1%). The Scenario 4 calculations assume preferential liberalization between the U.S. and China. They adopt the same tariff rate assumption as Scenario 3, but separately add the impact of service trade liberalization, drawing on Hufbauer, Schott and Wong (2010). Because Chinese service trade barriers are high, liberalization would sharply increase U.S. service exports to China, and this is the big feature of Scenario 4.

Figure A1: **Two-Stage Least Squares Gravity Model Estimates for Aggregate Merchandise Trade (SITC 0-9), Specifying Major Customs Unions and Free Trade Agreements, and Dropping Bilateral Trade less than $10 Million in 2011 U.S. dollars, 2008-2011**

		All-country exports	U.S. exports	U.S. imports	China exports	China imports
Log distance	Estimate	-0.724***	-1.515***	-0.859***	-0.232	-0.510
	(s.e.)	(0.024)	(0.161)	(0.292)	(0.153)	(0.336)
	(t-statistic)	(-30.433)	(-9.412)	(-2.941)	(-1.518)	(-1.517)
Log product real GDP (PPP)	Estimate	0.959***	1.017***	1.103***	0.857***	0.585***
	(s.e.)	(0.031)	(0.091)	(0.165)	(0.102)	(0.126)
	(t-statistic)	(30.723)	(11.199)	(6.672)	(8.432)	(4.642)
Log product real GDP (PPP) p/c	Estimate	0.074**	0.321**	0.302	0.167*	0.632***
	(s.e.)	(0.029)	(0.132)	(0.220)	(0.098)	(0.185)
	(t-statistic)	(2.531)	(2.427)	(1.371)	(1.694)	(3.410)
Common language	Estimate	0.435***	0.529***	0.429	2.675***	3.855***
	(s.e.)	(0.040)	(0.139)	(0.274)	(0.553)	(0.776)
	(t-statistic)	(10.831)	(3.797)	(1.565)	(4.837)	(4.969)
Land border	Estimate	0.760***	-0.389	0.569	0.162	-0.080
	(s.e.)	(0.070)	(0.365)	(0.563)	(0.314)	(0.481)
	(t-statistic)	(10.914)	(-1.067)	(1.011)	(0.517)	(-0.167)
Number landlocked	Estimate	-0.150***	-0.268*	-0.375	-0.246	-0.281
	(s.e.)	(0.028)	(0.160)	(0.345)	(0.163)	(0.290)
	(t-statistic)	(-5.269)	(-1.677)	(-1.085)	(-1.504)	(-0.966)
Number islands	Estimate	0.211***	0.453**	0.053	-0.038	0.129
	(s.e.)	(0.038)	(0.202)	(0.327)	(0.147)	(0.531)
	(t-statistic)	(5.532)	(2.244)	(0.161)	(-0.258)	(0.242)
Log product land area	Estimate	-0.118***	-0.017	-0.016	0.083	0.527***
	(s.e.)	(0.016)	(0.061)	(0.097)	(0.062)	(0.112)
	(t-statistic)	(-7.286)	(-0.279)	(-0.168)	(1.350)	(4.717)
Common colonizer	Estimate	0.746***			-3.594***	-2.580***
	(s.e.)	(0.073)			(0.694)	(0.770)
	(t-statistic)	(10.282)			(-5.178)	(-3.352)
Ever colony	Estimate	0.406***	-0.091	-0.126	1.082**	1.264*
	(s.e.)	(0.083)	(0.286)	(0.464)	(0.517)	(0.650)
	(t-statistic)	(4.895)	(-0.319)	(-0.273)	(2.093)	(1.945)
GSP	Estimate	-0.059**	0.498***	0.582*	0.353**	0.397
	(s.e.)	(0.028)	(0.171)	(0.318)	(0.162)	(0.391)
	(t-statistic)	(-2.065)	(2.917)	(1.833)	(2.184)	(1.015)
E.U.	Estimate	0.277***				
	(s.e.)	(0.050)				
	(t-statistic)	(5.571)				
European Free Trade Area	Estimate	0.579***				
	(s.e.)	(0.110)				
	(t-statistic)	(5.269)				
E.U. FTAs	Estimate	-0.031				
	(s.e.)	(0.053)				
	(t-statistic)	(-0.586)				
NAFTA	Estimate	1.101***				
	(s.e.)	(0.224)				
	(t-statistic)	(4.914)				

Mercosur	Estimate	0.629**				
	(s.e.)	(0.254)				
	(t-statistic)	(2.474)				
CMAS FTAs	Estimate	0.652***				
	(s.e.)	(0.131)				
	(t-statistic)	(4.977)				
AFTA	Estimate	0.981***				
	(s.e.)	(0.174)				
	(t-statistic)	(5.646)				
SAARC	Estimate	-1.043***				
	(s.e.)	(0.354)				
	(t-statistic)	(-2.947)				
Other FTAs	Estimate	0.665***				
	(s.e.)	(0.068)				
	(t-statistic)	(9.792)				
Constant	Estimate	-24.889***	-29.431***	-39.256***	-29.967***	-34.560***
	(s.e.)	(0.781)	(2.473)	(4.102)	(3.807)	(5.248)
	(t-statistic)	(-31.872)	(-11.903)	(-9.571)	(-7.872)	(-6.585)
Observations		22,654	439	394	441	375
R-squared		0.642	0.903	0.740	0.922	0.720
Adjusted R-squared		0.642	0.901	0.733	0.920	0.712
RMSE		1.183	0.713	1.240	0.625	1.328
F-statistic		…	…	…	…	…
Number of clusters		8472	150	136	151	131

*Note 1: Two-stage least squares with robust standard errors determined by clustering ordered country pairs. Dependent variable is log real bilateral trade, Tij (country i exports to importing country j). Instruments for the (assumed) endogenous purchasing power parity GDP variables are the contemporaneous product of population levels in partner countries, one-year lagged value of the product of purchasing power parity GDP levels in partner countries, and one-year lagged value of the product of GDP per capita levels in partner countries. *,**,*** denote statistical significance at the 10, 5, and 1 percentage levels.*

Note 2: Trade agreements represented by indicator variables are: European Union (E.U.); European Free Trade Area (EFTA); EU bilateral free trade agreements (EU FTAs); North American Free Trade Area (NAFTA); Southern Common Market (Mercosur); Chile, Mexico, Australia, and Singapore bilateral free trade agreements (CMAS FTAs); ASEAN Free Trade Area (AFTA); SAARC Preferential Trading Arrangement (SAPTA); and all other customs unions and free trade agreements (Other FTAs).

Note 3: No coefficient estimate is reported when there is insufficient variation in the explanatory variable. Trade agreement variables are dropped from the U.S. and China. regressions.

Figure A2: **Two-Stage Least Squares Gravity Model Estimates for Aggregate Trade in Services (All Categories), Specifying Major Customs Unions and Free Trade Agreements and Dropping Bilateral Trade less than US$10m in 2011 US$, 2000-2010**

		All-country exports	U.S. exports	U.S. imports	China exports	China imports
Log distance	Estimate	-0.543***	-2.039***	-0.505	-1.467***	-1.242
	(s.e.)	(0.031)	(0.671)	(0.556)	(0.414)	(0.793)
	(t-statistic)	(-17.419)	(-3.037)	(-0.909)	(-3.547)	(-1.567)
Log product real GDP (PPP)	Estimate	0.891***	1.051***	0.945***	1.062***	1.209***
	(s.e.)	(0.032)	(0.092)	(0.100)	(0.163)	(0.308)
	(t-statistic)	(28.228)	(11.478)	(9.433)	(6.520)	(3.924)
Log product real GDP (PPP) p/c	Estimate	0.381***	0.655***	0.732***	0.798***	1.121**
	(s.e.)	(0.036)	(0.226)	(0.201)	(0.288)	(0.436)
	(t-statistic)	(10.640)	(2.902)	(3.639)	(2.768)	(2.572)
Common language	Estimate	0.804***	1.319***	0.691**	2.301***	2.365*
	(s.e.)	(0.064)	(0.397)	(0.297)	(0.824)	(1.342)
	(t-statistic)	(12.651)	(3.328)	(2.327)	(2.792)	(1.762)
Land border	Estimate	0.563***	-2.011**	0.279	-0.554	0.167
	(s.e.)	(0.092)	(0.982)	(0.863)	(0.642)	(1.195)
	(t-statistic)	(6.146)	(-2.047)	(0.323)	(-0.863)	(0.139)
Number landlocked	Estimate	0.006	-0.132	-0.433	-0.236	0.206
	(s.e.)	(0.043)	(0.401)	(0.352)	(0.322)	(0.527)
	(t-statistic)	(0.140)	(-0.329)	(-1.232)	(-0.734)	(0.391)
Number islands	Estimate	0.221***	0.569**	-0.064	-0.102	0.184
	(s.e.)	(0.060)	(0.231)	(0.271)	(0.566)	(1.027)
	(t-statistic)	(3.667)	(2.464)	(-0.236)	(-0.181)	(0.179)
Log product land area	Estimate	-0.165***	-0.079	-0.085	-0.062	-0.170
	(s.e.)	(0.017)	(0.060)	(0.056)	(0.129)	(0.208)
	(t-statistic)	(-9.427)	(-1.331)	(-1.512)	(-0.484)	(-0.820)
Common colonizer	Estimate	1.114***				
	(s.e.)	(0.206)				
	(t-statistic)	(5.410)				
Ever colony	Estimate	0.814***	-1.263**	0.124		
	(s.e.)	(0.094)	(0.512)	(0.340)		
	(t-statistic)	(8.649)	(-2.466)	(0.364)		
GSP	Estimate	0.238***	0.049	-0.254	0.367	0.944**
	(s.e.)	(0.046)	(0.312)	(0.163)	(0.278)	(0.415)
	(t-statistic)	(5.117)	(0.155)	(-1.557)	(1.322)	(2.275)
E.U.	Estimate	0.231***				
	(s.e.)	(0.059)				
	(t-statistic)	(3.911)				
European Free Trade Area	Estimate	0.606***				
	(s.e.)	(0.128)				
	(t-statistic)	(4.738)				
E.U. FTAs	Estimate	-0.130**				
	(s.e.)	(0.052)				
	(t-statistic)	(-2.514)				
NAFTA	Estimate	0.405***				
	(s.e.)	(0.138)				
	(t-statistic)	(2.945)				

Mercosur	Estimate					
	(s.e.)					
	(t-statistic)					
CMAS FTAs	Estimate	0.841***				
	(s.e.)	(0.258)				
	(t-statistic)	(3.262)				
AFTA	Estimate					
	(s.e.)					
	(t-statistic)					
SAARC	Estimate					
	(s.e.)					
	(t-statistic)					
Other FTAs	Estimate	0.078				
	(s.e.)	(0.104)				
	(t-statistic)	(0.751)				
Constant	Estimate	-28.840***	-32.626***	-41.206***	-41.750***	-55.280***
	(s.e.)	(0.995)	(8.812)	(6.796)	(6.277)	(13.842)
	(t-statistic)	(-28.996)	(-3.702)	(-6.063)	(-6.651)	(-3.994)
Observations		25,367	398	398	263	250
R-squared		0.620	0.855	0.849	0.842	0.675
Adjusted R-squared		0.619	0.851	0.845	0.837	0.663
RMSE		1.094	0.567	0.562	0.725	1.102
F-statistic		…	…	…	…	…
Number of clusters		3491	38	38	28	29

*Note 1: Two-stage least squares with robust standard errors determined by clustering ordered country pairs. Dependent variable is log real bilateral trade, Tij (country i exports to importing country j). Instruments for the (assumed) endogenous purchasing power parity GDP variables are the contemporaneous product of population levels in partner countries, one-year lagged value of the product of purchasing power parity GDP levels in partner countries, and one-year lagged value of the product of GDP per capita levels in partner countries. *,**,*** denote statistical significance at the 10, 5, and 1 percentage levels.*

Note 2: Trade agreements represented by indicator variables are: European Union (E.U.); European Free Trade Area (EFTA); EU bilateral free trade agreements (EU FTAs); North American Free Trade Area (NAFTA); Southern Common Market (Mercosur); Chile, Mexico, Australia, and Singapore bilateral free trade agreements (CMAS FTAs); ASEAN Free Trade Area (AFTA); SAARC Preferential Trading Arrangement (SAPTA); and all other customs unions and free trade agreements (Other FTAs).

Note 3: No coefficient estimate is reported when there is insufficient variation in the explanatory variable. Trade agreement variables are dropped from the U.S. and China. regressions.

Figure A3: **U.S. Aggregate Merchandise Exports (SITC 0-9): Actual vs Predicted Trade, 1995-2022 (US$ millions at 2011 prices)**

				Predicted U.S. exports using		
Year	Export country	Import country	Actual U.S.-China trade	All-country coefficients	U.S. export coefficients	China import coefficients
1995	U.S.	China	22,499	9,055	5,445	29,347
1996	U.S.	China	21,951	10,366	6,455	34,002
1997	U.S.	China	21,640	11,873	7,658	39,417
1998	U.S.	China	21,908	13,406	8,920	44,953
1999	U.S.	China	24,772	15,166	10,417	51,413
2000	U.S.	China	27,769	17,172	12,183	58,897
2001	U.S.	China	31,699	18,833	13,678	65,054
2002	U.S.	China	32,199	20,971	15,666	73,196
2003	U.S.	China	39,533	23,714	18,309	83,918
2004	U.S.	China	51,214	27,134	21,724	97,533
2005	U.S.	China	54,590	31,232	25,977	114,161
2006	U.S.	China	64,819	36,275	31,426	135,043
2007	U.S.	China	74,261	42,399	38,335	160,979
2008	U.S.	China	85,157	46,551	43,125	178,281
2009	U.S.	China	79,803	49,090	46,053	188,362
2010	U.S.	China	104,438	56,005	54,457	218,367
2011	U.S.	China	123,124	62,088	62,076	245,009
2022 L	U.S.	China	…	166,340	215,138	721,121
2022 M	U.S.	China	…	195,518	265,292	872,759
2022 H	U.S.	China	…	229,526	326,605	1,054,722
2022 L/H	U.S.	China	…	205,529	283,018	925,627

Note 1: Authors' calculations using the accompanying gravity model coefficient estimates for 2008-11 (shaded years), for trade by all countries, trade by the U.S. only and trade by China only. Trade predictions for 2022 are based on the accompanying low (L), medium (M), and high (H) growth scenarios for the decade ending 2022 for the U.S. and China, assuming current population growth rates in the two countries. The L/H scenario predictions assume low U.S. growth and high China growth for the decade ending 2022.

Note 2: For the purposes of making projections to 2022, an adjustment factor of 2.6 was applied to the predicted value in 2022 using all-country coefficients. The adjustment factor is based on the average annual change in the ratio of U.S. actual to predicted exports to China for 2000-2011, projected forward from 2011 to 2022, and the authors' judgment.

Figure A4: **China Aggregate Merchandise Exports (SITC 0-9): Actual versus Predicted Trade, 1995-2022 (US$ millions at 2011 prices)**

				Predicted China exports using		
Year	Export country	Import country	Actual U.S.-China trade	All-country coefficients	U.S. export coefficients	China import coefficients
1995	China	U.S.	67,706	9,055	39,771	10,453
1996	China	U.S.	73,911	10,366	45,382	12,507
1997	China	U.S.	87,364	11,873	51,811	14,975
1998	China	U.S.	97,445	13,406	58,321	17,588
1999	China	U.S.	111,583	15,166	65,779	20,714
2000	China	U.S.	133,558	17,172	74,262	24,430
2001	China	U.S.	132,249	18,833	81,250	27,603
2002	China	U.S.	157,664	20,971	90,251	31,845
2003	China	U.S.	190,127	23,714	101,803	37,525
2004	China	U.S.	240,936	27,134	116,177	44,928
2005	China	U.S.	291,009	31,232	133,365	54,229
2006	China	U.S.	334,156	36,275	154,471	66,264
2007	China	U.S.	363,152	42,399	180,048	81,674
2008	China	U.S.	371,901	46,551	197,247	92,464
2009	China	U.S.	317,681	49,090	207,638	99,110
2010	China	U.S.	389,305	56,005	236,306	118,232
2011	China	U.S.	417,303	62,088	261,444	135,705
2022 L	China	U.S.	…	166,340	684,681	502,810
2022 M	China	U.S.	…	195,518	803,686	626,480
2022 H	China	U.S.	…	229,526	942,203	779,236
2022 L/H	China	U.S.	…	205,529	844,460	670,486

Note 1: Authors' calculations using the accompanying gravity model coefficient estimates for 2008-11 (shaded years), for trade by all countries, trade by the U.S. only and trade by China only. Trade predictions for 2022 are based on the accompanying low (L), medium (M), and high (H) growth scenarios for the decade ending 2022 for the U.S. and China, assuming current population growth rates in the two countries. The L/H scenario predictions assume low U.S. growth and high China growth for the decade ending 2022.

Note 2: For the purposes of making projections to 2022, an adjustment factor of 1.2 was applied to the predicted value in 2022 using China's export coefficients. The adjustment factor is based on the average annual change in the ratio of Chinese actual to predicted exports to the U.S. for 2000-11, projected forward from 2011 to 2022, and the authors' judgment.

Figure A5: **U.S. Aggregate Exports of Services (All Categories): Actual vs Predicted Trade, 1995-2022 (US$ millions at 2011 prices)**

				Predicted U.S. exports using		
Year	Export country	Import country	Actual U.S.-China trade	All-country coefficients	U.S. export coefficients	China import coefficients
1995	U.S.	China	…	914	811	317
1996	U.S.	China	…	1,072	1,002	421
1997	U.S.	China	…	1,259	1,239	560
1998	U.S.	China	…	1,454	1,497	722
1999	U.S.	China	4,978	1,682	1,815	935
2000	U.S.	China	6,233	1,950	2,206	1,215
2001	U.S.	China	6,551	2,174	2,545	1,472
2002	U.S.	China	6,859	2,470	3,014	1,848
2003	U.S.	China	6,644	2,861	3,663	2,404
2004	U.S.	China	8,325	3,363	4,539	3,210
2005	U.S.	China	9,430	3,982	5,680	4,344
2006	U.S.	China	11,462	4,767	7,213	6,000
2007	U.S.	China	13,896	5,752	9,259	8,410
2008	U.S.	China	15,743	6,426	10,720	10,238
2009	U.S.	China	16,413	6,833	11,616	11,389
2010	U.S.	China	21,512	8,005	14,336	15,133
2011	U.S.	China	…	9,059	16,892	18,883
2022 L	U.S.	China	…	28,709	77,578	146,319
2022 M	U.S.	China	…	35,683	103,849	217,951
2022 H	U.S.	China	…	44,276	138,702	323,648
2022 L/H	U.S.	China	…	38,159	113,622	246,432

Note 1: Authors' calculations using the accompanying gravity model coefficient estimates for 2008-11 (shaded years), for trade by all countries, trade by the U.S. only and trade by China only. Trade predictions for 2022 are based on the accompanying low (L), medium (M), and high (H) growth scenarios for the decade ending 2022 for the U.S. and China, assuming current population growth rates in the two countries. The L/H scenario predictions assume low U.S. growth and high China growth for the decade ending 2022.

Note 2: For the purposes of making projections to 2022, an adjustment factor of 1.0 was applied to the predicted value in 2022 using U.S. export coefficients. The adjustment factor is based on the average annual change in the ratio of U.S. actual to predicted exports to China for 2000-10, projected forward from 2010 to 2022, and the authors' judgment.

Figure A6: **China Aggregate Exports of Services (All Categories): Actual vs Predicted Trade, 1995-2022 (US$ millions at 2011 prices)**

				Predicted China exports using		
Year	Export country	Import country	Actual U.S.-China trade	All-country coefficients	China export coefficients	U.S. import coefficients
1995	China	U.S.	…	914	621	895
1996	China	U.S.	…	1,072	780	1,100
1997	China	U.S.	…	1,259	982	1,352
1998	China	U.S.	…	1,454	1,204	1,626
1999	China	U.S.	3,345	1,682	1,484	1,962
2000	China	U.S.	3,954	1,950	1,832	2,372
2001	China	U.S.	4,293	2,174	2,139	2,727
2002	China	U.S.	4,788	2,470	2,569	3,215
2003	China	U.S.	4,429	2,861	3,173	3,890
2004	China	U.S.	6,407	3,363	4,003	4,795
2005	China	U.S.	6,913	3,982	5,105	5,970
2006	China	U.S.	10,183	4,767	6,617	7,541
2007	China	U.S.	11,419	5,752	8,677	9,626
2008	China	U.S.	9,775	6,426	10,167	11,103
2009	China	U.S.	8,427	6,833	11,085	12,000
2010	China	U.S.	10,188	8,005	13,926	14,739
2011	China	U.S.	…	9,059	16,638	17,301
2022 L	China	U.S.	…	28,709	86,589	76,402
2022 M	China	U.S.	…	35,683	119,014	101,776
2022 H	China	U.S.	…	44,276	163,178	135,277
2022 L/H	China	U.S.	…	38,159	131,277	111,184

Note 1: Authors' calculations using the accompanying gravity model coefficient estimates for 2008-11 (shaded years), for trade by all countries, trade by the U.S. only and trade by China only. Trade predictions for 2022 are based on the accompanying low (L), medium (M), and high (H) growth scenarios for the decade ending 2022 for the U.S. and China, assuming current population growth rates in the two countries. The L/H scenario predictions assume low U.S. growth and high China growth for the decade ending 2022.

Note 2: For the purposes of making projections to 2022, an adjustment factor of 0.5 was applied to the predicted value in 2022 using China's export coefficients. The adjustment factor is based on the average annual change in the ratio of Chinese actual to predicted exports to the U.S. for 2000-10, projected forward from 2010 to 2022, and the authors' judgment.

Figure A7: **Actual-to-Predicted Ratios: Bilateral U.S.-China Trade Using 'Sliding' Adjustment Factors, 2000-22**

	U.S.				China			
	U.S. merchandise exports to China[1]	Adjustment factor	U.S. service exports to China[2]	Adjustment factor	China Merchandise exports to the U.S.[3]	Adjustment factor	China service exports to the U.S.[4]	Adjustment factor
2000	0.99	(1.6)	1.03	(2.7)	1.06	(1.7)	0.96	(2.3)
2001	1.01	(1.7)	1.00	(2.6)	0.97	(1.7)	0.99	(2.0)
2002	0.91	(1.7)	0.94	(2.4)	1.05	(1.7)	1.03	(1.8)
2003	0.97	(1.7)	0.80	(2.3)	1.14	(1.6)	0.86	(1.6)
2004	1.07	(1.8)	0.86	(2.1)	1.28	(1.6)	1.09	(1.5)
2005	0.98	(1.8)	0.83	(2.0)	1.36	(1.6)	1.03	(1.3)
2006	0.98	(1.8)	0.85	(1.9)	1.36	(1.6)	1.31	(1.2)
2007	0.94	(1.9)	0.85	(1.8)	1.28	(1.6)	1.24	(1.1)
2008	0.97	(1.9)	0.89	(1.7)	1.21	(1.6)	1.01	(0.9)
2009	0.84	(1.9)	0.91	(1.6)	0.99	(1.5)	0.89	(0.9)
2010	0.95	(2.0)	1.03	(1.5)	1.08	(1.5)	0.96	(0.8)
2011	0.99	(2.0)	…	…	1.06	(1.5)	…	…
2022	…	(2.6)	…	(1.2)	…	(1.0)	…	(0.5)

Note: 'Sliding' adjustment factors are based on the average annual change in the ratio of actual to predicted bilateral exports for 2000-11 (2000-10 for service exports). Adjustment factors for 2022 are 2011 (or 2010) adjustment factors projected forward to 2022, with judgements by the authors.

1 Actual-to-predicted trade calculated using all-country coefficients (see Figure A3) and adjustment factor rising at 1.9% per annum.
2 Actual-to-predicted trade calculated using U.S. export coefficients (see Figure A5) and adjustment factor declining at -1.1% per annum.
3 Actual-to-predicted trade calculated using China export coefficients (see Figure A4) and adjustment factor declining at -6.1% per annum.
4 Actual-to-predicted trade calculated using China export coefficients (see Figure A6) and adjustment factor declining at -10.3% per annum.

Figure A8: U.S.-China Trade Analysis – Four Scenarios (Simulation results in US$ billions)

	WEO (U.S.)		WEO (CHN)		Gravity Model (U.S.)				Gravity Model (CHN)			
	U.S. CAB	U.S.-CHN CAB	CHN CAB	U.S.-CHN CAB	U.S. CAB	U.S.-CHN CAB	Gds Xs U.S.⇒CHN	Svcs Xs U.S.⇒CHN	CHN CAB	U.S.-CHN CAB	Gds Xs CHN⇒U.S.	Svcs Xs CHN⇒U.S.
Year	At current prices											
2000	-416.3	-83.4	20.5	83.4	-416.3	-83.4	22.4	5.0	20.5	83.4	107.6	3.2
2001	-396.6	-81.3	17.4	81.3	-396.6	-81.3	26.2	5.4	17.4	81.3	109.4	3.6
2002	-457.2	-104.5	35.4	104.5	-457.2	-104.5	27.3	5.8	35.4	104.5	133.5	4.1
2003	-519.1	-127.5	45.9	127.5	-519.1	-127.5	33.9	5.7	43.1	127.5	163.3	3.8
2004	-628.5	-164.1	68.7	164.1	-628.5	-164.1	44.8	7.3	68.9	164.1	210.5	5.6
2005	-745.8	-208.8	134.1	208.8	-745.8	-208.8	48.7	8.4	132.4	208.8	259.8	6.2
2006	-800.6	-245.3	232.7	245.3	-800.6	-245.3	59.3	10.5	231.8	245.3	305.8	9.3
2007	-710.3	-268.2	353.9	268.2	-710.3	-268.2	69.6	13.0	353.2	268.2	340.1	10.7
2008	-677.1	-269.0	412.4	269.0	-677.1	-269.0	81.6	15.1	420.6	269.0	356.3	9.4
2009	-381.9	-224.0	261.0	224.0	-381.9	-224.0	77.8	16.0	243.3	224.0	309.5	8.2
2010	-442.0	-269.2	237.6	269.2	-442.0	-269.2	102.7	21.2	237.8	269.2	383.0	10.0
2011	-465.9	…	201.7	…	-465.9	…	123.1	…	201.7	…	417.3	…
	Projections at 2011 prices											
2012	-478.7	-430.8	185.8	185.8	…	…	…	…	…	…	…	…
2013	-484.8	-436.3	211.8	211.8	…	…	…	…	…	…	…	…
2014	-500.9	-450.8	258.6	258.6	…	…	…	…	…	…	…	…
2015	-532.5	-479.2	315.4	315.4	…	…	…	…	…	…	…	…
2016	-575.6	-518.0	399.8	399.8	…	…	…	…	…	…	…	…
2017	-623.0	-560.7	488.0	488.0	…	…	…	…	…	…	…	…
2018	-643.7	-579.3	524.2	524.2	…	…	…	…	…	…	…	…
2019	-665.1	-598.6	563.2	563.2	…	…	…	…	…	…	…	…
2020	-687.3	-618.6	605.0	605.0	…	…	…	…	…	…	…	…
2021	-710.2	-639.2	649.9	649.9	…	…	…	…	…	…	…	…
	2022 projections at 2011 prices											
Scenario 1												
a. M - M	-733.8	-440.3	698.2	698.2	-686.2	-411.7	508.3	103.8	411.7	411.7	964.4	59.5
b. L - L	…	…	…	…	-591.4	-354.9	432.5	77.6	354.9	354.9	821.6	43.3
c. H - H	…	…	…	…	-794.6	-476.8	596.8	138.7	476.8	476.8	1,130.6	81.6
d. L (US) - H (CHN)	…	…	…	…	-718.3	-431.0	534.4	113.6	431.0	431.0	1,013.4	65.6
Scenario 2	…	…	…	…	-455.2	-180.7	580.1	118.5	-294.9	180.7	828.3	51.1
Scenario 3	…	…	…	…	-649.7	-375.2	544.9	103.8	375.2	375.2	964.4	59.5
Scenario 4	…	…	…	…	-441.9	-167.4	544.9	341.9	167.4	167.4	991.6	62.6
Proportional trade gains	…	…	…	…	…	…	1.07	3.29	…	…	1.03	1.05

U.S. = United States; CHN = China; CAB = Current account balance; Gds Xs = Goods exports; Svcs Xs = Services exports; RMB = Renminbi

Note 1: Trade figures for 2000-11 are historical values at current prices. Values projected for 2012-22 are at constant 2011 prices. The WEO projections are calculated by the authors using WEO projections for rates of growth and current account balances relative to GDP through 2017, and then assumed constant thereafter. Based on recent observations, the WEO U.S.-China CAB is assumed equal to 60% of the WEO projection of the overall U.S. CAB, while the WEO China-U.S. CAB is assumed equal to the WEO projection of the overall China CAB.

Note 2: Scenario 1 results assume no RMB real appreciation and are calculated for four different growth scenarios: low (L), medium (M), and high (H) growth scenarios for the decade ending 2022 in the U.S. and China, and the L/H growth scenario which assumes low US growth and high China growth (see Figure 6). Scenario 1a represents the central scenario of the analysis; Scenario 2 results assume RMB real appreciation through 2016; Scenario 3 results from China unilateral merchandise trade liberalization (applied tariffs, n = -1.0); Scenario 4 results from U.S.-China mutual accomodation towards FTAAP (with services trade liberalization). Proportional trade gains under U.S.-China mutual accommodation calculated as Scenario 4/Scenario 1.

Figure A9: Scenario 2 – RMB Real Appreciation

Note: Change in CAB relative to GDP equals Cline-Williamson (CW) parameter times the proportional change in REER assuming 7.5% per annum growth in China GDP, 2012-22

China CAB
CH_CAB / GDP = CW Parameter * (%CH_REER / 100)
CAB = [CW Parameter * (%CH_REER / 100) * GDP_2022] + CAB_2022
CAB = [CW Parameter * (%CH_REER / 100) * GDP_2022] + CAB_2022
CAB = [CW Parameter * ((REER / REER_2022) - 1) * GDP_2022] + CAB_2022
CAB = [(-0.31) * (0.14) * (16169.8)] + 411.7
CAB = -290.1 (result reflects rounding)

US Exports to China, assuming US$/RMB and RMB REER appreciate at same rate and import price elasticity n = -1
USxCHN = $USxCHN_2022 + [%CH_USxCHN * $USxCHN_2022]
USxCHN = $USxCHN_2022 + [n * (-1 * (REER / REER_2022) - 1) * $USxCHN_2022]
USxCHN = 508.3 + [-1 * (-1 * 0.14)] * 508.3
USxCHN = 579.5 (result reflects rounding)

China exports to the US, assuming US$/RMB and RMB REER appreciate at same rate and import price elasticity n = -1
CHNxUS = $CHNxUS_2022 + [%CH_CHNxUS * $CHNxUS_2022]
CHNxUS = $CHNxUS_2022 + [n * (1 * (REER / REER_2022) - 1) * $CHNxUS_2022]
CHNxUS = 964.4 + [-1 * (1 * 0.14)] * 964.4
CHNxUS = 829.4 (result reflects rounding)

US-CHN CAB (= - CHN-US CAB)
CAB_US-CHN = CAB_US-CHN_2022 + CH_TRDBAL_US-CHN + CH_SVCBAL_US-CHN
CAB_US-CHN = -411.7 + 207.8 + 23.1
CAB_US-CHN = -180.8 (result reflects rounding)

US CAB
CAB_US = CAB_US_2022 + CH_CAB_US-CHN
CAB_US = -686.2 -180.8 + 411.7
CAB_US = -455.3 (result reflects rounding)

US = United States; CHN = China; CAB = Current account balance; RMB = Renminbi; REER = Real Effective Exchange Rate

Figure A10: Scenario 3 – China Unilateral Merchandise Trade Liberalization

Note: Change in CAB equals negative change in merchandise imports owing to tariff elimination, assuming import price elasticity n = -1

US exports to China
USxCHN = $USxCHN_2022 + [%CH_USxCHN * $USxCHN_2022]
USxCHN = $USxCHN_2022 + [n * (-1 * t_2022 / (1 + t_2022)) * $USxCHN_2022]
USxCHN = 508.3 + [-1 * (-1 * 0.077 / 1.077)] * 508.3]
USxCHN = 544.6 (result reflects rounding)

US-CHN CAB (= - CHN-US CAB)
CAB_US-CHN = CAB_US-CHN_2022 + CH_TRDBAL_US-CHN
CAB_US-CHN = -411.7 + 36.3
CAB_US-CHN = -375.4 (result reflects rounding)

US CAB
CAB_US = CAB_US_2022 + CH_CAB_US-CHN
CAB_US = -686.2 + 36.3
CAB_US = -649.9 (result reflects rounding)

US = United States; CHN = China; CAB = Current account balance

Figure A11: **Scenario 4 – U.S.-China Mutual Accommodation towards FTAAP (with Services Trade Liberalization)**

Note: Change in imports owing to tariff elimination on merchandise trade, assuming import price elasticity n = -1, and service trade liberalization

US Exports to China
USxCHN = $USxCHN_2022 + [%CH_USxCHN * $USxCHN_2022]
USxCHN = $USxCHN_2022 + [n * (-1 * t_2022 / (1 + t_2022)) * $USxCHN_2022]
USxCHN = 508.3 + [-1 * (-1 * 0.077 / 1.077)] * 508.3]
USxCHN = 544.6 (result reflects rounding)

China goods exports to the US
CHNxUS = $CHNxUS_2022 + [%CH_CHNxUS * $CHNxUS_2022]
CHNxUS = $CHNxUS_2022 + [n * (-1 * t_2022 / (1 + t_2022)) * $CHNxUS_2022]
CHNxUS = 964.4 + [-1 * (-1 * 0.029 / 1.029)] * 964.4]
CHNxUS = 991.6 (result reflects rounding)

US-CHN CAB (= - CHN-US CAB) – with services trade liberalization
CAB_US-CHN = CAB_US-CHN_2022 + CH_TRDBAL_US-CHN + CH_SVCBAL_US-CHN
CAB_US-CHN = -167.3 (result reflects rounding)

US CAB
CAB_US = CAB_US_2022 + CH_CAB_US-CHN
CAB_US = -686.2 + 244.3
CAB_US = 441.9 (result reflects rounding)

TL = Trade liberalization; FTAAP = Free Trade Area of the Asia-Pacific; CAB = Current account balance; US = United States; CHN = China

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Chapter 10
Cooperation in Agriculture

Dermot HAYES
Pioneer Chair in Agribusiness, Iowa State University

PAN Suwen
Research Scientist, Department of Agricultural & Applied Economics, Texas Tech University

Francis TUAN
Principal, The World Agricultural Economic and Environmental Services

ZHANG Haisen
Director, The Center for International Agricultural Cooperation and Development

With contributions from XU Changchun (Associate Research Fellow, Department of Strategic Research at CCIEE), Helen CHIN (The Fung Business Intelligence Centre)

Executive Summary

The U.S. and China are two of the world's largest producers and consumers of agricultural products. With a population of 1.33bn, a rapidly modernizing economy, and land and water constraints, China has a long-term need to source adequate food to satisfy rising domestic demand. The U.S. – with much more land per capita than China and higher agricultural productivity – is a major net exporter of food in the world, particularly in land-intensive products such as wheat, soybean, corn and beef. Given its abundance of workers, China has a comparative advantage in labor-intensive, processed items such as certain aquatic products, apple juice, and feathers and down.

In the past decade, both countries have made remarkable progress in liberalizing agricultural trade. Since China's accession to the World Trade Organization (WTO), U.S. exports of agricultural products to China have increased rapidly. China is now the largest market for U.S. agricultural exports while the U.S. is China's largest supplier. In the other direction, the U.S. is the second largest export destination for Chinese agricultural commodities while China is the third largest supplier to the U.S. Looking forward, the U.S. and China should develop further a cooperative relationship that benefits both countries.

One important recommendation of this Study is to set up long-term supply contracts between American suppliers and Chinese buyers, say, for a period of 10 years or longer. The quantities and prices of the products to be traded should be pre-determined, based on mutually agreed pricing formulas and arrangements. Such long-term contracts would encourage U.S. sellers to invest in new supply and logistics for the long term, while both buyers and sellers would not have to be concerned too much about short-term volatility in commodity prices. Arrangements have to be put in place to address China's concerns about the security of supply in such long-term arrangements. One solution is for U.S. suppliers to set up warehouses in China or a third country with one-year's supply stored as collateral. In return, China could have the corresponding funds held in escrow in the U.S. or a third location.

Another recommendation of this Study is for China to import more meat instead of feedstock as this helps reduce the strain on already tight land and water resources in China.

Agriculture is a sensitive trade issue in almost all countries. In China, ensuring food security is a strategic objective and hence the government has always emphasized the need to maintain self sufficiency. Protecting the small farmers is also an important consideration. China is highly self-sufficient in cereals with net imports of wheat, rice and corn in 2011 less than 1% of local production. There are a lot of opportunities for China to tap into both local and global resources, participate actively in agricultural trade, thus helping it to satisfy growing demand and cushion the country against fluctuations in supply and in prices without jeopardizing food security.

Meanwhile, continued growth in agricultural production and exports plays into the competitive edge of the U.S. Every US$1bn of agricultural exports creates 8,400 American jobs. Exports to China in 2011 were US$20bn, which supported more than 160,000 jobs – both farm and non-farm – across a wide range of sectors. As China develops and its people's incomes rise, their increased demand for imported, higher quality and new food products will offer unprecedented export opportunities for the U.S. agricultural sector.

Apart from the mutually beneficial trade ties, there are also many opportunities for technological cooperation and bilateral investment. In the long term, facing land and water constraints as well as an ageing agricultural workforce, China will have to keep improving its agricultural productivity so it can meet growing domestic demand, while at the same time address the many related environmental and health issues. This will generate many more opportunities for cooperation between China and the U.S. to foster modern, sustainable and resilient agricultural development.

Cooperation in Agriculture

Introduction

The U.S. and China are both the world's largest producers and consumers of agricultural products. China is the world's largest producer of cotton, rice, pork, peanuts, apples, tea and dairy products. The U.S. is the world's largest corn and soybean producer and exporter, the largest beef producer and the second biggest poultry producer.

In the past decade, both countries have made remarkable progress in liberalizing agricultural trade. Agricultural cooperation between the two countries has evolved into one of the most successful bilateral relationships. While disputes are inevitable over some contentious issues, more important are the tremendous mutual advantages that could be achieved by further deepening collaboration in the agricultural sector. Such benefits include economic growth and employment, enhanced food security, productivity and efficiency gains, lower and more stable food prices, profitable investment opportunities and a more sustainable environment. In short, the differences matter less than the common interests, and much remains to be done.

A Strong Basis for Cooperation

The U.S. and China are natural complementary partners in agriculture. Land and water constraints, coupled with rapid growth in its food requirements, mean that China's demand for imported agricultural products is strong. In the U.S., agricultural production capacity exceeds domestic demand. Export markets are thus crucial, particularly for land-intensive products in which the U.S. has a comparative advantage. For its part, China has a comparative advantage in labor-intensive, processed items such as certain aquatic products, apple juice, feathers, down, honey, garlic, ginseng, tea, ornamental plants, fruit trees, flowers, and dried and processed fruits and vegetables.

The two countries could reap enormous mutual benefits if they strengthen agricultural trade and cooperation. China's large market offers the U.S. opportunities to export its excess capacity. On the other hand, importing U.S. farm products not only helps China meet growing domestic demand and keep food prices low and stable, but also eases pressures on the environment due to land and water use. Meanwhile, the need to modernize China's agriculture sector should provide U.S. companies attractive opportunities for investment and technical cooperation.

Resources complementarity

Arable land

In terms of domestic supply, the biggest challenge for China's agricultural production is the constraint in arable land. While China's land size is comparable to that of the U.S., most of China's land is non-arable desert, dry savanna and mountains. China has around 120 million hectares of arable land, which needs to support a population of 1.33 billion and an agricultural workforce of 499 million. By contrast, the U.S. has 170 million hectares of arable land that supports 307 million people, including 2.28 million agricultural workers. In short, the U.S. has 40% more arable land than China, while China has over four times the population of the U.S. Each arable hectare in China provides food for eleven people; in the U.S., the figure is fewer than two people per hectare. The average for the world is 4.4 people per hectare[1].

China has lost about 8.3 million hectares of arable land over the last decade. Cultivated land in China decreased from 133 million hectares in 2001 to 122 million hectares in 2011. Apart from factors such as natural hazards and soil degradation, rapid economic development and urbanization are crucial factors leading to the shrinkage of arable land in China. Cities have increasingly expanded and encroached upon arable land in the past decades. In its 12th Five-Year Plan, China expects that the country will be 54% urbanized by 2015. By that year, its urban population is expected to exceed 700 million[2]. The World Bank forecasts that the urbanization rate will reach 70% by 2030[3]. The Chinese leadership vows to preserve arable land[4] in a gradual and healthy urbanization process. But the pressure on agricultural land is expected to continue and this is a major challenge for China over the long term.

Water

China faces an acute water shortage. While it has 20% of the world's population, it has only about 7% of the fresh water resources. The problem is compounded by uneven distribution. Around 80% of China's rainfall and snowmelt occurs south of the Yangtze River, while just 20% of the moisture occurs in the mostly desert regions in the north and west. The majority of China's arable land lies in the more water-scarce northern areas. For example, the North China Plain consumes an immense amount of water to produce half of China's wheat. In an average year, 15.3 million hectares of farmland – 13% of the total – suffer from drought.

To relieve the problem of uneven distribution of water resources, China launched a multi-decade South-North Water Diversion Project (SNWD) to better utilize water resources. The project was first proposed in the 1950s, but only after decades of planning was it approved in 2002, when construction of the eastern route began. The following year, the building of the central route started. Completion is expected in 2014. Estimated to cost more than US$80bn (RMB500bn), the system will divert 44.8 billion cubic metres of water every year from the Yangtze River to northern China by 2050.

The SNWD, however, is a limited solution to the water shortage problem in China, as the Yangtze River has also been in severe drought in recent years. During the dry season of 2007-2008, the water level in the Hankou region plunged to 13.98 meters, the lowest since records began in 1866. This unexpected drop caused more than 40 ships to run aground. In 2011, the Yangtze had its worst drought in 50 years. Most badly affected was Hubei province, which from January to April received 40% less rainfall than the average over the same period since 1961. The emergency forced the government

1 "Sino-U.S. Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012.
2 The National Bureau of Statistics of China released its census results in late April 2011. According to the latest census data, the urbanization rate was 49.68% in 2010. According to the 12th Five-Year Plan, the urbanization rate is to increase by 4% during 2011-2015.
3 "China's urban population to reach 70% by 2030", *China Daily*, 3 April 2012 http://www.chinadaily.com.cn/bizchina/2012-04/03/content_14974978.htm
4 China has maintained a 'red line' (minimum) of 1.8 billion mu, or 120 million hectares, of agricultural land.

to release water from the Three Gorges reservoir, sacrificing hydroelectric generation for irrigation, drinking supplies and ecosystem support. The drastic measure came amid warnings of power shortages and highlighted the severity of the dry spell in the Yangtze Delta, which supports 400 million people and 40% of China's economic activity.

The SNWD has also adverse social consequences as many people had to be relocated to make way for the first phases of the eastern and central routes. Because of high costs, uncertainty over the carrying capacity of the Yangtze River and other environmental and technical concerns, the western route has been delayed.

The deficit of surface water has led to excessive exploitation of groundwater resources, which in turn, has resulted in the rapid depletion of groundwater reserves. In Beijing, for example, the groundwater table has already dropped by 100 to 300 meters. As a result, scientists say, local aquifers may be exhausted within 30 years[5].

China also faces a water quality problem. According to China's State Environmental Protection Administration (SEPA), in 2006, 60% of the country's rivers could not be safely used as a source of drinking water. A 2008 SEPA report about the Yellow River pointed out that severe pollution caused by factory discharge and sewage from fast-expanding cities had made one third of the river unusable even for agriculture or industry. Pollution, which exacerbates water scarcity, is worse in the northern regions than in other parts of China. Due to the scarcity of water, polluted water supplies are used for irrigation in about 4.05 million hectares, or 7.4%, of the nation's irrigated land, two thirds of which is in northern China.

To make up for the water shortage, Chinese farmers have relied heavily on the use of chemical fertilizers and pesticides to support farm output growth. The intensive use of chemicals, however, has led to severe soil degradation and pollution, which will, in turn, adversely affect long-term agricultural production capacity.

Labor

Agriculture in China employs 499 million workers or 37.5% of the population, a much larger share than in the U.S. (2.28 million workers, or just 0.7%). With an agricultural labor force over 200 times larger than the U.S., China has a comparative advantage in labor-intensive agricultural products, such as processed food. Wage differentials of course matter in this agricultural division of labor, although productivity, access to capital and raw materials, closeness to markets and infrastructure may partially offset this.

Modernization of the Chinese economy and urbanization are driving a gradual migration of the agricultural population to cities. The availability of higher paying jobs in urban areas has attracted young people from the countryside to look for job opportunities and settle down there. The older generation is less adaptable to the demand for new skills in urban jobs and tend to stay behind and stick to farming. This means that, as time goes by, China's agricultural workforce is aging and deteriorating in quality. This is likely to become a more serious problem in the next decade.

U.S. excess capacity and the need for export markets

Driven by innovation and improved technology such as improved seeds, pest control and better farm management practices, U.S. agriculture productivity has been rising rapidly over the past few decades[6]. Looking ahead, the conservation of

5 "Sino-U.S. Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012; http://www.chinawaterrisk.org.

6 Over the past few decades, American agriculture has relied almost entirely on productivity growth to raise output. According to the US$A, U.S. farm output in 2009 was 170% above its level in 1948, an average annual rate of 1.63%. Aggregate input use increased by a mere 0.11% annually so the positive growth in farm sector output was substantially due to productivity increases. This contrasts with a 3.6% annual output increase in the private non-farm sector, with productivity growth accounting for slightly more than a third of the growth.

Figure 1: **Summary of the U.S. Production, Domestic Use and Ending Stocks (1000 mt), 2001-2013**

	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013
Production												
Barley	5,407	4,940	6,059	6,091	4,613	3,923	4,575	5,230	4,949	3,925	3,392	4,796
Corn	241,377	227,767	256,229	299,876	282,263	267,503	331,177	307,142	332,549	316,165	313,949	273,832
Cotton	4,420	3,747	3,975	5,062	5,201	4,700	4,182	2,790	2,654	3,942	3,391	3,703
Soybean	78,672	75,010	66,783	85,019	83,507	87,001	72,859	80,749	91,417	90,605	84,192	82,055
Wheat	53,001	43,705	63,805	58,698	57,243	49,217	55,821	68,016	60,366	60,062	54,413	61,755
Domestic Consumption												
Barley	5,661	5,179	4,990	5,672	4,570	4,596	4,324	5,127	4,604	4,537	4,193	4,680
Corn	200,941	200,748	211,595	224,610	232,015	230,674	261,632	259,272	281,590	285,014	279,023	262,571
Cotton	1,715	1,620	1,410	1,480	1,235	1,140	1,091	712	771	889	681	733
Soybean	50,867	47,524	44,600	51,410	52,751	53,473	51,627	48,112	50,671	48,403	48,810	47,207
Wheat	32,434	30,448	32,498	31,783	31,320	30,940	28,614	34,293	30,978	30,710	32,155	38,110
Ending Stock												
Barley	2,006	1,510	2,619	2,796	2,350	1,500	1,485	1,932	2,515	1,945	1,306	1,661
Corn	40,551	27,603	24,337	53,697	49,968	33,114	41,255	42,504	43,380	28,644	25,122	16,062
Cotton	1,622	1,172	751	1,196	1,321	2,064	2,188	1,380	642	566	729	980
Soybean	5,663	4,853	3,059	6,960	12,229	15,617	5,580	3,761	4,106	5,852	4,610	3,397
Wheat	21,150	13,374	14,872	14,699	15,545	12,414	8,323	17,867	26,552	23,466	20,211	18,818

Source: Foreign Agricultural Service, USDA, 2013

water and soil resources will play a critical role in supporting U.S. agricultural production. With the productivity of U.S. agriculture growing faster than domestic food and fiber demand, farmers and agricultural firms rely heavily on export markets to sustain prices and revenues. In fact, the Foreign Agricultural Service (FAS) of the U.S. Department of Agriculture (USDA) has made huge efforts jointly with farmers to develop and expand export markets around the globe.

Since 1960, U.S. agricultural exports have been larger than imports, generating significant surpluses in agricultural trade. This helps counter the persistent U.S. deficit in non-agricultural merchandise trade.

Over the past two decades, the shares of the value of exports with respect to the value of production rose from 13% in 1990 to 20% in 2012, while the shares based on volume remained relatively stable at around 20% over the same period[7]. Figure 1 presents production, domestic use and ending stocks for major commodities in the U.S. during the last decade. The numbers suggest that the U.S. continues to have a surplus for major agricultural commodities.

U.S. Agriculture Secretary Tom Vilsack recently pointed out that every US$1bn in agricultural exports supported 8,400 American jobs, meaning that in 2011 farm exports supported more than one million U.S. jobs throughout the farming, transportation, renewable energy, manufacturing and other sectors. Vilsack noted that, over the past few decades, agriculture was the second most productive sector of the U.S. economy after IT[8]. Indeed, amid sluggish growth and unbalanced overall trade, agricultural production and exports are the bright spots of the American economy.

According to the USDA, in the 2011 fiscal year, China became the top export market for American agriculture, purchasing US$20bn worth of goods. U.S. farm exports to China supported more than 160,000 American jobs in 2011 across a variety of

7 "US$Export Share of Production", ERS-US$A, 2012, http://www.ers.US$a.gov/topics/international-markets-trade/us-agricultural-trade/export-share-of-production.aspx#estimation

8 "Statement from Agriculture Secretary Vilsack on Record U.S. Farm Exports for Calendar Year 2011", Release No. 0046.12, US$A, 10 February 2012 http://www.US$a.gov/wps/portal/US$a/US$ahome?contentid=2012/02/0046.xml&contentidonly=true

Figure 2: Forecasts of China's Imports of Major Commodities (million mt), 2012-2022

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Cotton										
ERS-USDA	1.60	1.65	1.65	1.66	1.67	1.68	1.70	1.73	1.76	1.79
FAPRI										
WAEES	2.44	1.56	1.99	2.19	2.30	2.36	2.39	2.56	2.64	2.80
OECD-FAO										
Corn										
ERS-USDA	4.03	4.86	6.13	7.53	9.05	10.85	12.46	14.20	16.03	18.10
FAPRI	2.07	2.16	2.34	2.47	2.64	2.78	2.94	3.10	3.26	3.41
WAEES	1.34	5.69	7.96	8.85	10.01	11.05	11.97	12.61	13.11	14.03
OECD-FAO	5.83	6.86	7.35	7.85	8.26	8.83	9.35	9.91	10.43	11.04
Wheat										
ERS-USDA	1.49	1.33	1.39	1.42	1.49	1.56	1.60	1.69	1.75	1.77
FAPRI	0.68	0.79	0.93	1.06	1.20	1.33	1.48	1.63	1.78	1.94
WAEES	1.53	3.40	2.69	3.23	3.08	3.21	3.12	3.06	2.94	2.84
OECD-FAO	6.08	5.86	5.06	4.13	4.01	4.41	4.66	5.01	5.14	5.32
Rice										
ERS-USDA	0.53	0.50	0.51	0.50	0.53	0.56	0.59	0.61	0.63	0.65
FAPRI	1.24	1.28	1.32	1.35	1.33	1.35	1.37	1.44	1.44	1.50
WAEES	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
OECD-FAO	0.53	0.51	0.56	0.64	0.68	0.72	0.75	0.78	0.81	0.86
Soybean										
ERS-USDA	63.06	66.05	69.04	72.03	75.03	78.02	81.01	84.01	87.00	90.00
FAPRI	61.93	64.33	66.15	67.91	69.58	71.30	73.04	74.82	76.59	78.31
WAEES	61.00	63.86	66.08	67.59	69.20	70.67	72.15	73.70	75.21	76.70
OECD-FAO	58.60	60.37	61.68	63.95	65.68	67.01	68.45	69.94	71.46	72.75

Source: ERS-USDA; FAPRI; WAEES; OECD-FAO

sectors[9]. China's market potential is attractive as continued rapid economic growth will lead to unprecedented expansion in food demand. China will continue to offer a growing market for soybeans, oilseeds, cotton, hides, meats and grains. As incomes increase, the product mix of China's agricultural imports will also become more diversified. The Chinese are spending more on higher-value food items such as meat, dairy, fruits, vegetables and horticultural products, and less on staples like rice and wheat. U.S. farmers and agricultural firms are well positioned to tap these huge opportunities by adjusting their product mix to meet better the changing needs of China's consumers.

9 "U.S., China Sign Plan of Strategic Cooperation in Agriculture", Release No. 0057.12, US$A, 16 February, 2012 http://www.US$a.gov/wps/portal/US$a/US$amediafb?contentid=2012/02/0057.xml&printable=true&contentidonly=true

China as a vast and growing market for U.S. agricultural products

Over the past 30 years, China's economy has achieved impressive average annual growth of about 10% and as a result, an astonishing rise in household income. Income growth, together with the rising population, has led to heightened demand for food, with consumers wanting higher quality products. Domestic production, even with improved yields, cannot keep up. While self sufficiency is a strategic goal of the Chinese government, China has seen rapid growth in agricultural exports and imports in recent years, with a growing agricultural trade deficit. Considering China's limited land and water resources, there is a need to seek more sources around the world.

Figure 3: **The U.S. Domestic Production and Exports of Major Commodities (million mt), 2012-2022**

		20012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
WAEES Forecasting											
Cotton	Production	3.76	2.85	3.07	3.21	3.21	3.28	3.30	3.34	3.35	3.35
	Exports	2.55	2.24	2.39	2.51	2.49	2.56	2.62	2.67	2.70	2.73
Corn	Production	291.36	396.22	395.59	398.29	401.47	408.39	409.58	412.46	417.48	424.05
	Exports	29.95	50.87	62.23	66.15	68.31	71.19	73.67	76.54	79.59	82.41
Soybean	Production	77.84	90.26	91.36	93.08	94.63	94.13	96.67	98.24	99.53	100.68
	Exports	34.08	37.90	39.87	40.10	41.12	40.69	41.26	41.86	42.05	42.13
Wheat	Production	61.76	61.46	61.07	58.40	60.94	60.92	61.54	62.18	62.61	62.70
	Exports	31.15	31.41	30.78	30.63	31.00	31.46	31.71	32.27	32.48	32.25
ERS-USDA Forecasting											
Cotton	Production	3.53	3.83	3.85	3.88	3.90	3.88	3.90	3.92	3.92	3.94
	Exports	2.56	2.87	2.98	3.05	3.07	3.09	3.09	3.09	3.11	3.11
Corn	Production	387.41	374.08	376.25	383.06	390.00	396.80	401.43	408.37	413.00	420.07
	Exports	51.03	53.07	57.15	59.87	61.23	62.60	63.96	64.64	65.32	66.00
Soybean	Production	87.50	90.22	91.72	92.67	93.62	94.57	95.39	96.34	97.30	98.25
	Exports	38.92	41.23	41.78	42.32	42.46	42.59	42.73	43.00	43.27	43.41
Wheat	Production	57.70	55.79	54.02	54.43	54.84	55.25	55.79	56.20	56.61	55.79
	Exports	25.85	25.85	25.85	25.85	25.17	25.17	25.17	25.17	24.49	24.49
FAPRI Forecasting											
Cotton	Production	3.70	2.95	3.04	3.05	3.11	3.15	3.18	3.24	3.30	3.36
	Exports	2.47	2.33	2.33	2.35	2.42	2.46	2.51	2.58	2.65	2.73
Corn	Production	293.36	391.52	385.34	390.65	393.75	399.42	406.71	409.38	413.56	417.15
	Exports	33.75	51.44	55.93	59.49	63.19	66.54	72.14	76.19	80.24	86.86
Soybean	Production	73.26	90.52	90.71	92.12	94.14	95.53	95.98	97.22	97.91	98.47
	Exports	30.29	39.73	40.66	41.72	42.95	43.79	43.72	44.03	44.11	44.00
Wheat	Production	61.72	60.96	58.60	56.55	56.04	56.36	56.69	57.15	57.49	57.76
	Exports	32.69	31.00	28.88	26.86	26.45	26.59	26.98	27.06	27.44	27.53

Source: World Agricultural Economic and Environmental Services; USDA Economic Research Service; Food and Agricultural Policy Research Institute

China's middle class is estimated to be around 230 million people – already more than two thirds of the entire U.S. population – and projected to reach 630 million by 2022[10]. This is expected to make China the world's second largest retail food market, behind the E.U. and ahead of the U.S. Diets will diversify as income rises. The mounting demand for new food products, imports and higher quality foods should offer unprecedented opportunities for U.S. agriculture.

Figure 2 presents China's import numbers forecast for different commodities based on different institutes. Based on those forecasts, China is expected to import around 2 million metric tons (mt) of cotton, 5 million-18 million mt of corn, 2 million-5 million mt of wheat, 1 million mt of rice, 60 million-90 million mt of soybeans in the next 10 years.

Figure 3 presents forecasting results on U.S. domestic production and exports of major commodities by ERS-USDA, FAPRI and WAEES. Comparing those numbers with forecasts of China's imports of major commodities (see Figure 2), except for soybeans, the U.S. appears to be able to provide enough cotton, grains and oilseeds for China's imports in the next decade.

10 See Chapter 7 for more details.

U.S.-China agricultural trade and cooperation can help some of China's long-term concerns, while opening up market and investment opportunities for the U.S.

Food security

China's foremost concern is food security. Throughout its history the country's first priority has always been to feed its growing population. Many policy measures adopted by the government were to ensure the country's food security, including: a household contract responsibility system for farmers; policies for protecting cultivated land; the governors' grain responsibility system and mayors' vegetable basket responsibility system for ensuring production and supplies of grains and other staple foodstuffs; financial supports for commercial grain bases and vegetable bases as the most effective measures for sustained food security; expansion of state grain reserve capacities and grain marketing infrarestructure as a major measure for strengthening the government's ability to control or regulate the national grain market; and a food quarantine system that has been set up and implemented for protecting consumers' health[11].

Although China has successfully attained a high degree of grain self sufficiency and will try to maintain this trend in the future, most international organizations recently forecast that China will become one of the major cotton, soybean and corn importing countries in the next decade. The self-sufficiency rates for soybeans, cotton and corn would be lower than 20%, 60% and 95%, respectively (see Figure 4).

Given the acute shortages of land and water resources, urbanization and environmental degradation as mentioned above, the issue of food security looms large for China. U.S. agricultural exports can help buttress China's food security in case of shortfalls. In February 2012, the U.S. and China signed a five-year agreement on food security, sustainable agriculture and food safety at an agricultural symposium in Iowa. The agreement was largely focused on food security and agricultural sustainability issues and strengthened food supply and agricultural technology cooperation between China and the U.S.

Stable food prices

China also needs to maintain stable and affordable food prices, which are essential to social stability. Imports from the U.S. can help keep prices from rising, especially during shortages. For example, in 2007-2008, when the blue ear disease in swine cut production by 17% and prices rose by 54%, U.S. exports of pork made up the shortfall, preventing more severe price increases[12].

Environmental problems

A grave concern in China is the environment. Soil degradation and pollution have exacerbated the scarcity of arable land and water. Imports of agricultural products can help reduce China's environmental problems. The use of green technology and farming practices would attract more attention and be promoted, which would offer new opportunities for U.S. companies and investors.

Agricultural modernization

China has invested substantially in modernizing its agriculture sector. The upgrading of swine production, for example, is driving improvements in the feed business. Domestic and foreign investments are also flowing into seeds, chemicals and machinery for grain production.

Adopting technology and modernizing agriculture are part of China's long-term strategy for sustainable development. Increasing emphasis will be placed on areas such as farmland conservation

11 "Food Security in China. China: Regional Sustainable Development Review", Gu S. and Y. Zhang, Vol. I, Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, Beijing, 2007.

12 "Sino-U.S. Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript July 2012.

Figure 4: **Chinese Self-Sufficiency Rates Forecast by Different Organizations, 2012/13-2021/22**

	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Cotton										
ERS-USDA	58%	58%	58%	58%	58%	59%	59%	59%	59%	59%
FAPRI	77%	76%	75%	75%	74%	73%	72%	71%	71%	70%
WAEES	69%	79%	75%	74%	73%	73%	74%	73%	72%	72%
OECD-FAO										
Corn										
ERS-USDA	98%	98%	98%	97%	97%	96%	96%	95%	95%	94%
FAPRI	99%	99%	99%	99%	99%	99%	99%	98%	98%	98%
WAEES	**99%**	**97%**	**96%**	**96%**	**95%**	**95%**	**95%**	**95%**	**94%**	**94%**
OECD-FAO	97%	97%	97%	96%	96%	96%	96%	96%	96%	95%
Wheat										
ERS-USDA	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
FAPRI	100%	100%	100%	99%	99%	99%	99%	99%	99%	99%
WAEES	99%	97%	98%	97%	98%	97%	98%	98%	98%	98%
OECD-FAO	95%	95%	96%	97%	97%	96%	96%	96%	96%	96%
Rice										
ERS-USDA	100%	100%	100%	100%	100%	100%	100%	100%	95%	95%
FAPRI	**99%**	**99%**	**99%**	**99%**	**99%**	**99%**	**99%**	**99%**	**89%**	**89%**
WAEES	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
OECD-FAO	100%	100%	100%	100%	99%	99%	99%	99%	99%	99%
Rapeseed										
ERS-USDA										
FAPRI	86%	86%	87%	87%	87%	88%	88%	88%	88%	87%
WAEES	85%	89%	90%	91%	91%	92%	91%	92%	92%	92%
OECD-FAO										
Soybean										
ERS-USDA	29%	27%	25%	23%	22%	20%	19%	17%	16%	14%
FAPRI	18%	17%	17%	16%	16%	15%	15%	14%	13%	13%
WAEES	19%	18%	17%	17%	16%	16%	16%	15%	15%	15%
OECD-FAO	49%	49%	49%	48%	48%	48%	47%	47%	47%	47%

Source: World Agricultural Economic and Environmental Services; USDA Economic Research Service; Food and Agricultural Policy Research Institute; Organization of Economic Cooperation and Development Food and Agriculture Organization

and resource-saving technology, biotechnology, plant and animal health and diseases, improved farming practices and mechanization, post-harvest treatment, distribution and cold chain logistics, and upgrading agriculture processing facilities. Foreign investment could play a prominent role in these areas. As U.S. agriculture continues to apply the latest technology and achieve an unparalleled level of productivity, the participation of the U.S. agriculture sector and investors in modernizing Chinese agriculture will generate great benefits for both countries.

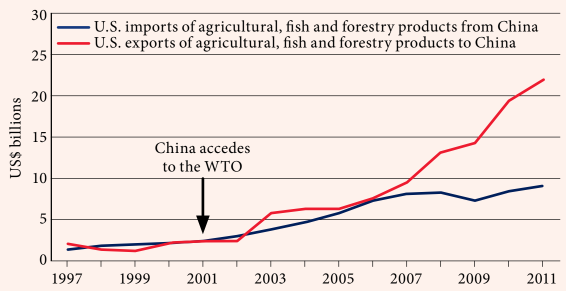
Existing Agricultural Cooperation

The rapid growth of U.S.-China agricultural trade

U.S. exports of agriculture, fish and forestry products to China rose from US$2.2bn before China's WTO accession in 2001 to US$21.9bn in 2011. At the same time, Chinese agricultural exports to the U.S. rose from US$2.3bn in 2001 to US$9.2bn in 2011[13] (see Figure 5).

13 US$A BICO reports, http://www.fas.US$a.gov/GATS.

Figure 5: **U.S.-China Agricultural Trade, 1997-2011**



Note: Figures include agricultural, fish and forestry products
Source: USDA Bulk high-value Intermediate and Consumer-Oriented Reports

China is now the largest market for U.S. agricultural exports, while China is the third largest supplier to the U.S. Major Chinese exports include tea, spices, apple juice, fresh vegetables, tree nuts, cat and dog food, processed fruit and vegetables, and seafood; while the U.S. exports soybeans, cotton, corn, hides and skins, seafood and forest products. Much of this trade is driven by the fact that the U.S. production exceeds domestic demand and needs export markets in land-intensive products such as field crops. On the other hand, China has a comparative advantage in labor-intensive, processed products such as apple juice[14]. Chinese demand is changing the face of U.S. agriculture. For example, in the meat industry, chicken feet are now exported. The tree nut sector is changing because of high prices driven by Chinese demand, and huge new pecan plantations are going online to meet Chinese demand. And there are tremendous exports of bovine genetics. America is even exporting alfalfa for Chinese dairy production. At the same time, new Chinese products are also grown and sold to America.

Until 2006, the U.S. trade surplus in its agricultural trade with China was relatively moderate. Since 2007, however, this surplus has risen rapidly, and reached US$12.7bn in 2011[15].

Figure 6: **Top 10 U.S. Agricultural Exports to China, 2011 (US$ thousands)**

Rank	Product	Value
1	Soybeans	10,480,227
2	Cotton	2,623,395
3	Hides and skins	1,163,410
4	Logs and chips	1,079,281
5	Coarse grains	842,770
6	Other edible fish and seafood	750,766
7	Red meat, FR/CH/FR	641,122
8	Feeds and fodders	627,108
9	Hardwood lumber	506,691
10	Other intermediate products	468,799

Source: USDA Bulk high-value Intermediate and Consumer-Oriented Reports

Figure 7: **Top 10 U.S. Agricultural Imports from China, 2011 (US$ thousands)**

Rank	Product	Value
1	Other edible fish and seafood	1,784,403
2	Other value-added wood products	1,445,192
3	Panel products (including plywood)	1,117,421
4	Processed fruit and vegetables	948,906
5	Other consumer-oriented products	753,710
6	Other intermediate products	641,134
7	Fruit and vegetable juices	558,813
8	Groundfish, fillet/steak	486,454
9	Shrimp	289,350
10	Snack foods	203,021

Source: USDA Bulk high-value Intermediate and Consumer-Oriented Reports

Trade in selected major agricultural commodities is examined below:

Trade in livestock

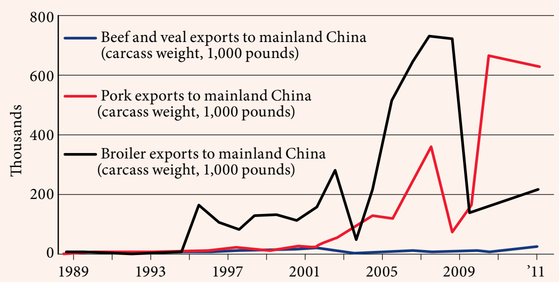
In 2011, the U.S. imported animal products worth US$449.3m from China and exported animal products worth US$2.63bn to China[16].

U.S. exports of broilers (chickens) to China rose rapidly after 2004 and reached the peak of 733.8 million lbs (332.85 million kg) in 2009. In 2010, China imposed anti-dumping and countervailing

14 Unpublished manuscript by Eric Trachtenberg, "Sino-U.S. Agricultural Cooperation", July 2012.
15 US$A BOCI Reports, http://www.fas.US$a.gov/GATS.

16 "Trade", China, ERS, USDA, http://www.ers.US$a.gov/topics/international-markets-trade/countries-regions/china/trade.aspx

Figure 8: U.S. Livestock Product Exports to China, 1989-2011



*Source: USDA Economic Research Service**
** "Livestock & Meat International Trade Data", ERS, US$A. Available at http://www.ers.US$a.gov/data-products/livestock-meat-international-trade-data.aspx*

duties on broiler products from the U.S., and U.S. exports of broiler products dropped significantly. At the moment, these imposing anti-dumping and countervailing duties are being challenged at the WTO by the U.S.

China's imports of U.S. pork rose rapidly after 2000. In 2003 the volume reached 44.7 million lbs (20.28 million kg) (carcass weight). Despite the drastic fall in 2008, imports of U.S. pork rebounded quickly to a new height of 639.5 million lbs (290.07 million kg) in 2011.

Trade in soybeans

Soybeans are the most important agricultural product traded between the U.S. and China. China's soybean growing area fell 13.8% from 2011/12 and totaled only 5.79 million hectares in 2012/13. Figure 10 presents the soybean monthly price margin during the last few years. The price margin between domestic soybeans and imported soybeans and mounting demand for vegetable oils and feed proteins have contributed to the increased imports. China imported nearly 60 million mt in 2011/12 and this will reach 63 million mt in 2012/13. Its domestic self-sufficiency rate (see Figure 9) was less than 20% and received more than 70% of total U.S. soybean exports during the last two years. Basically, all soybean imported into China are processed into soybean meal for animal feed and cooking oil for human consumption. The large quantities traded are consistent with the U.S. position as the world's largest soybean producer and China's as the world's largest soybean consumer.

Trade in cotton

Cotton is increasingly used in China due to the expansion of its large textile and apparel industries. China is the world's largest cotton producer, user and importer. Cotton imports accounted for 40% of domestic use (see Figure 9). U.S. cotton represented over one third of China's total imports. It was the second largest agricultural commodity imported from the U.S. Due to transportation costs, however, U.S. cotton has lost market share to India in recent years. India has also accounted for about one third of China's cotton imports since 2010/11. However, India exports are limited due to growing domestic mill use and quality issues. Therefore, even the U.S. suffered from cotton share decreases, the export value of U.S. cotton to China grew from less than US$50m in 2001 to more than US$3bn recently, and this trend is likely to continue in the future.

Trade in corn

Since China is the second largest corn producing country in the world, the country imported very little up until 2008/09. However, due to livestock feed demand, China has imported 1.296 million mt, 0.979 million mt and 5.231 million mt in 2009/10, 2010/11 and 2011/12, respectively, with most of the supply coming from the U.S. U.S. corn accounted for 40% of world corn exports over the last five years, with a record 62 million mt exported in 2007/08. The large influence of the U.S. on corn supply makes world corn trade dependent on the weather in the U.S. Corn Belt. Due to biofuel expansion in the U.S. and drought issues, the U.S. only exported 39 million mt and 23 million mt of corn in 2011/12 and 2012/13, respectively. Chinese corn export policy has often changed, with seemingly little relationship to the country's official corn production statistics, making China's corn trade difficult

Figure 9: Chinese Self-Sufficiency Rate, 2001/02-2012/13

	Soybean	Vegetable Oils	Cotton	Corn	Wheat	Barley
2001/02	63%	82%	98%	100%	99%	57%
2002/03	39%	60%	89%	100%	100%	63%
2003/04	51%	61%	71%	100%	96%	68%
2004/05	36%	68%	83%	100%	93%	62%
2005/06	39%	59%	56%	100%	99%	47%
2006/07	36%	55%	78%	100%	96%	73%
2007/08	24%	62%	76%	100%	100%	72%
2008/09	20%	62%	84%	100%	100%	63%
2009/10	15%	69%	78%	99%	99%	44%
2010/11	21%	67%	74%	99%	99%	60%
2011/12	18%	71%	47%	97%	98%	46%
2012/13	18%	72%	61%	99%	98%	50%

Source: Foreign Agricultural Service; USDA, 2013

to predict. However, population growth and consumer demand for meat products in China should continue to support expanding feed grain imports in the long term.

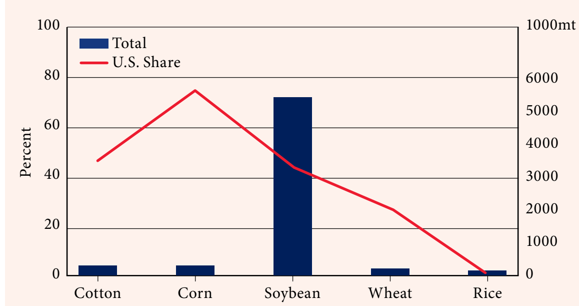
Trade in vegetable oils

Vegetable oils are China's second-largest agricultural import. The total imports are 8.56 million mt in 2012/13. During the last three years, palm oil and soybean oil accounted for 87% of total vegetable oil imports. Most of the palm oils are from Indonesia. China's soybean oil imports are relatively low compared to soybeans due to the difference in tariff treatment between soybean oil and soybeans, which are duty free, compared to soybean oil's 9% tariff. Price margins between domestic prices and cost, insurance and freight (CIF) prices of edible oils are presented in Figure 12.

Bilateral investment in agriculture

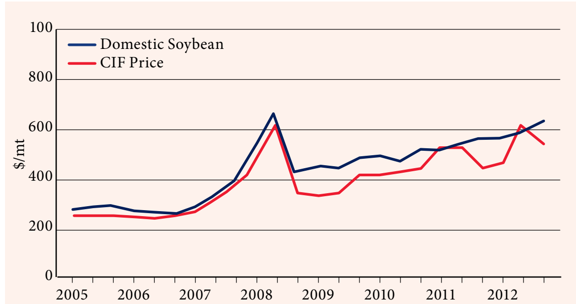
Since the Chinese government implemented economic reform in 1978, there has been an influx of foreign capital into the agriculture industry in China. U.S. companies have made massive investments in areas such as planting, breeding, grain and oil processing, agricultural machinery, etc. in China. These moves, which have also brought about massive technology transfer, have fostered the development and modernization of agriculture and related industries in China.

Figure 10: China Commodity Imports and their U.S. Shares, 2009/10-2011/12



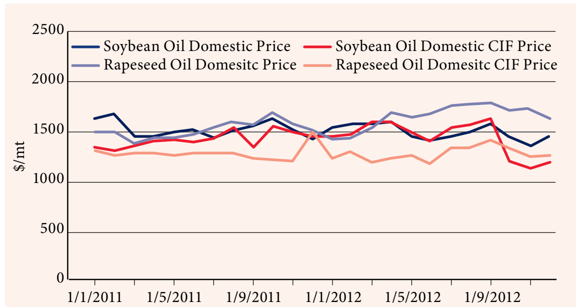
Source: Foreign Agricultural Service; USDA, 2013

Figure 11: Domestic Soybean Port Price and CIF Price, Jan 2005-Dec 2012



Source: China National Grain and Oils Information Center, 2013

Figure 12: Edible Oil Price Comparison between Domestic Port Price and CIF Price, Jan 2011-Nov 2012



Source: China National Grain and Oils Information Center (NGOIC) (2013)

On the other hand, China has been encouraging outbound investments, particularly in selected sectors including agriculture in recent years. In fact, compared with the outbound investments in sectors such as energy, utilities and mining, China's outbound investment in the agricultural sector has just started. The rise in worldwide food prices in recent years has spurred China's enthusiasm to invest in the overseas agricultural sector. One of the most eye-catching examples was Chinese food manufacturer COFCO acquiring in 2008 a 4.95% minority stake of Virginia-based Smithfield, the world's leading processor and marketer of fresh pork and packaged meat as well as the largest producer of hogs. Afterwards, in late-2009, COFCO paid US$31.24m (RMB194m) to take over Maverick, a joint venture between Smithfield and Belgium's ARTAL Group in China. The takeover was aimed at expanding COFCO's high-quality meat business; but it also hoped to acquire the technology and management skills of Smithfield and Maverick.

Also noteworthy is that, besides outbound investments and acquisitions made by China's state-owned enterprises (SOEs), the Chinese government is now also encouraging outbound investments and acquisitions by the private sector. On 29 June 2012, the National Development and Reform Commission (NDRC), the Ministry of Commerce (MOFCOM), the State Administration of Foreign Exchange (SAFE) and ten other regulatory authorities jointly released the "Implementing Opinions on Encouraging and Guiding the Active Outbound Investment by Private Enterprises" (the Opinions). The Opinions lay the foundation for more detailed measures to be promulgated in the future for encouraging cross-border investments and mergers and acquisitions activities by Chinese private enterprises. This may signal the beginning of a new wave of overseas investments and acquisition activities by Chinese private enterprises, many of whose owners wish to diversify their investments and wealth geographically. Agriculture is in China's list of 'preferred sectors'.

In view of these latest developments, China's outbound investments in agriculture are likely to increase at a fast pace going forward. The U.S. is likely to be one of the favorite investment destinations, and more focuses will be placed on agricultural technologies and green technologies.

Enhanced agricultural technology cooperation and personnel exchange

Since the U.S.-China Joint Working Group on Agricultural Technology was established in 1980, over 450 missions and over 2,500 visiting experts have been exchanged between the USDA and the Ministry of Agriculture of China (MOA), covering topics ranging from germplasm, biotechnology, biomass energy, pest management, pesticide management and agricultural technology extension. In addition, through various forms of collaboration, including joint research centers and laboratories, cooperative platforms and cooperative plans, a large number of personnel were trained in modern agricultural technologies, and made significant contributions to agricultural technology advancement and agricultural development in both countries[17].

A series of effective dialogues have been established

Both the U.S. and China have a chance to gain hugely from increased synergies. The key is to create a positive agenda to build on the accomplishments achieved in the past decades. Both governments have attached great importance to this, and have established a long-running series of dialogues – including the Joint Committee on Cooperation in Agriculture (JCCA) and Joint Working Group on Agricultural Technology – and have continued to engage in the Joint Commission on Commerce and Trade (JCCT) and the Strategic and Economic Dialogue (S&ED). In February 2013, agriculture ministers from the U.S. and China signed an historic

17 *China-U.S. Plan of Strategic Cooperation in Agriculture 2012-2017*

Figure 13: China's Agricultural Subsidies

			2009	2010	2011	2012
Direct Payment		US$ Billion	2.30	2.30	2.30	2.48
Seed Subsidy		US$ Billion	3.02	2.30	3.49	4.30
Machinery		US$ Billion	1.98	2.36	2.78	3.42
Fuel/Fertilizer Subsidy		US$ Billion	11.51	13.00	13.75	17.26
Total		**US$ Billion**	**18.80**	**20.32**	**22.32**	**27.45**
Government Procurement Price						
Rice	**• Early Indica Rice**	US$/MT	286	295	324	381
	• Late Indica Rice	US$/MT	292	308	340	397
	• Japonica Rice	US$/MT	302	333	406	444
Wheat		US$/MT	270	279	298	324
Corn		US$/MT	214	221	265	317
Rapeseed		US$/MT	582	574	730	754
Soybean		US$/MT	548	550	587	613
Lint Cotton		US$/MT	1,912	1,912	3,143	3,246

Source: collected from different China government rules

Plan of Strategic Cooperation that will guide the agricultural relationship of the two countries for the next five years. The plan builds on the already strong relationship the two countries enjoy around agricultural trade, science and education. It looks to deepen cooperation in priority areas such as food security, animal and plant health and diseases, sustainable agriculture, genetic resources, biotechnology, emerging technologies, as well as agricultural markets and trade[18].

Ongoing concerns and disputes

Complaints and concerns from the two countries

There are complaints from China about the limited market access for Chinese agricultural products in the U.S., due to the high tariffs levied on certain types of agricultural products. For example, although the overall tariff level in the U.S. is relatively low, the U.S. levies a 20% tariff on the imports of fowl, 19% on soybean oil and as high as 139% on dairy products. China also argues that the huge amounts of agricultural subsidies by the U.S. government have given U.S. agricultural products such as corn, cotton, wheat and soybean an unfair price advantage in the competition. The U.S. has argued that China's agricultural subsidies are stimulating production of land intensive products at the expense of U.S. exports (see Figure 13).

Green standards, packaging requirements and other technical barriers by the U.S. on China's exports are other areas of disputes. Disagreements also arise on China's 'market economy' status, as well as the selections of 'inappropriate surrogate countries' when the U.S. launches anti-dumping investigations against Chinese agricultural products.

Meanwhile, increasing food imports by China have prompted concerns about over-reliance on the global markets and food security, especially if the surge in imports would lead to dramatic falls in local production. Moreover, China is concerned about the potential harmful impact of genetically modified food from the U.S.

The U.S. has complained about the 'unscientific and inconsistent' applications of sanitary and phytosanitary measures by China, especially on U.S. beef and pork[19]. The U.S. is also concerned about China's

18 "China-U.S. Plan of Strategic Cooperation in Agriculture 2012-2017", USDA, 2012.

19 USITC (2011) estimated that China's sanitary and phyto-sanitary (SPS) measures have a larger effect on U.S. exports to China than tariffs. SPS measures substantially limit or effectively prohibit certain U.S. agricultural products. Refer to "China's Agricultural Trade: Competitive Conditions and Effects on U.S. Exports", United States International Trade Commission (USITC), 2011, USITC publication 5419, http://www.usitc.gov/publications/332/pub4219.pdf

seed and genetically modified organism (GMO) regulatory system. One example is the use of ractopamine in U.S. pork production. Ractopamine is a U.S. Food and Drug Administration (FDA) approved beta agonist feed ingredient that increases lean meat yield and is widely used in the swine industry in the U.S. However, ractopamine has been banned in countries such as E.U. member states, China and Russia. In 2002, China banned the use of all beta agonists, and delisted U.S. exporters whose products were found to contain ractopamine residue.

The U.S. claims that the allocation of China's tariff-rate quotas (TRQs) is opaque and problematic. In a WTO case initiated in September 2011, the U.S. challenged China's imposition of anti-dumping and countervailing duties on various U.S. poultry products. In addition, some U.S. agriculture companies argue that China's restrictions on foreign investment in the agricultural sector will limit competition and lead to slower industry development. Meanwhile, the U.S. government is actively monitoring China's subsidies and support measures for the agriculture sector in recent years. U.S. meat exporters are also frustrated by lengthy delays at custom clearance – a situation that prohibits them from exporting chilled meat.

Efforts and progress made by the two countries

In its "2011 Report to Congress on China's WTO Compliance", the U.S. Trade Representative's Office (USTR) acknowledges that China has implemented its tariff commitments for agricultural goods each year in a timely manner. Tariffs on agricultural goods of greatest importance to U.S. farmers and ranchers were lowered from the 1997 average of 31% to 14%, in almost all cases over a period of five years running from 1 January 2002, or by 1 January 2006. China did not have to implement any new tariff reductions in 2011, as the last few required tariff reductions on agricultural goods took place in 2008.

The USTR has commented that the accumulated tariff reductions made by China, coupled with increased demand, contributed to continued healthy exports of certain U.S. exports to China in 2011. Exports of some bulk agricultural commodities have increased dramatically in recent years, and continue to perform strongly, including soybeans and cotton. The value of U.S. soybean exports to China rose almost five-fold from US$2.2bn in 2005 to US$10.8bn in 2010; while U.S. cotton exports to China totaled a then record of US$1.4bn in 2004, and subsequently rose to US$2.2bn in 2010. Exports of forest products such as lumber encountered high demand, increasing by 86% from January through September 2011, when compared to the same period in 2010. Fish and seafood exports also grew significantly, up 57% for the first nine months of 2011. Meanwhile, exports of consumer-oriented agricultural products grew by 64% for the first nine months of 2011[20].

China claims this exemplifies its strong commitment to WTO principles, despite the potential damage to domestic farmers who face difficulties competing with imported products – for example, imports of cheap cotton from the U.S. have undercut Gansu and Xinjiang-based suppliers.

Over the last few decades, the U.S. farm policies have become more market orientated. The 1985 and 1990 Farm Bills reduced supply controls and cut price supports. The 1996 Farm Bill made a major move away from price support and income supports and focused more on conservation and water quality. The Export Enhancement Program (EEP), which was introduced in 1985 and was the U.S.' largest agricultural subsidy program, became inactive after 2002 and was finally repealed in the 2008 Farm Bill. U.S. production of meat products, horticultural products and processed foods are not subsidized. While the 2012 Farm Bill that aimed to terminate the Dairy Export Incentive Program (DEIP) was not passed because of political gridlock related to 'fiscal cliff' arguments, the need to reduce the federal deficit will put downward pressure on

20 "2011 USTR Report to Congress on China's WTO Compliance", The United States Trade Representative (USTR), December 2011.

government spending to support U.S. agriculture in the coming years. President Obama's budget proposal for the fiscal year 2014 released in April 2013, for example, proposed to eliminate direct payment and reduce the crop insurance fund[21].

China has maintained high self sufficiency in grains and not overly relied on U.S. agricultural imports[22]

China has a high degree of self sufficiency for cereals – rice, wheat and corn – the national staple food. In 2011, China produced 496.37 million tons of cereals and has a net import of only 4.51 million tons, 0.91% of domestic production. While the proportion of net imports has increased significantly in recent years (the percentage of net imports to domestic output was 0.38% in 2010), the sufficiency ratio remains high. Net imports of grains will continue to increase in the future, as there is a consensus among Chinese policy makers and scholars to lower the self-sufficiency ratio to 95%.

In cereals, China has gone from a net exporter of rice to a net importer in 2011, with the top three importing countries being Vietnam, Thailand and Pakistan. Among the total imports of 1.25 million tons of wheat in 2011, imports from the U.S. accounted for 0.43 million tons (34.34%) and ranked as the second largest importing country, while the largest source of imports was Australia with 0.64 million (51.11%). For corn, the U.S. was the largest supplier (96.16%), with Laos being the second largest (2.01%) and Myanmar being the third (1.62%).

On the other hand, China relies heavily on the import for soybeans, a substantial proportion of which is used as feed for animals. In 2006-2011, its imports of soybeans increased from 28.3 million tons to 52.6 million tons, while total domestic output remained around 14 million tons. The U.S. was one of the top three countries for imports of soybeans by China. In 2011, the volume of U.S. imports amounted to 42.46%, with another 39.18% of soybeans imported from Brazil and 14.90% from Argentina. The market has remained diversified and competitive.

Genetically modified agricultural products

While there remain issues of concern about U.S.-China bilateral trade on biotechnology or genetically modified (GM) agricultural products, they are usually of an administrative, procedural or technical nature[23]. While the Chinese Ministry of Agriculture (MOA) is alleged to have a time-consuming and inconsistent approval/registration process for GM agricultural products, the fact remains that bilateral trade of GM agricultural products between the U.S. and China is huge and growing. Unlike governments in Europe or Japan, both governments are in fact encouraging GM research, production and consumption.

Today, U.S. ranks first and China ranks sixth in terms of GM product cultivated area. Commercialized biotech crops in China include Bt Cotton, Bt Poplar, PRSV Papaya, VR Sweet Pepper, and DR and VR Tomato. Among these crops, adoption rate of Bt cotton in China was 71.5%[24] and nearly all commercial papaya grown in China are GM ones. Biotechnology plantings as a percentage of total crop plantings in the U.S. in 2012 were about 88% for corn, 94% for cotton and 93% for soybeans[25].

Both China and the U.S. are also relatively open to GM imports, as witnessed by the enormous flow of GM agricultural products between the two coun-

21 See "Farm Policy Roundup", Jeremy Peters, A New Farm Bill, 12 April 2013 http://www.farmbillfacts.org/farm-policy-roundup-4-12-2013

22 See the monthly report by Department of Foreign Trade of the Ministry of Commerce of China, http://big5.mofcom.gov.cn/gate/big5/wms.mofcom.gov.cn/aarticle/subject/ncp/subjectbb/200603/20060301783733.html

23 Issues include the lack of a low level presence (LLP) policy or a 'stacked traits approval' policy, which is highly technical. Refer to "Risk assessment of GM stacked events obtained from crosses between GM events", De Schrijver, A., et al, *Trends in Food Science & Technology* (2006), doi:10.1016/j.tifs.2006.09.002 http://www.lacbiosafety.org/wp-content/uploads/2011/09/risk-assessment-of-gm-stacked-events-obtained-from-crosses-between-gm-events1.pdf

24 "Global Status of Commercialized Biotech/GM Crops: 2011", Clive James, ISAAA Brief No. 43. ISAAA: Ithaca, New York, 2011.

25 "Adoption of Genetically Engineered Crops in the U.S.", USDA, http://www.ers.US$a.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us/recent-trends-in-ge-adoption.aspx

tries. In 2010 alone, China imported a total of 15.02 billion tonnes of corn (96.2% of its total corn import of 15.73 billion tonnes) and 235.95 billion tonnes of soybeans (42.5% of its total soybean imports) from the U.S. These imported corn and soybeans are almost entirely genetically engineered[26]. Imports of Chinese processed tomatoes for U.S. consumption increased from 691 million tonnes in 2003 to 12,116 million tonnes in 2007[27], the majority of which is also genetically modified.

Moving forward, the U.S. and China can further cooperate in the area of GM research and regulation to promote consumer welfare, productivity and trade. The introduction of a synchronous approval system that allows application for a biosafety certificate in the importing country – required before the product can be exported to China – before the product gets fully approved from the exporting country will eliminate unnecessary delays in marketing and trading new biotech products. In due course, a unified registration regime can be developed where approvals issued by one country will automatically be converted into approvals of the other country.

In today's world where GM technology has become irreversible, cooperation between the U.S. and China – two of the biggest producers and consumers of agricultural products – is critical to the protection of consumers' welfare in both countries and around the world. Co-development of the two countries' regulatory regimes is the only way to bring quality GM products to the general public. Studies of U.S. and Chinese public opinion have repeated shown that consumers are not necessarily against GM products, but they insist on their 'right to know'. To address this issue, the U.S. and China can learn from the E.U., where the mandatory labeling mechanism provides a framework for the traceability of products consisting of or containing GMOs, and food and feed produced from GMOs, so that effects on the environment and health can be monitored, and appropriate risk management measures can be implemented. To further protect the consumers' rights to know and enhance traceability, the U.S. and China can move ahead of the E.U. to legislate for the mandatory labeling of products such as meat, milk and eggs from animals fed on GM animal feed.

While presenting us with huge opportunities, the proliferation of GM technology would ultimately require fundamental changes to global governance that we are not fully prepared for. Unlike trade of other goods, cross-border monitoring and traceability of GMOs depend on a new level of systemic integration and convergence. As long as ongoing technical exchanges continue, and the U.S. and China learn to recognize each other's institutions and standards through dialogues, we are confident that both countries can come up with a mechanism acceptable to all stakeholders including farmers, food processors, food traders and consumers.

Our Recommendations

To sign long-term supply contracts between U.S. exporters and Chinese importers

A large proportion of most agricultural products are produced and consumed locally. Global prices for many agricultural products are affected by marginal changes in supply and demand, and therefore tend to be volatile. Such volatility in global prices, in turn, affects food prices and the livelihood of many people around the world, as well as introduces uncertainties for many producers.

Given the long-term growth in demand for food in China, this study proposes that long-term commodity supply contracts should be negotiated and signed between U.S. exporters and Chinese import-

26 Values of corn and soybeans imports are computed using Chinese Ministry of Commerce (MOFCOM) figures http://wms.mofcom.gov.cn/subject/ncp/index.shtml.Percentages of GM varieties among the imports are estimations based on the fact that 88% of corn and 93% of soybeans grown in the U.S. are GM (cited above) and the assumption (as shared by various reports and analyses) that most non-GM products are retained in U.S. to be sold at a premium domestically.

27 "Monitoring of U.S. Imports of Tomatoes 2008", United States International Trade Commission (USITC), 2008.

ers through platforms established and supported by both governments. This will help to encourage investments in new production and logistics capacity, stabilize the income of commodity suppliers, as well as enhance food security in China.

Agricultural commodities such as grains (maize, rice and wheat), soybeans and meat (beef, chicken and pork) all have potentially huge demand in China. The U.S. has the capacity to increase production and export these commodities to China. China has shortages of land and water, and the U.S. has higher productivity in the production of these commodities. In order for trade in agricultural commodities between the U.S. and China to be successful and sustainable, the U.S. farmers must, on the one hand, be assured that the Chinese demand is long term, so that they are willing to invest in land and equipment, and employ and train the necessary manpower. On the other hand, the Chinese importers must be assured of the reliability of the U.S. supply. Short-term contracts would not induce an expansion in U.S. output, investment and employment, but would merely lead to more volatility in global prices.

As for China, food security is crucial, and thus the Chinese importers must be assured that they can count on receiving the U.S. exports year in, year out. What is therefore needed is a long-term supply contract based on forecast numbers between the two sides say, for 10 or 20 years. The pricing formulas should be mutually agreed, say, on a cost-plus basis, so as to protect both the sellers and the buyers from the volatility of spot market prices. One way for China to be reasonably assured that the supply is not likely to be interrupted for any reason is for the U.S. exporters to set aside as collateral in warehouses in China, or a third country, an amount of agricultural commodities equal to one year of contracted supply, with the collateral withdrawable by the Chinese importers in the event of an interruption of exports from the U.S. At the same time, the Chinese importer would have to make available the necessary funds for one year's purchase in an escrow account kept in the U.S. or a third country to guarantee its purchase. Such collateral agreements would help to reduce uncertainty and discourage both sides to renege on their contractual obligations. If such a long-term supply contract can be negotiated by the two sides, it is not only win-win economically, but will also help promote a long-term friendly relationship between the two countries.

The desirability for China to import meat rather than animal feed

The U.S. has a major advantage in land intensive crops such as corn and soybeans. The issue, therefore, is where the animals that will consume this grain should be raised. All else held equal, if it is less expensive to move the animal product to China than it is to move the grain to China, then the industry should be located in the U.S. If it is less expensive to move the grain than the meat, then the industry should be in China.

The cost of corn or soybeans for Chinese pork producers is at least 11 cents per kg higher than in the U.S.[28]. This price difference can be taken as a proxy for transportation costs for feed. The cost of shipping meat from the U.S. to China is about 26 cents per kg[29]. From a transportation cost perspective it will make more sense to transport meat rather than the grain equivalent so long as the meat contains more than 2.4 units of grain. Using pork as an example, each kilogram of live animal contains 3 kg of grain. This live animal produces 76 kg of carcass for each 100 kg of live animal. Each 100 kg of carcass produces 75 kg of boxed pork. This means that each kilogram of boxed pork contains 5.2 kg of feed. Clearly it is far less expensive to ship pork rather than the grain equivalent.

Differentials in livestock productivity also favor locating the livestock industries in the U.S. In the

28 This can be confirmed by comparing U.S. and Chinese prices for these corn and soybeans where the Chinese price is typically US$110 per ton greater than the U.S. price.

29 This meat transport cost data comes from U.S. pork exporters who routinely export containers to China.

U.S., the feed conversion ratio (FCR) for poultry is 1.9-2.0 (pounds of grain per pound of meat), and 3.3-3.6 for pork and 5.5-6.5 for beef. In China, the corresponding numbers are 2.2-4.0, 3.5-8.0 and above 10 for beef[30]. These differentials support the idea that instead of importing U.S. grain and corn for feeding livestock, it would make more economic sense for China to import U.S. meat. (Note, however, that the economics of animal production can be greatly affected by labor costs, regulations, and distance to markets, logistics and other issues. In addition, the FCR depends on how old the animal is when it is slaughtered.)

Another strong reason for China to import more meat than feed is that the former is much more land intensive and water intensive, and China is a country with an acute shortage of arable land and water. A farmer can raise more calories on a hectare of land by growing plants rather than raising poultry or animals. Meat production also requires much more water. Beef is one of the most water-intensive meats. To produce one ton of beef requires, on average, 15,500 cubic meters of water; compared with 4,850 cubic meters for pork, 3,900 cubic meters for chicken, 1,800 for soybean and 1,300 for wheat[31]. Importing meat, especially beef, in that sense, is a way for China to import water.

To facilitate bilateral foreign investment

Restrictions on foreign investment in the agricultural sectors of the two countries result in under-investment, which ultimately will lead to a lack of competition and lost efficiency, slower agriculture development and higher food prices. To fully explore the benefits of U.S.-China agriculture cooperation, the two countries should reduce barriers for foreign participation and investment in agriculture and the food industry. This will open up lots of profitable investment opportunities for both sides, as well as promote the development and advancement of agriculture in both countries.

Currently, the Chinese government is trying to encourage investment in projects to address the severe water shortages in northern China, as well as erosion and pollution problems throughout the country. The government is also attracting investment in China's poorer western provinces. One attractive area for foreign investment is agricultural products for export. Considerable investment has already been made in chicken meat processing for export to Japan and Europe, as well as fruit and vegetable production, packaging and processing for export around the world. Investment in soybean crushing plants and seafood processing plants is also substantial and growing. Foreign-invested companies, including some agribusinesses, are responsible for half of all foreign trade. The largest investors are overseas Chinese, mostly from Hong Kong, Taiwan and Southeast Asia[32].

To maximize the synergies, more efforts should be made to promote cross-border investment in areas like biotechnology (such as large-scale seed production of genetically modified crops), green agriculture technologies (such as recycling agricultural wastes), emerging technologies (such as smart technology equipment) and modern logistics, just to name a few.

30 "Sino-US Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012.
31 Refer to the website of China Water Risk http://www.chinawaterrisk.org

32 "Sino-US Agricultural Cooperation", Eric Trachtenberg, unpublished manuscript, July 2012.

How investment along the agricultural supply chain promotes food security: A case study

Continental Barge and Grain is a huge U.S. company that is involved in all aspects of grain movement. At first glance, it resembles other U.S. grain companies such as Cargill or ADM in that it offers a full range of shipping and financial service. What is unusual about the company is that it is owned by Zen-noh and Itochu. A similar situation exists with Indiana Packers, a major U.S. pork processor, which is owned by Mitsubishi Corporation and Itoham Food. Why would Japanese based companies wish to become involved in such a low margin agricultural business as grain shipping or pork processing?

Anecdotal evidence from discussions with employees of both U.S. companies mentioned above, coupled with academic research on the topic, suggest that the primary reason is for Japan to "secure stable supplies of raw material"*. Japanese control of some aspects of the supply chain gives the Japanese company and Japanese society a sense of security that is apparently worth the investment. For example, one can imagine a strike by barge operators that cripples U.S. grain exports. By owning a key component of this industry, Japan is in a position to offset the negative impact of this strike by convincing its U.S. employees not to participate.

This concern with food supplies is difficult to understand by those who live in food surplus countries such as the U.S. However, when one looks at all of the efforts the U.S. has undertaken to secure a stable supply of oil, the concern that food importing countries have with securing a stable supply of imports becomes much more understandable .

Faced with the need to import food, it would be understandable if some companies in China developed an interest in control of the production and distribution system for this food. Some in the U.S. will oppose this move, but it is important to realize that U.S. agricultural exports to China will not reach their full potential unless China is comfortable with the security of the system that is delivering this food.

* See Raymond A. Jussaume and Martin Kenney, "Japanese investment in United States food and agriculture: Evidence from California and Washington", Agribusiness, Volume 9, Issue 4, pages 413–424, July 1993 .

To develop a more liberalized trade environment which enhances market access

The benefits of U.S.-China agricultural trade are so obvious that it would be unwise to pose any unnecessary barriers to it. Both countries should take sufficient measures to comply with their WTO obligations and implement their tariff commitments, while refraining from the use of non-tariff barriers such as subsidies, licensing requirements, sanitary and phytosanitary measures, packaging standards, etc. Safeguards, anti-dumping and countervailing measures must not be abused and have to be applied strictly in accordance with WTO disciplines. Meanwhile, both countries should actively seek to resolve trade disputes through discussions and negotiations.

Both countries are set to reap the low hanging fruits of closer trade ties. A case in point is the removal of the import ban on U.S. pork by China in May 2010. Since the lifting of the ban, Chinese imports of U.S. pork have grown substantially. This has benefited both the U.S. and China, renewing American access to China's pork market while reducing food inflation in China. In December 2012, the 23rd session of the U.S.-China Joint Commission on Commerce and Trade also concluded some agriculture deals. As the then U.S. Secretary of Agriculture Tom Vilsack said, "We were able to make progress on several key issues, while reinforcing the inherent value of the products produced in the U.S. Much more work remains to be completed and we'll continue working with our Chinese counterparts in the year ahead."[33]

Tariff-rate quotas (TRQs) are also significant barriers to trade as well as good protection methods for domestic producers. Transparency of quota distribution and the state trading issues are two of the main concerns related with TRQs. How to administer TRQs is a great challenge in the future. There are two criteria for quota administration: quota fill and non-discrimination[34]. The former requires no imports inhibition and the latter requires equal treatment across all countries. Currently, Chinese quota distributions are based on their historical market shares and allocated by license, 'first-come, first serve' methods, which is the most likely to be discriminatory and pose a moderate risk of biased trade[35]. However, auctioning for traders without experience may cause quota rent issues (some inexperienced traders may sell the quota instead of doing the actual trade). The management of the TRQs is a challenging but important subject, and the Chinese government should review it with a view to enhancing the best interest of the public. Taking a proportion of the quotas out for auctioning regularly to players with at least two years of experience in the business is an option to consider.

To deepen technological cooperation, information exchange and resource sharing

In the interest of boosting productivity and developing a more advanced, sustainable and resilient agricultural sector, China and the U.S. should strengthen their cooperation and exchange on the following fronts:

Sustainable agriculture – such as resource-saving agriculture: land conservation, cleaner farming practices, waste utilization and recycling; disaster management, etc.

Biotechnology and genetic resources – such as germplasm development, breeding of new varieties, genetically modified organisms, etc.

Plant and animal disease control – such as diagnosis techniques; research and development (R&D) of pesticides and veterinary drugs, etc.

Information exchange and resource sharing mechanisms and platforms can be established to exchange the latest progress in R&D and applications of agricultural science and technology. Various communication activities should be promoted and facilitated between government bureaus, universities, institutes, agricultural associations and chambers of commerce from both countries. The private sector also has a vital role to play; and the Joint Working Group on Agricultural Technology may be used as one mechanism to encourage the engagement of the private sector.

Signing long-term contracts for technology cooperation is also recommended. There are recent surges of interests in agricultural technology cooperation between China and the U.S. Agricultural development cooperation is being pursued primarily by the private sector in the U.S. and government supported research centers in China. Growing concerns for food and energy security and the volatility of global commodity prices are pushing for further cooperation. However, China should address property rights issues more seriously while the U.S. should provide more details in technology sharing policies.

To implement a transparent and science-based regulatory system in a consistent manner; as well as consider simultaneous approval and registration

Both China and the U.S. should employ a transparent, consistent and science-based approach towards the regulation of agricultural imports. Currently,

33 "U.S. and China Conclude 23rd Session of the Joint Commission on Commerce and Trade", Office of the United States Trade Representative, 19 December 2012, http://www.ustr.gov/about-us/press-office/press-releases/2012/december/us-china-conclude-23rd-JCCT
34 "Economics of Tariff-Rate Quota Administration", David W. Skully, Technical Bulletin No. 1893, 2001, Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture.
35 Ibid.

the two countries have different views and standards on agricultural product quality and safety, which often lead to misunderstandings and unnecessary disputes. In view of this, China and the U.S. should work together, through bilateral dialogues, workshops and in-depth scientific exchange, on the establishment of science-based inspection and regulatory systems for agricultural products. In particular, the two countries should strengthen cooperation in the standardization of agricultural product quality and food safety requirements. Meanwhile, the possibility of simultaneous approvals or registrations in both markets should also be explored.

Regarding the implementation of the regulations, both countries should endeavor to ensure the transparency and consistency of the regulatory decision-making process. The two sides should also collaborate on the development of public-private monitoring and reporting systems for contingencies such as animal and plant disease outbreaks and food contamination.

There have been concerns from the U.S. about the inconsistent manner in which the local China Inspection and Quarantine (CIQ) offices implement the standard procedures and regulations set by the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). For instance, periodically some local CIQ offices will deviate from the standard procedures, only verbally communicating the new requirements with no forewarning to the importers. While most Chinese ports accept electronic signatures on phytosanitary certificates issued to indicate that the plants and plant products have met specialized import requirements, at certain ports manually signed certificates are sometimes demanded indiscriminately, causing massively increased costs. Sometimes requirements for what needs to be included in contracts or certificates are arbitrarily changed as well[36]. It is strongly advisable that local CIQ offices in all ports throughout China consistently follow the standardized AQSIQ regulations, in order to minimize the variations in their implementation. The improved efficiency will help reduce costs for U.S. exporters, and the savings will ultimately be passed on to the Chinese consumers.

36 "2012 State of American Business in China White Paper", AmCham China, April 2012.

To promote rural development

Rural development is a major policy priority for both the Chinese and U.S. governments. Rural America is home to one fifth of the nation's people. As such, it is the keeper of natural amenities and national treasures, and safeguard of a unique part of American culture, tradition and history. Today, jobs and incomes are decreasing in many areas that are dependent on natural resource-based industries such as agriculture, mining and forestry, while other places, often associated with rural amenities, are thriving. In China, rural population numbers as many as the urbanites. Their standards of living vary significantly, with an average income one-third of their urban counterparts. In southern and coastal China, rural areas have seen increased development and are catching up with urban economies. In northwest and western regions, rural societies remain under-developed and isolated from other parts of the country. In some of these areas, even basic needs such as clean water and accessible transportation are still very much a problem.

Although the U.S. and China have very different histories and are in different stages of development, they are both plagued by income polarization among its rural citizens. Hence there is a huge opportunity for cooperation in social services and investments, as declining areas must diversify and attract new businesses, and growth areas must develop strategies to sustain their success. Possible areas of cooperation include investment on affordable and timely medical care for the rural population, rural education and other social services especially for the elderly. Agritourism is another investment area full of potentials.

Concluding Remarks

Agriculture has always been one of the most sensitive issues in U.S.-China relations. Nevertheless, given the synergies and huge opportunities that lie ahead, it is important for both sides to further strengthen agricultural trade ties and cooperation. By recognizing and respecting the differences in resource endowment and development stage, the complementarities, as well as the development needs and potentials of both sides, the two countries are set to explore and expand the depth and breadth of agriculture cooperation, and thereby generate tremendous benefits for both.

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Chapter 11
U.S.-China Cooperation in Tourism

ZHANG Yansheng
Director-General, Institute for International Economic Research of the National Development and Reform Commission

With contributions from LI Dawei, Ronald MAK, XIONG Yanyan, ZHANG Zheren

Executive Summary

Opportunities for U.S. exports of tourism services to China are abundant and are rising fast. As a sizable middle class emerges, China's demand for tourism services has entered a stage of rapid growth. In 2011, about 70 million outbound visitor trips were made by citizens of mainland China, including 28 million trips to Hong Kong and 16 million to Macau. Total international tourism expenditure by Chinese travelers in 2011 was around US$72.6bn and ranked third in the world. However, the U.S. had fewer than 1.1 million Chinese tourists in 2011 as compared to around 2.3 million that visited European countries in 2010. It is estimated that Chinese tourists will make 20 million trips to long-haul destinations in 2020. If a more favorable policy environment is to be created by the Chinese and U.S. governments, the U.S.' extensive, world-class tourism resources would place it in a unique position for more Chinese tourists to visit the country in the coming future.

The average per capita spending by Chinese tourists in the U.S. is much higher than that from most other countries, as the Chinese stay longer and spend more on shopping. For every one million Chinese tourists, around 61,000 American jobs directly related to tourism or in its supporting sectors are created in the U.S.[1]. This does not take into account the further rounds of multiplier effects on the rest of the economy. By 2022, Chinese visitors to the U.S. should exceed five million a year based on current growth trends. But the U.S. should aim at attracting 10 million Chinese visitors a year if more visitor friendly measures are put in place. 10 million Chinese visitors would create more than half a million jobs in the U.S.

While the magnitude of this impact is likely to be larger in destinations such as California and New York which are popular with Chinese tourists, the significance of this job-creation impact may be felt more strongly in locations that have lost jobs due to the globalization of manufacturing and yet hold promise in tourism where jobs cannot be offshored.

Chinese tourists are noted for their spending on shopping, particularly on luxury goods. Hong Kong's experience in recent years shows that the spending patterns of these tourists have a significant impact on the business of global luxury brands and retail market dynamics. Today, many global high-end consumer product brands have their regional headquarters in Hong Kong or have their supply chains managed in Hong Kong because of the rising importance of Chinese shoppers. The surge in Chinese visitors in the coming years will have an impact on the global strategies of many retail players, offering opportunities for the U.S. to properly position itself.

One of the major obstacles for the U.S. to fully capitalize on the potential of Chinese tourist demand is the existing U.S. visa-application process in China. Today, the U.S. government has visa-processing offices in only five cities in mainland China to serve a huge population spread out in a big country. An applicant may have to travel a long distance to have an interview, spending a lot of time and money even though approval may be far from certain. Out-of-the-box thinking is required to make the visa-application process more convenient and more user-friendly.

As for the flow of tourism in the other direction, there were 2.1 million U.S. visitors to China in 2012, accounting for approximately 3.6% of all U.S. out-

1 Please see Appendix 3 of this Chapter for the estimation methodology.

bound tourists and growing by an average of almost 2.2% per annum over the last five years. China is stepping up efforts to modernize its tourism-related infrastructure and upgrade its service standards, as well as liberalize restrictions on the business of foreign tourism operators. Further efforts are needed in these areas to attract more U.S. visitors to China, and to get them to stay longer and spend more.

U.S.-China Cooperation in Tourism

Introduction

"Every year, tens of millions of tourists from all over the world come and visit America. The more folks who visit America, the more Americans we get back to work. We need to help businesses all across the country grow and create jobs, compete and win."

U.S. President Barack Obama, January 2012, speech at Walt Disney World Resort, Orlando, Florida[2]

Tourism creates employment in many sectors, including aviation, the cruise industries, retail, hotels, restaurants and catering, and entertainment. Most of the tourism-related jobs are labor-intensive service jobs that are relatively less skilled. In an increasingly globalized world where division of labor has become finer and production has become fragmented, many work processes can be broken down into smaller and simpler steps, allowing some to be relocated or offshored to make the process more cost effective. This is the source of some unemployment among unskilled workers in developed countries such as the U.S.. Tourism therefore helps to mitigate such unemployment problems by creating jobs that could not be offshored.

Chinese outbound tourism has entered a phase of very rapid growth, as per capita gross domestic

Figure 1: Outbound Tourists from China and the U.S. Share of Departures from China*

Source: China National Tourism Administration; Office of Travel and Tourism Industries; CEIC China Premium Database

** Since the China National Tourism Administration has not released the figures for outbound Chinese tourists to the U.S. for 2001-08, the statistics from the U.S. Office of Travel and Tourism Industries (OTTI) have been used to calculate this number over this period. For consistency, the same statistics are also used to calculate numbers for 2009 – 2011, although the China National Tourism Administration has since started providing estimates since 2009.*

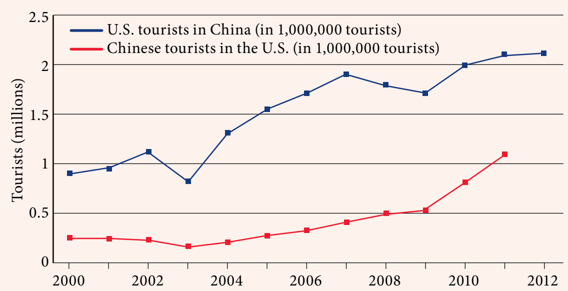
product (GDP) reached US$5,400 in 2011 coupled with a fast-growing middle class. Over the last ten years, Chinese outbound visitor-trips[3] increased from 17 million in 2002 to 83 million in 2012 (see Figure 1). While many Chinese tourists went on short trips initially, the long-haul travel segment is also entering a rapid growth phase in recent years. According to the United Nations World Tourism Organization (UNWTO)[4], China was the third largest spender on international tourism in 2011, with an expenditure of US$72.6bn, a significant jump from US$54.9bn in 2010. The UNWTO expected that the total number of outbound visitor-

2 "Remarks by the President Unveiling a Strategy to Help Boost Travel and Tourism", Jan 2012, http://www.whitehouse.gov/the-press-office/2012/01/19/remarks-president-unveiling-strategy-help-boost-travel-and-tourism

3 This number includes visitor-trips to Hong Kong and Macau.

4 "UNWTO Tourism Highlights, 2012 Edition", United Nations World Tourism Organization, 2012.

Figure 2: Visitor Numbers between China and the U.S.



Source: China Statistical Yearbook, 2012; China National Tourism Administration; Office of Travel and Tourism Industries

trips from China will reach 100 million in the next few years[5]. A study prepared by The Boston Consulting Group[6] projected that about 20 million long-haul trips will be made by Chinese travelers in 2020 as the value of the Chinese market for international outbound tourism grows by 17% annually over the coming decade. By 2022, it is projected in the same study that the number of Chinese outbound trips is likely to reach 182.7 million a year[7].

While the number of Chinese tourists visiting the U.S. has also been rising sharply in recent years from a low base (see Figure 2[8]), it accounted for only about 1.5% of the total outbound trips from China in 2011. There were around two million visitor-trips made by Americans in China in 2011, but Chinese tourist trips to the U.S. were only half that number. The 2.3 million trips to Europe made by Chinese citizens in 2010[9], as compared with 0.8 million trips made to the U.S., also shows the significant potential of U.S. tourism service exports to China that are waiting to be developed.

5 "Tourism 2020 Vision", United Nations World Tourism Organization, 2000.
6 "Taking Off: Travel and Tourism in China and Beyond", The Boston Consulting Group, Mar 2011. See Appendix 1 to this chapter for further details.
7 The Boston Consulting Group estimated in Mar 2011 that the number of Chinese outbound trips would grow by over 10% per annum from 2010 to 2020.
8 The drastic decline in visitations in 2003 was mainly due to the outbreak of the severe acute respiratory syndrome (SARS) in Hong Kong and its impact on travel around the world.
9 "New Chinese Tourists in Europe from 2017", Z_punkt The Foresight Company & TUI Think Tank, Jun 2012 (for further details see Appendix 1 at the end of the chapter).

The Current State of US-China Tourism

Rich tourism resources

Due to both countries' rich histories and large geographical areas, the U.S. and China have a wide variety of tourist attractions for every kind of traveler. Natural scenery and manmade landscapes in China – such as Huangshan Mountain, Tai Mountain, Badaling Great Wall, Leshan Giant Buddha, the terracotta soldiers in Xian and the karst landscape in Guilin – are popular among American tourists. On the other hand, China's tourists enjoy visiting a range of attractions in one of the world's most advanced economies, including New York City, Yellowstone National Park, Grand Canyon National Park, Independence Hall in Philadelphia, prestigious universities such as Harvard and Massachusetts Institute of Technology in Boston, Hollywood, Broadway, Disneyland parks in Florida and Los Angeles, and various Chinatowns around the country. The two countries offer tourists a diverse range of unique cultural and culinary experiences. Chinese visitors also enjoy shopping for American consumer goods at competitive prices, ranging from fashion to electronic gadgets.

Great potential of the two countries in each other's inbound tourism market

In 2011, the U.S. was China's fourth largest source of inbound tourists, after South Korea, Japan and Russia (see Figure 3). China welcomed about two million American tourists in the same year. This is a relatively small proportion compared to the large size of U.S. economy and population, suggesting great potential to increase this figure.

As for inbound travel to the U.S., more than half of its tourists come from its two neighbors – Canada and Mexico. Accounting for around 1.7% of total inbound tourists to the U.S. in 2011, China registered a 27.7% average year-on-year growth rate over the period 2006 to 2011 and has been moving up steadily in the rankings.

Figure 3: Inbound Travel to Mainland China by Country of Origin

Rank	Country	Inbound tourists in 2011 (millions)	Average year-on-year growth rate 2006-2011 (%)
1	South Korea	4.19	1.3
2	Japan	3.66	-0.5
3	Russia	2.54	1.1
4	U.S.	2.12	4.4
5	Malaysia	1.25	6.5
6	Singapore	1.06	5.1
7	Vietnam	1.01	N.A.
8	Mongolia	0.99	9.5
9	Philippines	0.89	4.9
10	Canada	0.75	8.4

Source: China National Tourism Administration
Note: Hong Kong, Macau and Taiwan are not included in the above analysis.

Figure 4: Inbound Travel to the U.S. by Country of Origin

Rank	Country	Inbound tourists in 2011 (millions)	Average year-on-year growth rate 2006 - 2011 (%)
1	Canada	21.34	5.9
2	Mexico	13.49	0.3
3	U.K.	3.84	-1.7
4	Japan	3.25	-2.4
5	Germany	1.82	5.6
6	Brazil	1.51	23.5
7	France	1.5	13.7
8	South Korea	1.15	8.7
9	China	1.09	27.7
10	Australia	1.04	11.5

Source: Office of Travel and Tourism Industries

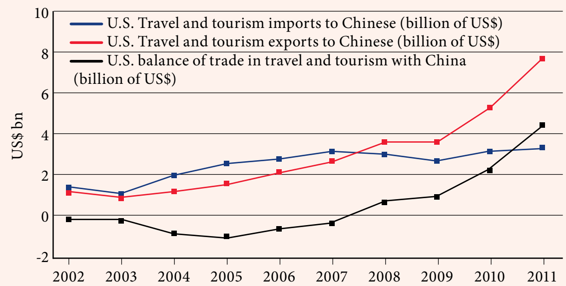
Economic implications of tourism on the U.S. economy

According to the U.S. Bureau of Economic Analysis (BEA), the tourism and travel industry (comprising domestic travel and international inbound and outbound travel) accounted for about 2.7% of U.S. gross domestic product (GDP) in 2010. In the same year, it created 7.5 million jobs, 16% of which were generated by international visitor demand. Being the largest service export industry, tourism accounted for 7% of total exports and 24% of service exports. The BEA estimates that every 65 additional international visitors to the U.S. can support an additional job in the travel and tourism industry[10].

The average growth rate of Chinese tourists going to the U.S. was 27.7% over the last five years as compared to 4.2% for all tourists visiting the U.S. In 2011, a total of 62.7 million foreign tourists visited the U.S., of which 1.1 million came from China. Total spending by all foreign visitors to the U.S. was estimated to be about US$153bn in 2011, of which Chinese visitors accounted for US$7.7bn. Chinese visitors made up 1.8% of all visitors to the U.S., but 5% of total tourist spending, reflecting the much

10 See Appendix 3 at the end of this chapter for further details of the BEA estimate.

Figure 5: **U.S. Trade Balance in Travel and Tourism with China**



Source: U.S. Department of Commerce; Office of Travel and Tourism Industries from the Bureau of Economic Analysis

higher per capita spending of Chinese visitors than the average, due partly to a longer period of stay and partly more expenditure on shopping[11]. The value added to the U.S. economy of spending by travelers from China in 2010 is estimated to be almost US$2.2bn[12].

As shown in Figure 5, U.S. travel and tourism exports to China increased from US$2.7bn in 2007 to US$7.7bn in 2011, representing an average annual growth of 30% in recent years. In spite of a smaller number of Chinese tourists going to the U.S. than Americans to China, the U.S. has run a trade surplus in travel and tourism with China since 2008, which grew to around US$4.4bn in 2011.

Tourism Cooperation and Promotion Mechanisms

China and the U.S. have strengthened cooperation in tourism over the past decade as both countries recognize the important role the sector plays in generating economic growth and jobs. First held in 2007, the U.S.-China Tourism Directors Summit rotating between cities in the two countries is an annual event to advance cooperation and exchange in tourism at various levels. Another important annual conference is the U.S.-China Tourism Leadership Summit, during which members of the Chinese National Tourism Association and the U.S. Travel Association meet to discuss how to develop bilateral tourism and travel through a deeper understanding of the two markets.

In 2007, the two governments put forward the Initiative on Establishment of U.S.-China Strategic Cooperation Framework in Tourism, laying the foundation for subsequent collaboration on tourism promotion. The signing of the memorandum of understanding in December 2007 is a milestone signifying that the U.S. has become an Approved Destination for Chinese travelers. For group travel, only business, educational and official trips to the U.S. with approval of the Chinese government were allowed before this memorandum came into force. Under the memorandum, qualified American operators are permitted to work together with Chinese travel agencies in some provinces in China to arrange U.S. tour packages for Chinese group leisure travelers. Besides, American travel destinations and companies can market their brands in China. As a result, a variety of package tours to the U.S. having been organized since then. The measures agreed under the memorandum have contributed significantly to the upsurge in the number of Chinese tourists to the U.S. in recent years. Some tourism friendship agreements reached at the state-provincial level have added a further boost.

Major Obstacles to U.S.-China Cooperation in Tourism

While the number of Chinese tourists in the U.S. has grown significantly over the last decade, there remain substantial bottlenecks that are discourag-

11 According to the Office of Travel and Tourism Industries of the U.S. Department of Commerce, the average spending per Chinese tourist in the U.S. in 2011 was about US$7,100 as compared with an average of around US$2,470 for all visitors.

12 The value added of the U.S. travel and tourism industry in 2010 was about US$393.68bn. In the same year, the non-resident demand for travel and tourism-related goods and services was around 15% of total demand. This percentage is used to apportion the total value added of the U.S. travel and tourism industry to international visitor demand. The value added of spending by international inbound travelers in 2010 is therefore estimated to be US$59.05bn. Since spending of Chinese visitors in the U.S. in 2010 accounted for 3.72% of total tourist spending, the value added to the U.S. economy of spending by travelers from China was almost US$2.2bn.

ing many Chinese citizens from visiting the U.S. for leisure or business. Meanwhile, due to a relatively lower level of economic development, China's existing tourism infrastructure and institutions are not able to keep up with the expectations and increase in numbers of American visitors to China.

Difficulties in obtaining a U.S. entry visa

Applying for a visa is widely regarded by Chinese travelers as the hardest part of preparing for a trip to the U.S. First, the application rejection rate is high. According to a survey[13], the average rate of refusal has stayed above 15% over the last decade, peaking at 22.6 % in 2004. Second, the waiting time for an interview used to be too long (see Figure 6) and that disrupts travel planning and work scheduling[14]. Third, there are only a limited number of locations where visa interviews are conducted in China. In a country of 1.33 billion people, the U.S. government now has visa processing offices in only five cities, compared to 12 in the U.K. (see Figure 7). To attend an interview that may last only a few minutes, many visa applicants in China need to travel long distances and incur costly trips. Moreover, unpleasant experiences by some Chinese travelers going through security inspection points at U.S. Customs and Immigration could deter them from returning or others from going.

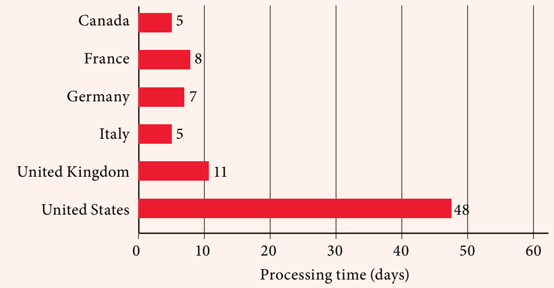
Short validity periods of China and U.S. entry visas

Visas valid for only a short period can be issued to business travelers, students and tourists. Given that the Chinese government's current practice is to issue visas to Americans with only one year validity, the U.S. has reciprocated by capping visas to Chinese citizens also to one year. Even though the U.S. government hopes to issue visas that are valid for a longer duration, the Chinese government has yet to respond similarly.

13 Sun Kan, "A survey on the application for U.S. business entry visa by Chinese travelers", *Work and Study Abroad*, 3rd issue, 2007, available in Chinese only, 孙侃，《中国内地赴美商务签证疑难问题综合调查》，《出国与就业》，2007年第3期.

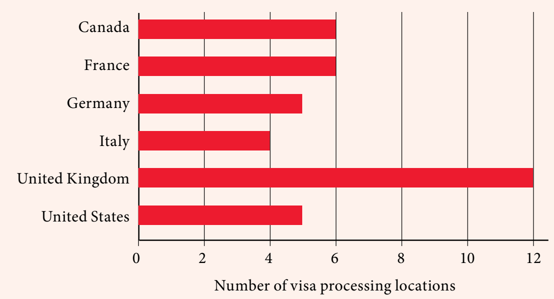
14 The U.S. government introduced improvements to visa processing in 2012. These are explained later in this chapter under Recent Progress.

Figure 6: Average Visa Processing Time in China July 2010



Source: U.S. Travel and Tourism Advisory Board
Note 1: For the U.S. typical wait time for visa appointment plus processing time.
Note 2: For the U.K. processing time for 80% of applications.

Figure 7: Number of Visa Processing Locations in China



Source: U.S. Travel and Tourism Advisory Board

Regulations for U.S. travel firms in China

Before 2009, the Chinese government imposed strict restrictions on the minimum capital and business activities of foreign-owned travel enterprises in China. In particular, they were not permitted to operate outbound package tours. Moreover, some U.S. companies among others have complained that their travel agents are required to use China's nationally owned computer reservation system when booking airline tickets. Given that the tourism industry and travel agency services have not been put onto the list of 'encouraged' industries in the latest *Catalogue for the Guidance of Foreign Investment Industries*, U.S. tourist firms are concerned that China's regulations will continue to put them at a disadvantage in the Chinese tourist market and thus pose obstacles for full cooperation in tourism between the two countries.

By contrast, in the U.S. foreign travel firms face no restrictions on market access or business coverage. U.S. Trade Representative Ron Kirk has urged the Chinese government to honor its commitment to allow joint ventures in the travel and tourism services sector, and requested China to liberalize its market[15]. Relaxing restrictions on U.S. enterprises investing directly in China's outbound tourism sector would promote cooperation at a time when travel between the two nations is growing rapidly.

Need to modernize China's regulatory and administrative frameworks and improve tourism infrastructure

China does not have a comprehensive regulatory framework that promotes good tourism practices and coordination amongst different tourism sectors. Chinese laws on tourism are still in the process of enactment. Legal responsibility and penalty on misconduct of tourism operators are unclear and often ineffective. This is not conducive to an environment that fosters the growth of quality services[16].

Most tourists from the U.S. usually visit only a small number of famous and popular scenic spots in China. They tend to neglect the historic and natural scenery in other areas because of China's poor tourism infrastructure. This also reduces their length of stay in China. Apart from hardware infrastructure such as roads, hotels, clean water and hygiene, soft infrastructure such as the quality of services also needs improvement.

Recent Progress

In January 2012, U.S. President Barack Obama signed an executive order raising non-immigrant visa processing capacity in China by 40% in 2012, and requiring that 80% of non-immigrant visa applicants be interviewed within three weeks after receipt of application. The Jobs Originated through Launching Travel (JOLT) Act introduced to the U.S. Senate in March 2012 proposed that, among other statutes, the U.S. should issue visas for longer than one year to Chinese tourists. In its report "National Travel and Tourism Strategy" released in May 2012, the U.S. Task Force on Travel and Competitiveness summarized recent measures adopted by the U.S. government to cut interview backlogs in China, including the expansion of visa adjudication staff in China and the increase in the number of adjudication windows. According to U.S. Ambassador to China Gary Locke, the waiting time is generally reduced to one week after the recent improvement in visa application processes, except for peak travel time[17]. These are all moves in the right direction. Nevertheless, given the large number of actual and potential applications, more efforts are required to deal with this major barrier to attracting Chinese tourists.

China, for its part, has been gradually liberalizing its market for travel and tourism services beyond the commitments it made when it acceded to the World Trade Organization (WTO) in 2001. For instance, the Regulation on Travel Agencies released by the National Tourism Administration in 2009 stipulates that foreign-owned enterprises be accorded national treatment with respect to capital requirements. The Opinion of the State Council on Accelerating the Development of the Tourism Industry promulgated in the same year stated that the Chinese government would allow foreign enterprises to operate outbound travel services on a pilot basis. In 2010, CITS Group Corporation and American Express One launched a travel agency, one of three pioneering joint ventures[18] formed between domestic and foreign firms.

China's tourism-related government depart-

15 "Kirk To Press China On Expanding U.S. Presence In Tourism Industry", *Inside U.S.-China Trade*, vol. 11, No. 11, 16 March 2011.
16 "China mulls tourism law to eradicate six loopholes", *People's Daily Online*, www.china.org.cn

17 "Ambassador Locke Presents One Millionth Visa in China: Wait Times Drop to Less Than One Week", U.S. Department of State, 2011, www.state.gov
18 The other two joint ventures are TUI China (between Germany and China) and JTB New Century International Tours (between Japan and China).

ments have identified impediments to the industry's development and are taking steps to remove them. The central government has been stepping up efforts in legislation and is set to promulgate nationwide laws on tourism[19]. Some provincial governments such as Shandong and Hainan have enacted relevant regulations tailored to their market and social conditions. For example, the Shandong Province Tourism Ordinance released in 2010 has clarified the rights and responsibilities of regulators, tour operators and travelers, and introduced provisions to protect the interests of employees.

The Mutual Benefits of Promoting U.S.-China Travel and Tourism

Capturing the business potential of Chinese outbound tourists to the U.S. would give a boost to the U.S. economy, particularly in terms of employment in popular tourist destinations. According to the U.S. Office of Travel and Tourism Industries[20], the number of Chinese travelers to the U.S. is predicted to grow by an average of 23.7% in the six-year period between 2011 and 2017, from 1.1 million to 3.9 million. Compared with an average actual growth rate of 30% in the last three years (2008-11) when demand for U.S. travel from Chinese tourists was only partially increased and China's economy was adversely affected by the global economic downturn, this prediction is probably too conservative.

Given the increased disposable income of the fast-expanding middle class in China, demand for long-haul travel has entered a period of rapid growth. The actual outcome, however, depends on how far the U.S. government can improve its visa policies to make the application procedures more user-friendly. This study suggests that the U.S. should target a much higher growth of inbound Chinese travelers. The number of outbound Chinese tourists to the U.S. is projected to increase to 5.73 million after ten years, constituting 3.1% of the total number of outbound Chinese tourists. If visa and other arrangements are made more accessible, it would not be unreasonable to target 10 million Chinese visitors by 2022[21]. This translates to an average growth rate of 22.5% per annum from 2011 to 2022.

According to the BEA, every 65 visitors to the U.S. creates one extra job in travel and tourism-related activities. As per capita spending is significantly higher for Chinese tourists than for other foreign tourists, it is estimated that the total spending of about 17 Chinese tourists is sufficient to support one job in the U.S. Ten million Chinese visitors therefore are expected to generate a demand for 610,000 employees in tourism-related sectors in the U.S. economy[22].

Promoting U.S.-China two-way tourism is also in line with the economic interests of China. It should actively develop its inbound tourism while developing the outbound tourism in an orderly fashion. More Chinese citizens could afford and enjoy the high-quality tourism services the U.S. has to offer in the coming decade. Such travels would also enrich and open the minds of Chinese travelers.

Meanwhile, U.S. tourists going to China grew at an average annual rate of almost 2.2% from 2007 to 2012. Despite making up 21.6% of the market of U.S. visitors in Asia, China was only ranked ninth in the list of top destinations of Americans traveling abroad in 2011. The rate of growth of American tourists to China could be raised if China invests more in tourism infrastructure and raises service standards. Development of the services industries is a priority included in China's 12th Five-Year Plan.

19 "China eyes tourism development through legislation", *China Daily*, 2012, www.chinadaily.com.cn

20 "International Travel Forecast to the United States: 2011-2017", prepared by the U.S. Office of Travel and Tourism Industries (OTTI), Nov 2012.

21 For further details see Appendix 2 at the end of this chapter.

22 The methodology of these estimations is discussed in Appendix 3 of this chapter.

Promoting tourism also helps to generate services jobs for many sectors in China.

Today, 130,000 Chinese students are studying in the U.S., and 30,000 American students are now studying in China. The two countries have committed to raise the number of U.S. students studying in China to 100,000 over the next five years. This exchange of students will indeed become a significant and direct contributor to economic growth and employment in both countries. Foreign students in the U.S. can increase domestic aggregate demand in the same way as tourists. Chinese foreign students spend less per day than Chinese tourists, but much more per person per year. Assuming an inflow of 100,000 Chinese foreign students per year, an average stay of four years, and an average spending of US$50,000 per person per year, the total expenditure amounts to US$20bn per year, which is capable of creating more than 136,000 local jobs.

Lastly, U.S.-China two-way tourism can help improve mutual understanding and trust, and enhance cultural and social exchanges between the people of the two countries. This goes on to foster mutual trust and a more conducive environment for further cooperation in other areas.

The Experience of Hong Kong

In 2003, the total number of overnight mainland Chinese tourists visiting Hong Kong was only 8.5 million[23]. By 2012, this number has risen to 34.9 million, about five times the Hong Kong population and accounting for 72% of the total of 48 million inbound tourists to Hong Kong. The per capita spending of overnight Mainland tourists in Hong Kong in 2011 is estimated to be US$1,054, the highest compared to tourists from other economies to Hong Kong[24]. Hong Kong's experience in dealing with the large inflow of tourists from mainland China is useful and illustrative to other countries that are receiving an increasing inflow of Chinese tourists.

For a long time when China imposed stringent restrictions on its people travelling overseas, the flow of tourists and business visitors between Hong Kong and mainland China was predominantly one way – from Hong Kong to the Mainland. But as China's economy grew and travel restrictions on its residents were gradually relaxed, mainland Chinese tourists coming to Hong Kong have increased rapidly. A watershed change occurred in 2003 when China introduced the Individual Visitor Scheme (IVS) which allows individual tourists to travel to Hong Kong without having to join tour groups, initially for people in selected major cities and the southern province of Guangdong, but it gradually extended to more cities and provinces. The procedures for the application of IVS visas, the frequency of visits allowed, the validity period of such IVS visas, the cities and provinces covered by IVS, etc. have also been gradually relaxed. As these changes took effect, tourists coming from the Mainland to Hong Kong grew rapidly.

Mainland tourists to Hong Kong today symbolize purchasing power, as reflected in the large number of Mainland shoppers frequenting many shops in Hong Kong that sell expensive jewellery, watches, handbags or cosmetics. And given the proximity of Hong Kong to many southern Chinese cities, the ease of travel to Hong Kong has also led to an increasing number of Mainland residents coming to Hong Kong to visit medical doctors for consultation, purchase daily necessities, buy the latest trendy products such as mobile phones that are not yet sold in the Mainland, or attend concerts by popular singers. Such demand for goods and services in Hong Kong by Mainland residents reflect the strong demand for quality assurance that the Hong Kong market provides, particularly given the news from time to time about fake and unreliable goods and services being sold in the Mainland. High levels of import duty im-

23 This number does not include day visitors from mainland China.
24 "A Statistical Review of Hong Kong Tourism 2011", Hong Kong Tourism Board, June 2012

posed by China on certain products such as luxury goods, are also another important reason for the increasing numbers of Mainland visitors to Hong Kong where prices of such luxury goods are lower.

Furthermore, given the geographical size of China, wealthy consumers are spread across the country. It is a market where many customers will go to meet the goods and services available in big cities, rather than the goods and services going to meet the customers. And amongst all the major cities in China, Hong Kong commands a lead in its retail sector.

In 2010, the tourism industry is estimated to have contributed US$9.56bn in GDP value added to the Hong Kong economy and employed 215,100 people, representing 4.3% of Hong Kong's GDP and 6.2% of Hong Kong's total employment. The smaller share contribution to GDP than to employment illustrates the fact that many of the jobs in the tourism sector are relatively lower skilled. But the jobs created by the tourism industry are a major factor accounting for a low unemployment rate in Hong Kong (3.4% in late 2012) at a time when most of the developed world was suffering from an economic downturn while China was also going through a period of economic adjustment and consolidation.

The presence of a large number of mainland Chinese tourists in Hong Kong has also had a major impact on the retail businesses in Hong Kong, particularly for the luxury brands. The rapidly growing demand from these shoppers has naturally spurred the growth of retail sales. On top of that, these shoppers' behavior in Hong Kong reflects the evolving tastes and changing preferences of the rapidly emerging middle-class consumers in China. To many consumer product brands, having a retail presence in Hong Kong is important to understand these changes, particularly given the vast differences in tastes and style of consumers coming from different parts of China.

Furthermore, since Hong Kong is seen by mainland Chinese consumers as a trendsetter in style, fashion and new products, many global consumer product brands have to build up a strong presence through advertising and product promotions in Hong Kong, as this could project a strong brand image targeted at a wide range of well-to-do Chinese consumers coming from different parts of China. Many luxury brands have stepped up their presence in Hong Kong in different ways. Some of them have set up regional headquarters in Hong Kong, handling corporate functions such as strategy, legal, finance, branding and design. Some brands such as L'Occitane, Samsonite and Prada have listed their companies on the Hong Kong stock market, and this helps to increase brand awareness amongst mainland Chinese consumers.

The rapidly rising outflow in Chinese tourists to other countries is set to continue as household incomes grow and travel restrictions are further lifted in China. The experience of Hong Kong in recent years – similar to those of the Japanese tourist booms in the 1980s and 1990s – suggest that the global retail landscape, particularly for high-end brands, is likely to change gradually as the flow of these shoppers surges.

However, the large influx of Mainland tourists also brings new challenges. There were initial worries amongst many local residents that these Mainland visitors might become a source of illegal immigrants and crime in Hong Kong. With close cooperation between the immigration and law enforcement agencies on both sides of the border, Hong Kong and the Mainland have been able to keep such problems under control. And given the rapidly rising incomes on the Mainland in recent years, there is little evidence to suggest that there are higher crime rates or higher incidences of overstaying in Hong Kong by Mainland visitors as compared with tourists from other sources. The new problem facing Hong Kong today is that there is too much demand from the Mainland visitors, with the result that shop rentals have been driven too high for many retail operators that serve primarily the local market. The strong demand for daily necessities by Mainland residents could also sometimes lead to temporary shortages of specific products, such as the case of formula powders for babies in 2012. To mitigate these problems, Hong Kong has been working closely with the relevant authorities on the Mainland to fine tune the pace of liberalization of China's immigration controls and to tackle parallel trading operations.

Our Recommendations

Whether the potential of U.S.-China two-way tourism can be unleashed in the coming years depends largely on the policy environment created by the two governments. Our study suggests that a quantum leap in the number of Chinese visitors to the U.S. could be realized if the necessary policy changes are put in place. The U.S. could realistically target an annual inflow of 10 million Chinese visitors by 2022. Recent measures to improve the processing of visa applications adopted by the U.S. government are encouraging, but more needs to be done.

To keep up with the rising number of tourists from the U.S., China ought to further improve its tourism regulatory system and infrastructure. The two countries could explore how to promote direct investments from both sides so as to facilitate further tourism growth.

Make visa application processes of both countries more customer friendly

To meet the large and rapidly growing demand for U.S. visits from China, the U.S. should speed up and expand efforts to enhance further its visa processing capabilities. The American government is advised to consider increasing the number of offices that could process visa applications and employing more staff at these visa processing locations. More out-of-the-box thinking should also be put into making the process more user-friendly, such as allowing for video interviews and making the application process more Chinese language friendly.

According to the report "Ready for Takeoff" published by the U.S. Travel Association in 2011, recapturing the historic U.S. share of worldwide overseas travel (17% in 2000) by an improvement in the visa policy could create up to 1.3 million additional jobs by 2020 (relative to 2010), raise exports by a cumulative US$390bn and generate US$859bn cumulative additional economic output over a decade for the U.S. economy. Developing the potential of the Chinese market is a key component of this vision.

Similarly, it is proposed to the Chinese Government that the Chinese visa application process for tourists and students, and especially that for businessmen, should also be streamlined and expedited.

Extend the period of validity of visas reciprocally

To reap more economic benefits from inbound tourism, the Chinese government is advised to consider the extension of the validity period of the visas issued to U.S. travelers to more than one year. Locke has said that the U.S. would like to issue five-year visas to Chinese visitors for business, travel or study, and has officially asked the Chinese government to do the same for Americans. Reciprocal extension would encourage more visits and greater interaction between the two countries. It is recommended that both countries extend the visa durations to five years to begin with, then ten years, and eventually move to a visa-free regime for each other's citizens.

Improve tourism infrastructures and institutions

China still has a long way to go in upgrading into a world-class destination and a favorite choice among international tourists. While the measures introduced in recent years are positive steps forward, reforms and efforts with greater depth and breadth are necessary. For example, as suggested by the 2011 "Travel and Tourism Competitiveness Report" published by the World Economic Forum (see Appendix 4 for details), China needs to improve sanitation and access to clean drinking water in the central and western parts of the country; further develop its air and ground transport infrastructure; improve hotel facilities such as internet access; raise the quality of services provided to foreign tourists; and invest more in training and educating its tourism labor force. Furthermore, China could consider negotiating an open skies agreement with the U.S.

In the period of rapidly rising two-way visitor numbers, the transpacific flight capacity between the U.S. and China could become insufficient. It is proposed to the civil aviation regulatory agencies of both U.S. and Chinese Governments that the transpacific flight capacity between the two countries should be increased in terms of both frequency and points served, especially for nonstop flights between major cities. Airlines from both countries should be granted reciprocal onward extension rights within the other country in order to facilitate the development of bilateral tourism. For example, a U.S. carrier should be able to make a stop in Beijing, allowing passengers to disembark and to board, and then continue onward to Xian. Similarly, a Chinese carrier can make a stop in Honolulu and then continue onward to San Francisco.

It is also advisable that the state and local governments of the U.S., and the U.S. hospitality and tourism industry evaluate the need to improve and expand its infrastructure, such as airports and hotel rooms, to meet with the influx of Chinese visitors in the coming decade. More staff training would also be required to meet the new demands of the rapidly changing profile of Chinese tourists[25].

Promote cross-country investments in tourism

A correct set of incentives is needed for both economies to exploit mutually beneficial business opportunities. Encouraging foreign direct investment into each country would help both to more effectively capture the benefits from growing two-way tourist traffic. To encourage the participation of foreign firms in the outbound and inbound tourism markets, more joint ventures should be allowed to provide tourism services in China. The Chinese government could also encourage local enterprises to invest directly in the U.S. by providing support in foreign exchange, insurance and credit.

25 For further details see Appendix 1 at the end of this chapter.

Appendix 1

The New Generation of Tourists from China in the Coming Decade[26]

Two studies prepared by the Boston Consulting Group and the Z_punkt The Foresight Company & TUI Think Tank have both highlighted the huge growth potential of the outbound tourism market in China, and the diversification of preferences of future Chinese travelers.

The market value of the outbound travel market in China is forecast to rise from RMB321bn in 2010 to RMB1,544bn in 2020 representing a growth rate of 17% per year. The number of international visitor-trips from China will be rising by an average year-on-year rate of 10% over the same period. Its outbound travel market is projected to grow to triple the size of Japan's by 2020. In the same year, around 20 million long-haul trips will be made by Chinese travelers. 25% of international travelers arriving in South Korea and Japan are expected to be from China in or before 2020. China could also become the third largest source of inbound visitor-trips for North America in the coming decade. As far as arrivals in Europe are concerned, it is probable that China alone will make up more than half of its incremental arrivals originated from countries outside the EU.

Urbanization, digital culture, individualization

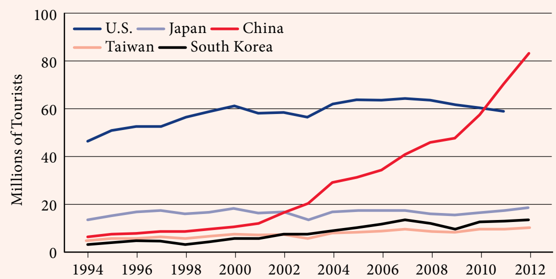
26 This Appendix is a summary of the analyses on the Chinese outbound tourism markets in the report titled "Taking Off: Travel and Tourism in China and Beyond" by The Boston Consulting Group, and "New Chinese Tourists in Europe from 2017" by the Z_punkt The Foresight Company & TUI Think Tank.

and other megatrends that are underway in China would create new consumption patterns of its outbound tourists to developed countries. It is reasonable to expect that Chinese travelers after 2016 will differ noticeably from today's travelers in terms of expectation and needs. Besides addressing the mostly time-invariant needs of first-time travelers keen on sightseeing, foreign countries have to better prepare themselves to receive travel-savvy customers from China in the future. They have to cater for a more diverse, broader tourist profile encompassing different age groups and income classes, including independent travelers, eco-tourists, adventure-seekers and more sophisticated travelers. A larger proportion of these experienced travelers have been growing from passive holiday takers to holiday makers.

Notwithstanding the fierce competition in the travel and tourism industry in mainland China, it is still relatively underdeveloped in the sense that there is only little product differentiation or service innovation to meet the needs of these consumers in different market segments. Affluent travelers, for instance, are more dissatisfied with the packaged tours provided by travel agencies relative to those in other income groups. Moreover, some Chinese complain that the services offered by premium hotels operated by multinationals cannot live up to their expectations.

The burgeoning demand for tourism in China and the lack of quality offerings with sufficient variety for its travelers together present an unprecedented opportunity for firms to gain first-mover advantage by creating the standard. In addition to serving customers in large and more developed cities in China, firms in the industry are also encouraged to tailor their services to middle-class travelers in smaller cities whose number will increase rapidly. With sufficient investment in this area, they have the potential to build up well-known brands signifying credibility and value among Chinese travelers, and to guide their consumption behaviors.

Figure 8: Total Outbound Tourists from Selected Economies



Source: CEIC China Premium Database, China National Tourism Administration, U.S. Office of Travel and Tourism Industries, Japan Tourism Marketing Co, Korea Tourism Organization, Tourism Bureau, M.O.T.C. Rep. of China (TAIWAN)

Appendix 2

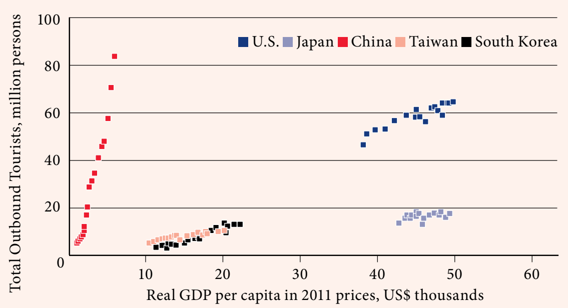
Projection of Total Outbound Chinese Tourists and Chinese Tourists to the U.S. – XIONG Yanyan[27]

The number of annual outbound tourists from China has been increasing by leaps and bounds, from 10.5 million in 2000 to more than 83 million in 2012, at an annual compound rate of growth of 19%. In comparison, during the same period, the numbers of annual outbound tourists from Japan and the U.S. are almost stationary, and tourists from South Korea and Taiwan have been growing at average annual rates of 8% and 3% respectively (see Figure 8).

What drives the growth of outbound tourism? Real per capita GDP is probably the single most important factor. Both Japan and the U.S. have had high real GDP per capita for a long time, and therefore their annual numbers of outbound tourists are probably more or less stable. Chinese real GDP per capita has been growing at between 8% and 9% per annum during this period and so it is not surprising that Chinese outbound tourism has been growing at high double-digit annual rates. There is a signifi-

27 XIONG Yanyan is Associate Professor of Economics, Nanjing University.

Figure 9: The Relationship between Total Outbound Tourists and Real GDP per Capita



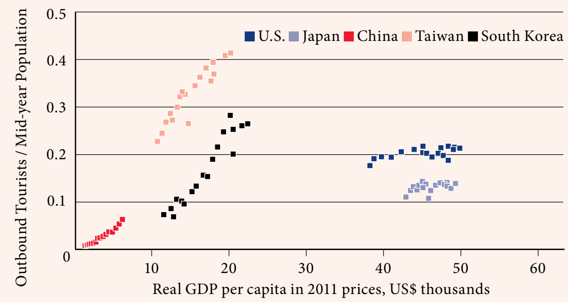
Source: CEIC China Premium Database, China National Tourism Administration, U.S. Office of Travel and Tourism Industries, Japan Tourism Marketing Co, Korea Tourism Organization, Tourism Bureau, M.O.T.C. Rep. of China (TAIWAN), International Financial Statistics (IFS) database, U.S. Bureau of Economic Analysis (BEA), Statistical Bureau of Taiwan, and author's calculation.

cant positive correlation between the annual number of outbound tourists and real GDP per capita (see Figure 9).

However, a country or region with a larger population will have a larger annual number of total outbound tourists, given the same real GDP per capita. Thus it is necessary to control for the size of the population. There are wide variations in the number of outbound tourists per capita across economies. In 2012, the share of Chinese annual outbound tourists in its population was 6.14%, compared to approximately 13% for Japan and 20% for the U.S. (see Figure 10). A positive correlation between annual total outbound tourists per capita and real GDP per capita is also unmistakable.

Another important factor that affects the number of tourists per capita is the size of the country or region. The smaller the country or region, the more likely the tourists will travel outside the country or region. For the U.S. and China, there are many possibilities for domestic tourism. For a region such as Hong Kong, almost all tourism will be outbound. Thus, it is unlikely that the proportion of outbound tourists in the total population of China will ever approach the same levels as South Korea and Taiwan, no matter how high the Chinese real GDP per capita becomes. It is unlikely that this proportion will exceed 20%.

Figure 10: The Relationship between Total Outbound Tourists per Capita and Real GDP per Capita



Source: International Financial Statistics (IFS) database, U.S. Bureau of Economic Analysis (BEA), Statistical Bureau of Taiwan, and author's calculation.

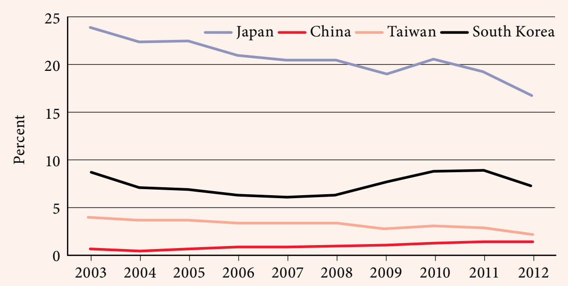
Figure 11: Ordinary Least-Squares Regression of Total Outbound Tourists/Mid-year Population on Real GDP per Capita for China

Independent Variables	Dependent Variable Total Outbound Tourists/Mid-year Population	
	(1)	(2)
Constant	-0.0123	-0.0107
	(0.0015)	(0.0032)
Real GDP per capita	0.0113	
	(0.0006)	
Ln(Real GDP per capita)		0.0330
		(0.0034)
R-squared	0.978	0.910
Sample size	19	19

Source: author's estimation
Notes: All the estimated coefficients are statistically significant at the 1% level. Robust standard errors are reported in the parentheses.

An ordinary least-squares regression can be run with the annual number of outbound tourists per capita as the dependent variable and real GDP per capita as the independent variable (in both linear and log-linear forms). The results are presented in Figure 11. The linear regression has the highest R-squared. What the estimated coefficient of the real GDP per capita variable of this regression means is that for every US$1,000 (in 2011 prices) the increase in the real GDP per capita of China, the proportion of the population who will undertake annual outbound tourism will increase by 1.13%. If the real GDP per capita in 2022 is doubled that of 2012, is represents an increase of US$6,000 (at 2011 prices), and the proportion of the population who will undertake annual outbound

Figure 12: Proportion of Total Outbound Tourists Visiting the U.S.



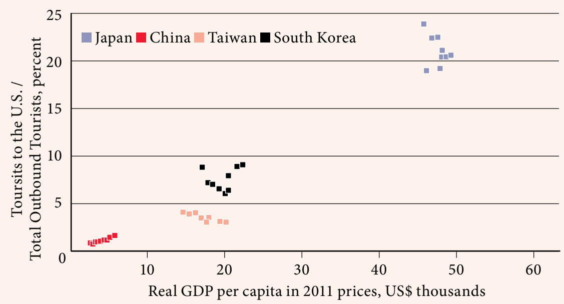
Source: CEIC China Premium Database, China National Tourism Administration, U.S. Office of Travel and Tourism Industries, Japan Tourism Marketing Co, Korea Tourism Organization, Tourism Bureau, M.O.T.C. Rep. of China (TAIWAN), and author's calculation.

tourism will become 6.14% + 6.78% = 12.92%. The Chinese population in 2022 may be projected to be 1.414 billion, implying a total number of outbound tourists of 182.7 million, or an average annual rate of growth of 8.2% between 2012 and 2022, marginally higher than the expected rate of growth of real GDP per capita for the same period.

What proportion of outbound tourists will choose to visit the U.S.? In Figure 12, the data on the proportion of total outbound tourists that choose to visit the U.S. are presented for China, Japan, South Korea and Taiwan. There are two important factors that affect the proportion of total tourists visiting the U.S.: whether an entry visa is required and real GDP per capita. Japanese citizens have enjoyed visa-free access to the U.S. for a while, and that is one reason why the proportion of its outbound tourists visiting the U.S. is significantly higher than those of other countries and regions. South Korean citizens were granted visa-free access to the U.S. in 2008, and the proportion of its outbound tourists visiting the U.S. rose from 6.3% to 9.0% in 2011[28].

Real GDP per capita is an important factor because a visit to the U.S. is more expensive than a visit to a nearby country or region. The effect of real GDP per capita can be seen in Figure 13, in which the proportion of total tourists visiting the U.S. is plotted against real GDP per capita. Figure 13 shows that there is definitely a long-term positive correlation. However, there can be year-to-year fluctuations depending on the macroeconomic conditions of the home country or region.

Figure 13: The Relationship between the Proportion of Total Outbound Tourists Visiting the U.S. and Real GDP per Capita



Source: CEIC China Premium Database, China National Tourism Administration, U.S. Office of Travel and Tourism Industries, Japan Tourism Marketing Co, Korea Tourism Organization, Tourism Bureau, M.O.T.C. Rep. of China (TAIWAN), International Financial Statistics (IFS) database, U.S. Bureau of Economic Analysis (BEA), Statistical Bureau of Taiwan, and author's calculation.

Another ordinary least-squares regression can be run with the proportion of total outbound Chinese tourists visiting the U.S. as the dependent variable and real GDP per capita as the independent variable (in both linear and log-linear forms and with and without a constant term). The results are presented in Figure 14. As before, we use the regression with the highest R-squared. What this regression means is that for every US$1,000 (at 2011 prices) increase in the real GDP per capita of China, the proportion of the annual outbound tourists who will visit the U.S. will increase by 0.264%. If the real GDP per capita in 2022 is double that of 2012, it represents an increase of US$6,000 (at 2011 prices), and the proportion of outbound tourists who will visit the U.S. will rise from 1.550% to 3.134%. Total Chinese outbound tourists in 2022 has been projected to be 182.7 million, so that total Chinese tourists to the U.S. may be projected to rise to 5.73 million, compared to 1.29 million in 2012, at an average annual rate of growth of 16.1%. If, however, Chinese citizens are granted

28 The 2012 figure for South Korea, 7.6%, may not be completely reliable because it has been estimated based on the first 11 months of data, but it is still higher than the 2008 figure. Residents of Taiwan were granted visa-free access to the U.S. in November 2012, too late to have any significant effect on the data.

Figure 14: **Ordinary Least-Squares Regression of the Share of Tourists to the U.S. in Total Outbound Tourists on Real GDP per Capita for China**

	Dependent Variable			
	The Share of Tourists to the U.S. in Total Outbound			
	Tourists from China			
	(1)	(2)	(3)	(4)
Constant	0.0004	-0.0028		
	(0.0009)	(0.0016)		
Real GDP per capita	0.0025		0.0026	
	(0.0002)		(0.0001)	
Ln(Real GDP per capita)		0.0099		0.0080
		(0.0012)		(0.0003)
R-squared	0.944	0.903	0.996	0.991
Sample size	10	10	10	10

Source: author's estimation
Notes: The estimated coefficients for the constant term are not statistically significant. The estimated coefficients of real GDP per capita are statistically significant at the 1% level. Robust standard errors are reported in parentheses.

visa-free access during this ten-year period, the proportion of Chinese tourists visiting the U.S. should go up by between 1.3% and 2.7%, based on the South Korean experience. Total Chinese tourists to the U.S. may then be projected to be between 8.1 million and 10.7 million in 2022.

Appendix 3

Estimation of the Impact of Inbound Tourism on U.S. Employment

According to the U.S. Department of Commerce, "every additional 65 international visitors to the United States can generate enough exports to support an additional travel and tourism-related job" (White House, 2012). This number is estimated using figures on total tourism-related output and tourism-related employment in 2010. The Department's Bureau of Economic Analysis (BEA) has estimated that one additional job is created for every US$147,000 spending by travelers in the U.S. under the assumptions of the equality of marginal productivity of labor across sectors, and other basic labor economic axioms. In 2010, the U.S. received 63.2 million visitors who collectively spent US$142.5bn on travel and tourism-related goods and services. The average spending per international tourist in the U.S. was US$2,255 and this therefore implies that approximately 65 international tourists would support the demand for an employee in the tourism-related sectors.

Tourists from China have a much higher per-capita spending in the U.S. than the average, due partly to longer stays and partly to more shopping expenditure. It has been estimated that a typical Chinese tourist will spend approximately US$750 a day. Assuming that the average visit to the U.S. lasts 14 days, this will imply, on average, a total spending of US$9,000 per tourist (not counting the days of arrival and departure). A proportional rough estimation suggests that about 17 Chinese travelers would support one job in the U.S.

Assuming that the growth in average spending per Chinese tourist in the U.S., inflation in the U.S. and productivity growth in the U.S. during the forecast period would not have a significant impact on the job impact estimates of the base year, it could be deduced roughly that 10 million Chinese visitors would generate 610,000 jobs in the tourism-related sectors for the U.S. economy.

An input-output analysis by Professor Chen Xikang[29] on the employment generated by Chinese travelers to the U.S. shows that 10 million Chinese visitors would generate 780,000 U.S. jobs if one takes the complete multiplier effects into account. The estimates by BEA are used in this study because they are more conservative.

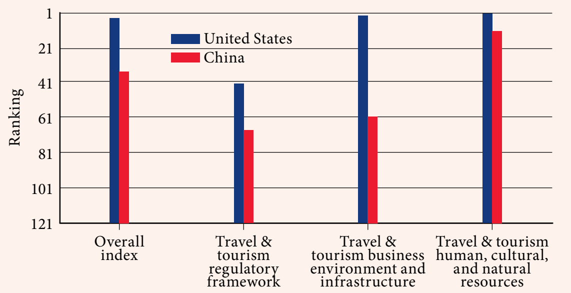
Appendix 4

World Economic Forum's "Travel and Tourism Competitiveness Report"

The 2011 "Travel and Tourism Competitiveness Report" published by the World Economic Forum

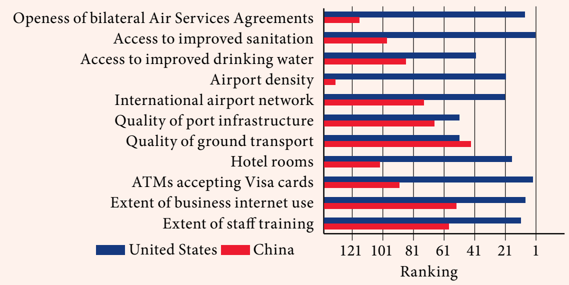
29 Please see Appendix to Chapter II 8.

Figure 15: **Travel and Tourism Competitiveness Index, 2011**



Source: "Travel and Tourism Competitiveness Report 2011", World Economic Forum, Mar 2011

Figure 16: **Travel and Tourism Competitiveness Index: Selected Indicators, 2011**



Source: "Travel and Tourism Competitiveness Report 2011", World Economic Forum, Mar 2011

(WEF) analyzes different factors contributing to the competitiveness of the travel and tourism sectors in 139 economies. An extract of some of these indicators comparing China and the U.S. are shown in Figures 15 and 16. This report highlights the need for China to enhance its policy environment, health and hygiene, transport and tourism infrastructure.

China could consider negotiating an open skies agreement with the U.S. The U.S. ranked eighth in "openness of bilateral air service agreements", much higher than China, which ranked 116. This implies that the U.S. may have benefited more from aviation liberalization.

The Chinese government should improve sanitation and access to clean drinking water in central and western parts of the country.

As reflected by various indicators such as the airport density and the quality of roads, China ought to further develop its air and ground transportation infrastructure.

Hotels and communication facilities, including internet connections and mobile networks in less-developed regions, have to be improved.

To raise the quality of services provided to foreign tourists, China should invest more in training and educating its tourism labor force.

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Chapter 12
U.S.-China Science and Technology Cooperation

Lan XUE
Professor and Dean of School of Public Policy and Management, Tsinghua University

Denis SIMON
Vice Provost, International Strategic Initiatives and Foundation Professor of Contemporary Chinese Affairs at Arizona State University

With contributions by XU Zhanchen (Associate Research Fellow, Department of Strategic Research at CCIEE), Ronald MAK

Executive Summary

Since the second half of the 20th century, global science and technology (S&T) have advanced by leaps and bounds. The U.S. – with its strong foundation of support for S&T development, research and development (R&D) activities, manufacturing capabilities and its comprehensive national talent pool – has been at the forefront of the world's technological revolution, from microelectronics and IT to life sciences and clean energy. China, as an ancient, oriental civilization, has tried to leverage its huge domestic market and strong statist orientation to catch up with the developed countries over the past 30 years. Propelled by Deng Xiaoping's program of economic reform and opening up policy, this effort has gathered increasing momentum and has yielded significant results. The U.S. and China have independently developed their own unique paths in the field of S&T policy and innovation strategy, using their array of competitive advantages and national assets. The interface between the 'high-technology' orientation of the U.S. and China's 'large domestic market' has served as an attractive value proposition for the growth of U.S.-China cooperation across a wide range of scientific fields and industrial sectors.

Starting with the establishment of diplomatic relations between the U.S. and China in 1979, the two nations have witnessed many important achievements in such key fields as energy, agricultural S&T, and wireless communications technology. Looking into the future, based on the evolving patterns of S&T development in both countries, it seems clear that the two nations have many potential opportunities for deepening as well as expanding their bilateral cooperation and collaboration. Moreover, with ample consultation and coordination, the two nations could form a truly unique strategic win-win partnership: American companies operating in China could further enhance the rate of return on their investments, while China could continue to energize its S&T development and accelerate its industrial upgrading. More importantly, enhanced S&T cooperation between the two nations could help both countries reach a useful consensus on a series of critical global issues including renewable energy, food security, climate change and healthcare – thus fostering a more positive sum, collaborative approach to international agenda setting. Clearly, there continue to be many problems and hurdles that plague U.S.-China S&T cooperation, including disputes over intellectual property rights, export control restrictions, trade barriers and most recently, information security. Amelioration of these problems will require nothing less than continuous bilateral engagement, negotiation and dialogue at the highest levels of both governments.

The content of this paper begins with an analysis of the development, priorities and trends in U.S. and China S&T affairs as well as the core S&T strengths of the two nations. The paper then examines the prospects for possible future cooperation, highlighting some of the successes of the past 30 years of S&T cooperation, including a case study in the field of energy. The paper also explores areas of friction and tension in the S&T cooperation process and ends with a series of policy proposals for removing existing barriers and areas of disagreement.

U.S.-China Science and Technology Cooperation

U.S.-China S&T Development: Status and Trends

The overall state of American S&T development

Since the end of World War II (WWII), the U.S. has been the worldwide leader in S&T, whether measured in terms of scientific and engineering personnel, R&D funding and performance, etc. The U.S. has played a demonstrable role in shaping the thrust and direction of global S&T development. Generally speaking, throughout this period, the U.S. has continued to invest steadily in both R&D and manufacturing advancement – despite most recently facing a serious downturn in the global economy and high government deficits. According to the *United Nations Educational, Scientific and Cultural Organization* (UNESCO) *Science Report 2010: The Current Status of Science around the World*, the U.S. not only remains the world's leader in terms of R&D investment and scientific research achievements, but it also remains far ahead of most other countries and economies. U.S. President Barack Obama's administration has indicated its intention to increase the country's R&D expenditure as a percentage of gross domestic product (GDP) from 2.7% to 3%, especially in the fields of clean energy R&D[1, 2]. To further spur on and guarantee continued American technological leadership, the U.S. government announced the following specific measures:

Promote U.S. manufacturing and enhance overall competitiveness
According to the "Advanced Manufacturing Partnership" announced by the U.S. government in 2011, federal funding will reach US$2.2bn for manufacturing sector R&D at the National Institute of Standards and Technology, Department of Energy and the National Science Foundation.

Develop a clean energy economy and create employment for the future
Clean energy is considered to be one of the core industries underlying U.S. leadership in global S&T affairs. Therefore, it is not surprising that it has been given vigorous support by the American government[3]. The designated budget for 2013 was over US$90bn. While very optimistic, the U.S. plans to increase its clean energy generating capacity from the current level of approximately 40% to 80% by 2035; it will also increase basic research in a broad range of fields related to clean energy, including solar energy, wind power, environmental protection, transportation, biochemical products, etc.

Train the next generation of S&T leaders, including training 100,000 S&T teachers for the next decade
To enhance the U.S.' future competitiveness, cultivating ample S&T talent is viewed, by far, as the most important factor and determinant of success. The government plans to educate 100,000 teachers in science, technology, engineering and mathematics (STEM) fields for K-12 (primary and secondary)

1 *UNESCO Science Report 2010: The Current Status of Science around the World*, United Nations Educational, Scientific and Cultural Organization, Paris, 2010.
2 The White House Document "Supporting American Innovation", http://www.whitehouse.gov/omb/factsheet/supporting-american-innovation

3 The White House Document, "Creating the Clean Energy of Tomorrow and Protecting the Environment and Natural Resources", http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy2013omb_ee.pdf

education[4]. Meanwhile, the U.S. is amending its immigration laws to attract and retain more high-tech talent; it is hoping to attract more foreign students with degrees in key S&T fields to remain in the U.S. after they complete their studies, especially at the graduate level.

Continue to increase investment in basic research, create a full-scale technical transformation and develop the jobs of the future

Since the end of WWII, the U.S. has stood in the forefront of technology advances and R&D investment in the world. According to the U.S. Government Accountability Office (GAO) data, the government was projected to invest US$142.2bn in R&D in 2013, about half going to defense research and the rest to support core research institutions, including National Institutes of Health (NIH), National Science Foundation, Department of Energy and National Institute of Standards and Technology. The government has proposed a series of policies and initiatives to bring about a comprehensive transformation of the U.S. technological base, further develop the domestic job market and mobilize a full plethora of resources to support advances in clean energy, wireless communication technology and advanced manufacturing – leading to the overall upgrade of America's industrial foundation and the development of a broad range of new job opportunities. Unfortunately, however, due to the problem of the U.S. budget deficit and its associated impact on available funding to support these stated goals, enactment of President Obama's current and future budgets remain highly uncertain.

Support the biomedical industry

The biomedical industry is known as a 'sunrise industry' and is seen as one of the leading sectors for driving the global economy in the 21st century. The U.S. effort in this area is designed to ensure continued American leadership in this strategically important field. The U.S. government is expected to allocate approximately US$31bn to NIH for basic and applied biomedical research[5]. Biomedical research has the potential to:

- Create new, large-scale employment opportunities;
- The birth of new technologies will help drive enterprises onto a road of sustainable development in this field, bringing more new products to the market and opening up more diversified types of employment for the community;
- Create positive interactions among policymakers, researchers and commercial enterprises; and
- Promote the future onset of the widely coveted new knowledge economy.

Support efforts to increase wireless communications and IT

Wireless communications and IT are widely used in military, commercial and daily life. U.S. leadership in global commercial and economic affairs cannot be separated from its stable, efficient wireless communications technology. The U.S. government initiated the "National Wireless Initiative"[6], to encourage R&D of a new generation of wireless communications technology products, including smartphones, tablet PCs, and innovative hardware and software products and services. Currently, there has been more than US$10bn invested in the so-called "Wireless Technology Innovation Fund" to promote development and application of new, cutting-edge technologies. Developments associated with these funds will play a critical role in U.S.

4 The White House Document, "Preparing a 21st Century Workforce",http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy2013rd_stem.pdf

5 The White House Document "Supporting American Innovation", http://www.whitehouse.gov/omb/factsheet/supporting-american-innovation

6 The White House Document, "President Obama Details Plan to Win the Future through Expanded Wireless Access", http://www.whitehouse.gov/the-press-office/2011/02/10/president-obama-details-plan-win-future-through-expanded-wireless-access; The White House Document, "Remarks by the President on the National Wireless Initiative in Marquette, Michigan", http://www.whitehouse.gov/the-press-office/2011/02/10/remarks-president-national-wireless-initiative-marquette-michigan

economic development in the future – ideally creating many new forms of employment and helping to facilitate the onset of a more efficient and effective networked society.

Become a world leader in nanotechnology and related types of new materials[7]

The U.S. has made an explicit commitment to strengthen ongoing efforts regarding the commercialization of nanotechnology. The key measures include:

- Extending the R& D chain and accelerating large-scale production;
- Addressing the concerns and needs of industry, and speeding up the commercialization process;
- Strengthening infrastructure construction, establishing national equipment suppliers and related support systems;
- Supporting nanotechnology-related small businesses; and
- Enhancing U.S. participation in the field of nanotechnology internationally[8].

Ensure that U.S. military industrial technology continues to be the worldwide leader

Investment in R&D and production equipment for generating advanced military technology is an integral part of the national S&T and innovation infrastructure. America's large military production network supports the global projection of U.S. armed forces along with the development of sophisticated weapons and associated improvements. The military S&T system is also tied to a multiplicity of civilian innovation thrusts, including the high-speed network of satellite technology that serves both defense and non-defense constituencies[9].

7 The White House Document, "The NNI Vision and Strategic Plan", http://www.whitehouse.gov/administration/eop/ostp/NNIStrategy

8 *National Nanotechnology Initiative Strategic Plan*, National Science and Technology Council, 2011.

9 The White House Document "Supporting American Innovation", http://www.whitehouse.gov/omb/factsheet/supporting-american-innovation.

The current status and direction of China's S&T development

In recent years, the continued growth of Chinese government investment in S&T as well as its initiation of a wide range of new policies to support the strengthening of domestic innovation capacity has attracted worldwide attention. Over the past decade, China's R&D intensity has increased quite rapidly, with R&D spending expanding at an annual rate of 20% or more. China has become a major force in promoting the growth of R&D spending among all the nations in the Asia region. It is estimated that in 2012, China's R&D investment reached approximately RMB 1.0 trillion, with R&D expenditures as a share of GDP climbing to 1.83%, thus placing China in the same range of many moderately developed countries[10]. China's output of cited S&T papers in refereed journals and the number of new patent applications have also been growing very rapidly. In addition, the Chinese government has introduced a series of new programs and policy measures to enable Chinese S&T to achieve leapfrog developments in a variety of key fields.

"15-Year National Long-to-Medium-Term Science and Technology Development Plan"

In 2006, the Chinese government issued the "15-Year National Long-to-Medium-Term Science and Technology Development Plan (2006-2020)" (MLP), which represented the first comprehensive national S&T plan since the establishment of China's market-oriented economic system and People's Republic of China's (P.R.C.'s) accession to the World Trade Organization. The MLP articulated a strategic blueprint for China's S&T development over the next 15 years. The plan, which remains in place today, provides guidelines for S&T work up to 2020; it encourages a greater emphasis on indigenous in-

10 Juan Tang, the Ministry of Science and Technology: 2012 China invested one trillion in R&D, up to the level of moderately developed countries, China News, December 24, 2012.

novation and an increase in the R&D/GDP ratio to 2.5% by 2020 – both of which are aimed at allowing China to become an advanced innovative country[11]. The emphasis on indigenous innovation is specifically designed to strengthen the local capacity for innovation among China's enterprises, thus helping to reduce Chinese dependence on foreign technology and helping to ensure that more of the IP needed to support technology development at all levels comes from domestic sources.

The MLP is divided into a series of core tasks as follows:

• Key areas and priority themes
'Key areas' refers to industries that require urgent S&T support to strengthen development of the national economy, society and national defense. 'Priority themes' address selected technology groups in key fields that need to develop a clear strategic development path, an improved technical foundation and greater use of recent breakthrough technologies[12]. The precise key areas and priority themes are:
– Energy;
– Water and mineral resources;
– Environment;
– Agriculture;
– Manufacturing;
– Transportation;
– IT and modern service industries;
– Population and health;
– Urbanization and urban development; and
– Public safety and national defense.

• Cutting-edge technologies
A series of cutting-edge technologies are specified as the building blocks for China's emerging knowledge economy. They include:
– Biotechnology;
– IT;
– New materials technology;
– Advanced manufacturing technology;
– Advanced energy technology;
– Marine technology;
– Laser technology; and
– Aerospace technology.

• Program for basic research
Under the MLP, basic research is to receive enhanced support. The key specified fields identified reflect the problems of cutting-edge science, fundamental research, major national strategic needs-oriented basic research and major scientific research programs.

The key areas and priority themes, the cutting-edge technologies and the program for basic research manifest the overall direction of China's technological development over the next decade[13].

"Decision on Accelerating the Development of Strategic Emerging Industries"

Along with the MLP, to promote the development of industrial technology innovation, China's State Council promulgated the "Decision on Accelerating the Development of Strategic Emerging Industries" in 2010. This important document lays out seven key sectors for emphasis as China restructures its economy away from the traditional manufacturing orientation that dominated economic activity during the 1980s and 1990s. Development of these seven industries must be closely aligned with the requirements of S&T development, the goal being to ensure that underpinning the growth and development of these industries is an enhanced array of domestic innovation capabilities. The specific foci for emphasizing the strategic emerging industries include fostering the development of energy-saving environmentally friendly know-how, a new genera-

11 "*National Medium-to-Long Term Science and Technology Development Plan* (2006-2020)", the State Council of People's Republic of China, 2006.
12 Ibid.
13 Ibid.

tion of IT, biotechnology, high-end manufacturing equipment, new energy technologies, new materials and a new energy-efficient automotive industry.

"12th Five-Year Strategic Emerging Industry Development Plan"

In July 2012, the State Council issued its "12th Five-Year National Strategic Emerging Industry Development Plan", which points out that China must maintain more than 20% annual growth rate across the proposed strategic emerging industries; the stated goal is for these seven strategic emerging industries to account for 8% of GDP by 2015. The priority attached to these seven key industries reflects Chinese assessment of the changing competitive landscape around the world and the fact that the future direction of international competition will be built around advancements in these specific sectors.

"Views on Deepening the Reform of Science and Technology Systems and Speeding Up Construction of the National Innovation System"

In assessing the country's overall progress since the onset of the MLP and the substantial addition of resources to support national S&T development, Chinese leaders have concluded that the net addition of material resources must be accompanied by further reforms in the management and operation of the S&T system at the national and local level. In other words, despite the transition from a situation of resource scarcity to resource abundance, R&D performance has continued to lag expectations. Accordingly, in July 2012, the National Science and Technology and Innovation Conference was held in Beijing. This conference brought together all the major stakeholders involved in China's innovation system; the gathering provided an opportunity for a serious critique of prevailing S&T practices and organization. In September 2012, the CPC Central Committee and the State Council jointly issued a major document entitled "Views on Deepening the Reform of Science and Technology Systems and Speeding Up Construction of the National Innovation System". The document highlights the strategic role of enterprise-driven technology innovation; it also explicitly lays out a number of key emphases designed to shape the direction and thrust of future S&T activities:

- Innovation-driven, services development;
- Stronger focus on corporate innovation and greater stress on collaborative innovation;
- Striking a better balance between government support and market orientation;
- Stronger system-wide coordination and reliance on legal instruments; and
- Adherence to the five basic principles of the reform and opening up, including continued reliance on international cooperation, but with a stronger orientation in the direction of 'win-win' outcomes.

The document also further clarifies the goals paramount to China's S&T development by 2020:

- To build a national innovation system for S&T development based on the principles of a socialist market economy with Chinese characteristics.
- Significantly improve the capacity for indigenous innovation and integrated innovation, as well as enhance capabilities for introduction, absorption and re-innovation.
- Achieve a series of original major S&T breakthroughs.
- Make great leaps in strategic high tech areas of R&D.
- Develop a number of innovations at world class levels.
- Optimize the overall innovation environment.
- Substantially increase the distribution of the benefits of innovation across society and the economy.
- Improve the quality of the national scientific and engineering talent base.

- Improve the capacity of leaders to drive economic and social development at both the national and local level to enable China to become an innovative, S&T nation[14].

The introduction of these policies and measures is designed to provide a strong impetus to the further development of China's innovation capabilities and overall progress in S&T. The clear motivation behind this renewed emphasis on unleashing the necessary forces to support the move to a more innovation-driven economy derives from the realization that not only has innovation become the new watchword in global economic and technology affairs, but also that those countries who fail to seize the high ground in this next phase in global technology advancement will not command a serious position of influence in international relations. The "UNESCO Science Report 2010" has pointed out that the gap between China and the world's S&T advanced nations has been narrowing, especially during the period of the 11th Five-Year Plan. Yet, while it is clear that China is steadily advancing towards its goal of becoming an innovation-oriented country by 2020, it also is facing a highly fluid, highly dynamic global innovation system that does not allow much time for careful pause or reflection.

Accordingly, it also is clear that Chinese leaders, including the new leadership team of President Xi Jinping and Premier Li Keqiang, realize that China is facing many challenges in the process of becoming an innovative country, including developing a still incomplete market environment; further strengthening protection of IP rights; overcoming financing difficulties that support small and medium enterprise-driven innovation; improving cooperation processes among those main organizations charged with supporting China's innovation agenda, including enterprises, universities and research institutions; and putting further investment in basic research[15]. To solve these problems, China must continue the process of S&T reform and opening up and deepen international cooperation in S&T to accelerate and promote the development of China's S&T and innovation capabilities and competencies.

U.S.-China S&T development comparison: Features and advantages

A comparison of U.S. and Chinese S&T planning processes and policies reveals numerous differences. This is not surprising given the readily apparent differences in history, culture, national values and political systems. Most importantly, the continued efficacy of these differences helps to explain both the reasons for some of the disconnects between the two nations in their approaches to innovation as well as the broad range of possible complementarities that hold great potential for forging enhanced cooperation now and in the future. An examination of several of these areas of difference and complementarities brings to the surface several key action points of possible importance to the leaders of both countries.

Overall strengths and level of commitment – superiority of the U.S. and China's rapid 'catch up' trajectory

The U.S. began to strengthen the components of its national innovation system after WWII and remains far ahead of most of the world in terms of past and present levels of S&T achievement. During the period since the mid-1980s, total U.S. national R&D investment has been more than the sum of all other Organisation of Economic Co-operation and Development countries. This huge investment in R&D has helped lay a solid material foundation for America's overall S&T advancement and capabili-

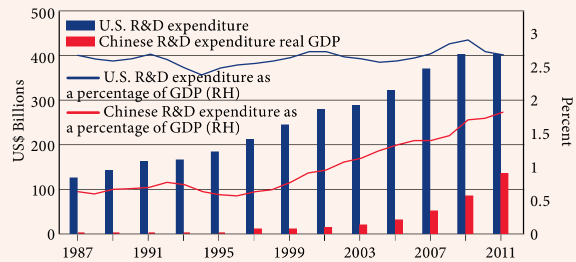
14 *The Opinions on Deepening the Reform of Science and Technology Systems and Speeding Up the Construction of the National Innovation System*, CPC Central Committee and the State Council, September 2012.

15 *UNESCO Science Report 2010: The Current Status of Science around the World,* United Nations Educational, Scientific and Cultural Organization, Paris, France, 2010.

ties. The U.S. has both breadth and depth in terms of its national S&T assets and knowledge base. At the same time, as a mature market-driven nation, generally speaking, the U.S. national innovation system exhibits a high level of overall effectiveness; its universities, national research institutes, enterprises and financial institutions have established a highly effective operating model after many years of practice. In addition, the American IP protection system, the set of antitrust regulations, and unfair competition laws and regulations largely provide a friendly environment for small and medium enterprises to grow and prosper, which helps to promote high-tech entrepreneurship and innovation along with a sustained series of national S&T advances.

China's current version of a national innovation system has been evolving since the period of reform and opening up began. Since the initial reforms were launched in the late 1970s, China's national innovation system has undergone a series of major reforms, including the first major S&T system reform initiative announced in March 1985; the 1999 structural reform of research institutes; and the 2006 launch of China's national long-term S&T development plan. The prevailing structure and operation of China's national innovation system is being shaped in important ways by the nature of the interface between its S&T system and its economic system – both of which are evolving in real-time. The interplay between economic and S&T reform provides the context for shaping the country's R&D environment and driving Chinese S&T development. More specifically, China's enterprises steadily, albeit gradually, are becoming the main drivers for execution and implementation of S&T innovation in China. In fact, across the entire geography of China at all levels, R&D investment is increasing rapidly. In 1996, national R&D investment accounted for 0.6% of GDP; since 1999, it has continued to grow at double-digit rates for several years. In 2011, China became the world's second largest R&D investment country after the U.S. By

Figure 1: R&D Expenditure and Its Share of GDP: A Comparison of China and the U.S., 1987-2011



Source: China Statistics Yearbook, China S&T Statistics Data Book, http://www.sts.org.cn/sjkl/kjtjdt/index.htm, Bureau of Economic Analysis, National Science Foundation

2013, China's R&D investment is expected to surpass RMB 1.0 trillion, accounting for close to 2% of GDP, with 70% of R&D investment provided by enterprises. Of course, quantity is no guarantee of quality, but this substantial addition of financial resources along with modernization of the physical infrastructure and growing Chinese high-end talent pool now offer the P.R.C. a serious opportunity to catch up with the West to a degree that would not have been possible in the past.

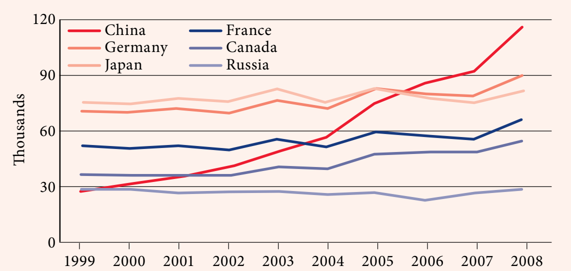
Figure 1 shows U.S. and China R&D investment levels and their respective shares of GDP. It can be said that the U.S. holds a greater advantage in terms of the absolute value of its annual R&D investment. At the same time, starting from a much smaller base and as a country in catch-up mode, China's R&D investment growth rate is leading the U.S. Clearly, the U.S. innovation system is more mature, which while offering many advantages, also presents some unique challenges in terms of introducing new changes into the prevailing system. With its concerted efforts to move sharply and steadily away from its previous reliance on a Soviet-style approach to R&D structure and operation, China's evolving innovation system seems less and less-plagued by prior existing legacy systems and baggage; in some ways, China may be better poised to experiment with new types of innovation models and to adapt itself to the changing requirements for launching and supporting the development of new emerging industries. The differences in the core strengths and system design across the respective innovation systems of the two countries seemingly provides a unique opportunity for both nations to promote new types of cooperation in S&T and create more win-win outcomes.

Basic research – the U.S. has a strong base in basic research while China is continuously strengthening its basic R&D efforts

One of the major objectives of the U.S. government is to maintain its leading position in basic research around the world. The proportion of basic research investment in the U.S. has consistently been relatively high. In 2009, basic research R&D accounted for 19% of total U.S. R&D investment of US$400.5bn, 53% of which has come from federal governmental funds. The bulk of basic research in the U.S. is usually conducted in research universities (53%) and national laboratories (15%). American research universities combine basic research and talent training together in ways that benefit the advancement of new knowledge creation. This is reflected by the fact that since the beginning of the 1950s, more than half of Nobel Prize winners (in fields other than literature and peace) have been from the U.S.

China's basic research has been plagued by a serious lack of investment in the past, with basic R&D investment accounting for around 5% of total R&D spending for many years. In recent years, however, with the implementation of the "Knowledge Innovation Project" and the "Construction of World-class Universities" initiative, China's basic research efforts have made some appreciable progress. The number of Chinese academic articles appearing in key international journals has been growing rapidly. As Figure 2 shows, the beginning of this century, the number of Chinese articles in major international journals placed China well behind most S&T advanced nations; since 2005, however, exclusive of the U.S., China began to surpass other nations and has become the second largest country in terms of the publication of international journal articles.

Figure 2: Annual Publications in Web of Science, 1999-2008



Source: Web of Science

A useful comparison of U.S. and China's basic research activities can be gotten from a review of their respective output of scientific papers. From the point of view of international publications, highly cited papers as well as those published in various respected scientific journals are an important manifestation of the quality and level of scientific research of a nation[16]. From 2005 to 2010, the average annual growth rate of highly cited papers worldwide was 4.9%, with the rate for China being 27.6% and the number of published papers reaching 5,264 (the figure for the U.S. was 56,299) – leaving China ranked seventh in the world. In 2010, China had 145 papers in the three major S&T journals (the figure for the U.S was 2,538), an increase of 84% compared with 2005. In fact, the total number of published papers in the three major journals was 358 less than in 2005, though China had an increase of 66 papers. As for the various world-class leading journals, the total number of published papers in 2010 increased by only 927 compared to 2005; China's increased by 3,406 papers in these journals during the same pe-

16 Highly cited papers are calculated based on statistics over a period of 10 years, and the number cited is ranked in the top 1% of papers in various disciplines; the three leading journals are: Cell, Nature and Science; the 'various leading journals in different fields' refers to these journals which have the highest impact factor. In general, according to Thomson Reuters published in "The Report of Journal Citation", there were 157 leading journals covering various disciplines in 2005; that number increased to 173 in 2010.

riod. In 2010, China published 5,203 papers in the world's leading journals (the figure for the U.S. was 21,296), ranking second in the world. From 2005 to 2010, the average annual growth rate of the number of Chinese papers published in the world's leading journals increased by 23.3%[17].

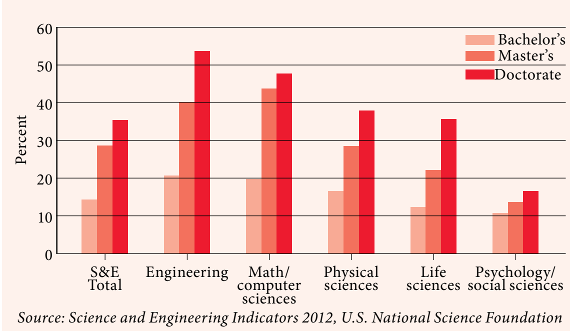
This shows that China's progress in basic research not only is reflected in the total output of scientific papers, but also in the quality of high level papers published in the world's leading journals. Clearly, Chinese scholars have achieved rapid growth in published papers. Nonetheless, compared with the U.S., the quantity of highly cited Chinese papers in the three major and world-leading journals – *Cell*, *Nature* and *Science* – only accounted for 9.3%, 5.7% and 24.4%, respectively of the U.S. totals. Obviously, the gap between the two countries remains considerable. For China to make a demonstrable leap in terms of the international impact of its ongoing scientific research activities, it necessarily will have to close this gap in the coming years. This means China's researchers will have to move into the mainstream of those trans-border, collaborative research networks that are now increasingly defining the cutting edge of new knowledge creation.

S&T Human Resources – the US high-level scientific and engineering (S&E) talent base and its continued dependence on overseas migration versus China's abundant S&T human resources

The supply, demand and utilization of S&E human resources are an important determinant of national S&T development. In general, America's S&E human resources are growing faster than its overall employment growth, though in 2010, the percentage of jobs in this field dropped to 4.9% from a high of 5.3% in 2000 – the first such decline since 1950. Over the past 25 years, the number of S&E human resources has grown sharply, reaching about 6.65 million people in

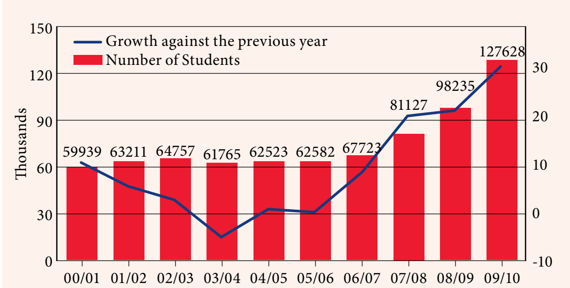
17 Defang He, "The Comparative Study of Chinese High-impact Papers", *China Soft Science*, 2011, issue 9, pp. 94-99.

Figure 3: Percentage of Foreign-born S&E degree holders in the U.S. by field and level of S&E degree, 2008



Source: Science and Engineering Indicators 2012, U.S. National Science Foundation

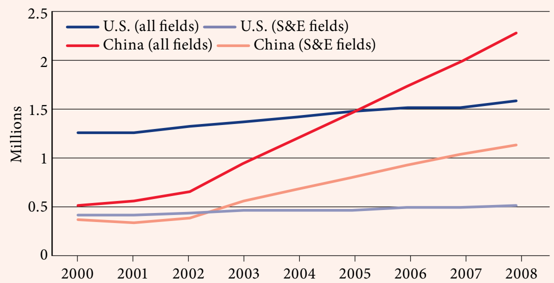
Figure 4: Number of Chinese students in the U.S., 2000-2010



Source: Open Doors: Report on International Educational Exchange, Institute of International Studies

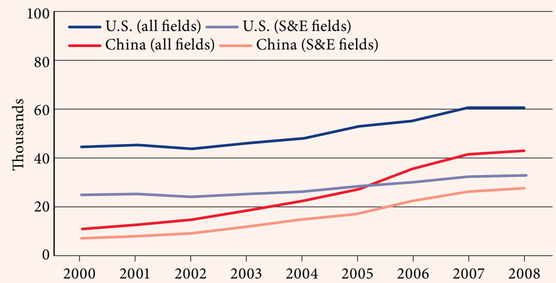
2010. One of the hidden shortcomings across the U.S. S&E human resource pool is the country's apparent dependence on foreign talent migration to meet its need for S&E expertise. The figures above, which are from a survey of American S&E personnel published in 2012, show the statistics for 2008. According to Figure 3, the proportion of foreign-born talent across the different fields and levels of the S&E talent pool is quiet high. For example, in the field of engineering, more than half of the doctoral students, 40% of the master's students and 20% of the undergraduate students are foreign born. It is the same situation in such key fields as mathematics and computer science. Not surprisingly, among foreign-born S&E doctoral students, the percentage of mainland Chinese is quite high. Since the late 1970s, a large number of Chinese students went to the U.S. to pursue graduate degrees in S&E; the overall number has been growing steadily year by year, though there was a decline in

Figure 5: **First University Degrees in the U.S. and China, 2000-2008**



Source: Science and Engineering Indicators 2012, US National Science Foundation

Figure 6: **Doctoral Degrees in the U.S. and China, 2000-2008**



Source: Science and Engineering Indicators 2012, US National Science Foundation

Figure 7: **China's S&T Talent – Current Situation and Development Goals***

Year	R & D personnel (10,000/year)	R & D researchers (10,000/year)	R & D personnel per 10,000 labor force (person/people)	R & D researchers per 10,000 labor force (person/people)	R & D personnel per capita R&D expenditure (10,000s)	R & D researchers per capita R&D expenditure (10,000s)
2008	196.5	105.0	24.8	13.3	23.5	44.0
2015	280	150	33	18	38	71
2020	380	200	43	23	50	100

* *"15-Year National Medium to Long-Term Science and Technology Development Plan (2006-2020)", the State Council of the P.R.C., 2006.*

Source: the Compendium of National Medium-and-Long-Term Plan for Education Reform and Development (2010-2020)

the growth of graduate students in 2012 to 2013. Figure 4 shows the growth of Chinese students studying overseas in the U.S. between 2000 and 2010.

Compared with the U.S., Chinese colleges and universities also have trained a large number of S&E students and technology personnel every year. The number of first university degrees awarded by universities in China has exceeded that by American universities. University enrollment used to be quite low in China until the policy of expansion of college education was implemented in 1999. Chinese universities conferred a similar number of doctorate degrees in S&E fields as their American counterparts in recent years. However, if all fields are taken into account, doctoral degrees offered by U.S. universities still were significantly more than those by Chinese universities (see Figures 5 and 6).

According to the forecast contained in the MLP, the total number of Chinese R&D personnel is projected to increase from 19.65 million in 2008 to 38 million by 2020. The number of R&D personnel will increase from 10.5million per year in 2008 to 20 million per year. And, the percentage of R&D personnel and R&D researchers per 10,000 workers is projected to increase from 24.8% and 13.3%, respectively, in 2008 to 43% and 23% respectively, by 2020 (see Figure 7). China is going to attain new heights in the supply of talent in the fields of equipment manufacturing, IT, biotechnology, new materials, aerospace, marine, ecological and environmental protection, new energy and agriculture technology.

It can be seen from the data above that China already possesses a large S&T human resource pool that have mainly gone through its own training and education system. That said, every year, a growing percentage of China's S&T talent pool head abroad for undergraduate and graduate study; a percentage of this group has decided to remain abroad after completing their studies. This pool of talent helps to support the U.S. need for scientists and engineers, with an appreciable proportion of this group being ethnic Chinese[18]. It must also be recognized that this group has a strong tendency to stay engaged with China's research establishment through special programs such as the "One Thousand Talents Program" as well as through affiliated appointments at various Chinese universities. Many U.S.-based scientists and engineers who are part of the Chinese diaspora have government-sponsored projects in China and are training groups of mainland Chinese graduate students, thus serving as a bridge between the American and Chinese scientific communities.

Space exploration – the U.S. remains the most influential player leading China and the rest of the world

The U.S. has had a commanding position in space exploration since the mid-20th century. It has a long and impressive track record of successful space-related initiatives, such as the launch of satellites, the manned space program, and the Moon and Mars exploration. One of the most influential achievements of the U.S. Space Shuttle is the assembly of the International Space Station that has been serving as a multi-purpose observatory and research laboratory for astronauts and cosmonauts from various countries. China, for its part, has made steady progress in its space capability over the past decade. The number of manned space flights launched by China has grown in recent years, although it still lags behind the U.S. and Russia[19]. 2012 witnessed China's successful manned rendezvous and docking technology with the Tiangong-1 orbital vehicle. However, U.S.-China cooperation in space exploration, whether in the form of policy dialogue on space, information sharing or other joint activities, remains limited.

18 *UNESCO Science Report 2010: The Current Status of Science around the World,* United Nations Educational, Scientific and Cultural Organization, Paris, France, 2010.

19 Jeffrey Logan, "China's Space Program: Options for U.S.-China Cooperation", Congressional Research Service Report for Congress, Sep 2008, http://www.fas.org/sgp/crs/row/RS22777.pdf.

S&T consumer market – America's mature domestic market versus China's large potential market – which has created a dynamic 'market surge effect'

When it comes to the consumer market for high-technology goods and services, the U.S. market remains a relatively stable source of demand, while China, with its large and increasingly prosperous population, provides a potentially huge market opportunity for advanced technology products and services. With the growth of the Chinese 'middle class', there has been an appreciably rapid increase in demand for high-quality, more sophisticated technology products and services in China. It can be seen from the success of Apple products in China that the overall gains in GDP growth have helped drive the emergence of a huge, still-growing consumer market. According to Apple's fiscal report (second quarter of 2012), its revenue in the Greater China region has tripled, reaching a record of US$7.9bn, equivalent to about RMB49.8bn, which accounted for 20% of its total worldwide revenue. During this same period, Apple earned RMB550m in revenues every day from the Chinese market. According to Apple's own market reporting, the Chinese market has a huge and growing demand for the iPhone 5 and iPad 3. The sales total for the iPhone is four times more than the same period last year (data is for the iPhone 4 and 4S). Apple's Mac retail sales have grown more than 60% over the same period. Currently, Apple has over 1,800 Mac retail stores, 11,000 iPhone retail stores and 2,500 iPad retail stores[20]. Even taking into account some of the strong criticism of Apple in the Chinese media during the first several months of 2013, this success highlights the emergence of a 'market surge effect' for sophisticated technology products and the enormous remaining business opportunities for other U.S. firms operating in this same market space.

20 "Apple sales 550 million every day in China; iPhone sales increased 4-fold", *First Financial Daily*, 26 April 2012.

Figure 8: **International Patent Applications and Ranking of Main Countries*, 2006-2010**

2006		2007		2008		2009		2010	
Rank	Applications	Rank	Applications	Rank	Applications	Rank	Applications	Rank	Applications
U.S.	51280	U.S.	54043	U.S.	51637	U.S.	45618	U.S.	44855
Japan	27025	Japan	27743	Japan	28760	Japan	29802	Japan	32166
Germany	16736	Germany	17821	Germany	18855	Germany	16797	Germany	17171
France	6256	Korea	7064	Korea	7899	Korea	8305	China	12337
Korea	5945	France	6560	France	7072	China	7900	Korea	9686
U.K.	5097	U.K.	5542	China	6120	France	7237	France	7193
Netherlands	4553	China	5455	U.K.	5466	U.K.	5044	U.K.	4857
China	3942	Netherlands	4433	Netherlands	4363	Netherlands	4462	Netherlands	4097

* *"Analysis on 2010 PCT Patent Application for World Development Trend and Characteristics of Chinese",* Chinese Inventions and Patents, *2011, issue 5, pp. 33-36.*

Source: Analysis on the 2010 World Trend in PCT Application and China's Features. China Invention & Patent, *2011 (5): 33-36*

Enterprise innovation capability and competitiveness in the international market – U.S. leading enterprises and the steadily expanding presence and growing strength of Chinese enterprises abroad

America's high-technology enterprises retain a strong presence in global markets and continue to offer a range of sophisticated, cutting-edge products and services that define the frontier in many consumer and industrial product categories. U.S. technology-based firms maintain a vast array of core business and technology competencies that afford them leading positions across the world in clean energy, bio-pharmaceuticals, IT, aerospace, high-end manufacturing and military industries. On 4 December 2012, Thomson Reuters ranked the top 100 global innovation companies based on their overall number of patents, patent licensing success rate, global coverage of their patent portfolio and the influence of their patent citations. The U.S. was at the top of the list with 45 American companies (including U.S. governmental agencies). Japan had 25 companies, the E.U. had 21 and South Korea had seven companies.

Chinese high-tech enterprises have been expanding rapidly over recent years. Since 2006, the number of China's international patent applications to the Patent Cooperation Treaty (PCT) has witnessed sustained and rapid growth; China has become the world's fastest growing country in international patent applications over the past few years. China ranked eighth in terms of PCT applications in 2006; it surpassed the Netherlands ranking of seventh in 2007. China then surpassed the U.K. ranking of sixth in 2008 and in 2009, China surpassed France and ranked fifth. In 2010, China surpassed South Korea and ranked fourth in the world. In 2010, there were 12,337 Chinese PCT applications, reflecting an increase of 56.2% over 2009 (see Figure 8). Many Chinese companies such as Huawei, ZTE, CNPC, etc. also are among the leaders on the list of international patent applications. Of course, quantity is no predictor of quality, and there remain some serious concerns among international observers about the commercial value – real and potential – of Chinese patents. Moreover, even with these appreciable increases in IP generation, the fact is that China remains a major importer of new know-how, while the U.S. still retains its leadership position as a generator of commercially relevant new knowledge. In 2009, for example, according to International Monetary Fund data, China experienced a US$10bn deficit in its IP rights balance of payments, while the U.S. had a US$64bn surplus.

Assessment and Stocktaking

According to their different stages of development and the unique characteristics of their respective technology systems, it is not difficult to understand why these two nations might have strong prospects for meaningful, mutually beneficial long-term S&T cooperation, especially if they are able to harness their strong complementary advantages across many S&T fields of common interest. The U.S. potential in the domain of applied S&T is especially strong given its substantial capabilities and extensive experience with the commercialization of research. More specifically, the U.S. could gain appreciable market share in China and seize many emerging opportunities by relying on its acknowledged core competitive strengths; American firms can leverage their potential successes in the Chinese market to enhance their overall competitive positions elsewhere around the globe. China, which once stood at the margins of global competition, now stands center stage; commercial success in China can help supply the revenue needed to help U.S. firms open up new markets elsewhere as well as support existing industries that have been affected by the maturation of markets in the advanced industrial countries. For China, its academic community and business sector are moving through a catch-up period as part of their country's overall S&T development. Cooperation with the U.S. can enhance the overall pace of S&T acceleration and industrial upgrading. It also can help China keep up with the speed of S&T globalization. In addition, Chinese companies can learn from their U.S. counterparts about how to establish a more innovative, forward-looking corporate culture and philosophy. Moreover, through increased contacts and cooperation, China can also deepen its knowledge and understanding of the role and management of technology in driving long-term corporate competitiveness. All of this new knowledge can help facilitate the further transformation of China's economy and society as well as its R&D system.

On the other hand, if these two nations miss these apparent opportunities for extending their cooperation, Chinese enterprises will necessarily have to turn to other corporate and industrial regional partners during this important time in their own technological transition. Given such a possible turn of events, China might begin to view the U.S. in more adversarial terms, viewing the U.S. much more as a strategic competitor rather than as a long-term strategic partner. Catching up with the U.S. could increasingly be seen in zero-sum terms. For the U.S., it would lose an important opportunity to shape and influence the future development of China's economy and S&T system; it also could conceivably lose out on some of the benefits to be derived from closer articulation with the Chinese economy as the P.R.C. moves into its next stages of development. Current differences in understanding and perspective regarding trade protection and export restrictions, in particular, are specific barriers between the two countries that could become a more serious bottleneck to meaningful, sustained cooperation. The tangible and growing levels of economic and technological interdependence between the world's two largest economies is undeniable; they both have shared in the benefits derived from their high level of integration in terms of commercial affairs, academic and S&T exchanges, etc. A souring of the U.S.-China bilateral relationship from a political perspective, would almost certainly transform their engagement from the current, largely win-win orientation to more of a zero-sum game – leaving both countries with many lost opportunities, especially in terms of their ability to work together to address many of the world's pressing problems.

U.S.-China S&T Exchanges and Cooperation: Experience and Future Trajectory

Review of U.S.-China S&T exchanges and cooperation since the establishment of diplomatic relations three decades ago

Formal education exchanges and S&T cooperation between the U.S. and China started in 1979. In January 1979, former Vice Premier Deng Xiaoping and former President Jimmy Carter signed the "US-China Inter-governmental Science and Technology Cooperation Agreement", which has served as an important guiding document for driving S&T cooperation between the two countries for more than 30 years. According to the terms of this agreement, the U.S. and China established a Joint Commission on U.S.-China Cooperation in S&T (JCM); the two countries also signed an equally important agreement to promote and facilitate exchanges in education as well.

As a result of the signing of these documents, China began to select and send a large number of students and S&T professionals to the U.S. for advanced training. Up to 1989, the governments had signed numerous S&T cooperation agreements, protocols and memoranda of understanding involving 27 subareas such as management, transportation, aviation, nuclear and biomedical sciences. Since that time, based on the framework provided by the "US-China Inter-governmental Science and Technology Cooperation Agreement", the two nations have initiated more than 50 cooperation projects, protocols and memoranda of understanding in the fields of high-energy physics, space, atmospheric, marine, medical health, transport and energy. The broad areas of bilateral cooperation include energy, environment, agriculture, basic sciences, IT, S&T policy, transportation, health, medicine, nuclear safety and civil nuclear technology, materials science, metrology, biomedical science, earthquake science and geology, oceans, atmospheric sciences and medicine.

The main mechanisms for carrying out cooperation include collaborative R&D, joint investigations, technology transfer, technology demonstrations, data exchange, academic conferences, technical advice, personnel exchanges, etc. Some important achievements include a Remote Sensing Satellite Ground Station, the Beijing Electron-Positron Collider and the China Digital Seismograph Network[21]. Following the principles of equality, mutual benefit and reciprocity, the two governments have supported continued expansion of the bilateral S&T relationship.

In many ways, the S&T relationship has expanded far beyond the government-to-government ties that were formalized in the bilateral accord; today, U.S.-China S&T cooperation includes universities and their faculty, thinktanks, corporations and many non-governmental organizations. Most important, the S&T cooperative relationship has continued to thrive even in the midst of ongoing disagreements in the political arena; in fact, the S&T relationship has served as one of the most important vehicles for building long-term trust and cross-cultural understanding between professionals from both countries.

Since 2000, in particular, U.S.-China education and S&T cooperation have proceeded at an accelerating pace. Through the JCM and other numerous channels for S&T engagement, both nations continue to seek out new areas for expanding their cooperative ties and have reinforced their commitment to sustain the bilateral S&T relationship. As a result, cooperation now includes such new fields as second generation internet technology, high-energy physics, nuclear physics and magnetic confinement fission, surface water hydrology, electric car and fuel cell vehicle technology development, advanced reactor technology, etc. In fact, it is safe to say that U.S.-China S&T cooperation has become one of the

21 Xinhua Newsagency, "US-China S&T Cooperation", http://news.xinhuanet.com/ziliao/2002-01/28/content_257226.htm

highlights in the overall bilateral relationship and now includes a significant and growing number of active constituencies and committed stakeholders on both sides of the Pacific Ocean.

As suggested earlier, U.S.-China S&T cooperation has helped the two countries overcome many cultural and institutional differences and has withstood the impact of political tensions that have arisen from time to time between Washington and Beijing, including the June 1989 Tiananmen Incident, the 1999 accidental bombing of the P.R.C. Embassy in Yugoslavia and the 2001 EP-3 air collision incident in the South China Sea, etc.

The following highlights some of the major achievements in U.S.-China S&T cooperation in terms of the focus of cooperation, local government cooperation, enterprise R&D initiatives, jointly published S&T papers and monographs, and S&T personnel training.

Focus of cooperation

The two nations have made useful progress in agricultural S&T, clean energy, bio-medicine, wireless communication technology, etc. Taking U.S.-China agricultural S&T cooperation as an example, the two countries signed a formal protocol in 2002 under the umbrella of the overall "US-China S&T Agreement". Within a decade, U.S.-China agricultural S&T had made great strides. A joint working group mechanism was established and seven priority areas of cooperation were identified, including management of natural resources, agricultural biotechnology, agricultural water-saving technology, processing of agricultural products, food safety, dairy production and processing and biofuels. Nine joint research centers were formed. More than 50 international S&T cooperation projects were carried out, more than 100 graduate students and young researchers received training, and a series of high-level international academic conferences and seminars were held. In addition, a broad range of S&T academic exchanges in agriculture have been carried out. The direction of future activities will be in the fields of agricultural biotechnology, water-saving agriculture and gene bank collection technology and practice[22].

Cooperation between the two nations in agriculture has helped U.S. enterprises enter the Chinese market and gain an important share in selected product areas. Also, it has provided unprecedented opportunities for U.S. agricultural S&T and product exports to China. At the same time, China's agricultural production know-how has shown great improvement through the absorption and assimilation of U.S. advanced technology and joint R&D activities. Both countries clearly have benefitted from their strong relationship in the field of agricultural S&T cooperation and it is likely this will continue to be a field that both sides find attractive and mutually rewarding.

Local government S&T cooperation

In addition to national level cooperation, S&T cooperation between local governments has yielded some important results and holds great potential for expansion in the future. Cooperation between local level entities tends to be more complementary, with each side bringing something unique to the table. For example, under the auspices of a collaborative agreement between Qinghai province and the Utah state government, the two sides have become the only U.S.-China Green Partnership approved by the U.S. State Department and China's National Development and Reform Commission (NDRC) in May 2011. The two sides established a formal sister relationship in July 2011 and at the same time, the Provincial/State Governors Forum was held in Salt Lake City. The foci of cooperation include international technology transfer as well as R&D commercialization, both of which are embodied in the joint establishment of a cooperative innovation hub. Under the umbrella of both the national and local cooperation mechanisms, the

22 "Ten Years Achievements of the China-US agricultural cooperation in science and technology", *S&T Daily*, August 22, 2012

two sides have also launched a comprehensive, multi-level, multi-field range of cooperative activities. Breakthroughs in cooperation have been achieved in the fields of IP rights, the establishment of overseas R&D bases, the commercialization of R&D results and technology transfer demonstration projects, etc. Based on the cooperation between Utah and Qinghai, Utah also has developed cooperative relationships with several other P.R.C. provinces, including several provinces in Western China[23].

Figure 9: **Internationally Co-authored S&E Articles – World, China and the U.S., 1995 and 2010**

	1995	2010	Percentage change
World-World	79,128	185,303	134.18%
U.S.-World	36,361	79,581	118.86%
China-World	2,914	24,164	729.24%
U.S.-China	1,112	10,917	881.74%
The share of U.S.-China papers in U.S.-World	3.06%	13.72%	•
The share of U.S.-China papers in China-World	38.16%	45.18%	

Source: Science and Engineering Indicators 2012, U.S. National Science Foundation

Enterprise R&D activities

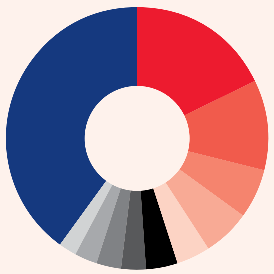
R&D investments into China by foreign multinational companies have grown sharply over the last decade. U.S. multinational corporations have more R&D centers than any other foreign companies operating in China. Currently, there are more than 130 U.S. R&D centers in place in Beijing, which is the top location in China for foreign R&D activity. The U.S. share accounts for about 36% of all foreign R&D centers in Beijing[24]. U.S. multinational corporations also have set up approximately 100 R&D centers in Shanghai, accounting for one third of all foreign R&D institutions in Shanghai – double that of Japan – with 45 R&D centers. Some of the U.S. R&D units operating in China have upgraded their activities from a focus primarily on adaptation of existing products for the Chinese market to a focus on East Asia and even global markets. Some R&D centers are heavily engaged in core S&T research services for international markets, including companies such as HP and the Microsoft Asia Research Center. A large number of U.S. enterprises are growing their presence in China to include R&D centers so that they can reduce their R&D costs and improve the competitiveness of their products. While there is some concern in China about a so-called 'internal brain drain', whereby appreciable numbers of Chinese returnees are choosing to work in foreign rather than local R&D organizations, the fact is that the presence of such foreign R&D centers provides numerous opportunities for positive spillover effects and externalities that are well aligned with China's goal of strengthening the overall domestic innovation system.

Co-authored S&T papers and monographs

Traditionally, the U.S. has always been the most important partner in producing co-authored papers. As Figure 9 shows, the number of co-authored science and engineering papers between China and the U.S. has been growing very rapidly over the last two decades. Specifically, the share of U.S.-China co-authored papers among the total number of co-authored papers of the U.S. with all countries rose from 3% in 1995 to over 13% in 2010. On the U.S. side, China ranks seventh on its list of foreign partners for co-authored papers. In recent years, scientists from both countries have increased the number of co-authored papers in the fields of chemistry, nano-science, and gene and cell biology. Taking nano-science as an example, in 1996, there were only 16 papers co-authored by U.S. and Chinese scientists in this field, while there were 86 by U.S. and German authors, 65 by U.S. and Japanese, and 43 by U.S. and Russian scientists. In 2005, collaborations between U.S. and Chinese scientists ranked first in this field with 293 papers, surpassing Germany with 269 papers, Japan with 202 and South Korea

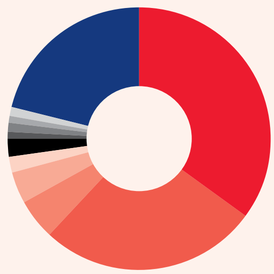
23 Thanks for the information provided from Mr. Hu Xiangqian at "Green Partner" Utah - Qinghai Western Union office.
24 Followed by the E.U. which accounts for about 24%; Japan which accounts for about 20%; and Hong Kong and Taiwan which account for about 10%.

Figure 10: Foreign Undergraduate Science and Engineering Student Enrollment in U.S. Universities, by Selected Places of Origin, Nov 2010



Source: Science and Engineering Indicators 2012, US National Science Foundation

Figure 11: Foreign Graduate S&E Student Enrollment in U.S. Universities, by Selected Places of Origin, Nov 2010



Source: Science and Engineering Indicators 2012, US National Science Foundation

with 195[25]. Increasing numbers of U.S.-China co-authored papers are published in leading academic journals with high impact. This reflects the growing depth of high level U.S.-China S&T cooperation in many scientific fields.

S&T personnel training

The U.S. stands as the most important destination for Chinese students engaged in overseas study. During the 2009-2010 academic year, there were 127,628 Chinese students in U.S. higher education institutions, an increase of 29.9% over 2009. Chinese students accounted for 18.5% of the total number of international students in the U.S., surpassing India – which was 15.2%. China has become the primary source country for international students in the U.S. Chinese students also account for the largest proportion of foreign undergraduate S&E students in U.S. universities (see Figure 10). For foreign S&E postgraduates, China is the second largest source behind India. In 2012, according to the Institute of International Education, the number of Chinese students studying in the U.S. reached over 194,000. While not all of these students are coming from top-tier universities or high schools, a significant proportion are coming from some of China's best schools and colleges, giving the U.S. access to some of the brightest young minds in China. In recent years, with the rapid development of China's economy and the "Introduction of the Overseas High-level Talents Plan", (referred to as the Thousand Talents Program) and other talent attraction policies, the number of Chinese students returning home has started gradually to increase. This cadre of returning talent represents an important catalyst for upgrading Chinese S&T and innovation efforts. Some of these returnees have secured employment with Chinese organizations, while, as noted, a substantial percentage also have gotten jobs with U.S. (and other) multinational firms operating manufacturing and R&D centers in China. Obviously, a portion of these returnees represent an important potential vanguard that will drive China's innovation system in the years ahead.

From an overall perspective, it is clear that both the U.S. and China attach great importance to S&T cooperation. The priority attached to the bilateral S&T relationship is reflected in the fact that S&T cooperation has become a top priority within the U.S.-China Strategic and Economic Dialogue (SED). Both sides have supported the establishment of an ongoing 'U.S.-China dialogue mechanism'. After several dialogues, the two sides have realized some significant outcomes, including the establishment and implementation of a U.S.-China Clean Energy Research Center, the creation of a U.S.-China agricultural innovation program, a U.S.-China initiative for pro-

25 Bihui Jin and Richard P. Suttmeier, *Sino-US S&T Cooperation: Bibliometrics Analysis*, Ministry of Science and Technology major basic research pre-special (2004CCC00400); U.S. National Science Foundation-funded project (0IsE 0440423), 2007.

tection of the environment, bilateral cooperation in health and a U.S.-China natural sciences foundation. These projects have secured about a US$20bn investment from enterprises for projects such as third generation nuclear power, China's UHV transmission, U.S.-China S&T eco-park, and an integrated gas-steam combined cycle (IGCC). The nature of cooperation has gradually but steadily begun to tie together cooperation in S&T with economic and commercial cooperation.

Considering the future of U.S.-China S&T cooperation, there appear to be a range of new popular areas for expanding the ties between the two countries. For example, in the field of third generation nuclear power, the U.S. and China have set up a 50-50 joint venture company to promote the third generation development of nuclear power technology around the world. In the field of IGCC, China appears to have the strongest technology in coal-gas transformation, while the U.S. ranks first in the world in steam turbine technology. The U.S. and China could achieve more in-depth cooperation using the complementary advantages of each country to achieve more 'win-win' outcomes. In addition, if they can overcome their respective political concerns about dealing with global climate change, the two nations potentially have a great deal to gain from expanded cooperation in the fields of carbon capture, utilization and storage (CCUS).

Win-win cooperation: cooperation mode and key areas

While S&T cooperation between the U.S. and China has yielded substantial results over the past decades, looking to the future, there still is plenty of room for new cooperative initiatives between the two countries. From an overall macro perspective, however, there still remains a pressing need to strengthen mutual trust in the political and military realms between Beijing and Washington. Otherwise, more comprehensive cooperation in S&T between the U.S. and China is unlikely to occur. On the other hand, a scenario that sees a reduced level of cooperation from the current level appears to be unlikely as well – unless political tensions flare up over such issues as Taiwan, the South China Sea or cyber security. Such a change would be contrary to the historical trends over the last three decades, would be inconsistent with the high level of interdependence between the two nations and would mark a return to the Cold War mentality that seriously divided both countries between 1949 and 1979. The result would be a major loss for both nations. Accordingly, the more likely scenario is that the two countries will maintain, at a minimum, the existing levels of cooperation (even if there are changes in emphasis) while striving to achieve a breakthrough in terms of the expansion of local cooperation. The possible modes for future expanded cooperation include:

Enterprise-centered Business to Business

Barring any major changes in the international and regional economic environment, American firms are likely to continue their enthusiasm for participating in China's huge domestic market by utilizing their advanced technologies and marketing expertise to capture greater market share. This will further drive 'the market surge effect' within China's consumer and industrial markets in communications and IT, bio-pharmaceutical and other technology-driven industries. Apple and Johnson & Johnson's successful performance in China are good examples of U.S. firms that have been able to enter the Chinese market through a combination of product-driven and market-oriented strategies. Meanwhile, with the increasing prominence of foreign investment by Chinese enterprises around the world, it is quite likely that more and more P.R.C. companies will seek to invest in high-tech fields in the U.S. The U.S. and Chinese governments will need to negotiate a more normalized path to reduce barriers to such investment and to allow the market mechanism to play the primary role for screening potential investment projects. Chinese enterprises, such as Huawei and ZTE, should pay ample deference to the U.S. government's concerns about national security and fully cooperate by providing ample information about their firms and their operations. Both governments as well as those firms involved will need to ensure greater transparency on a regular basis as well as balanced treatment of all parties in general.

Official cooperation mode actively promoted by governments at all levels

Government promotion is another important factor in achieving meaningful bilateral S&T cooperation. Government promotion is not limited necessarily to the level of the U.S. federal government or the Chinese central government; policies to promote cooperative and business opportunities by state and provincial governments are also critically important. For example, the U.S. and China can use a multi-level government-level approach to advance agricultural cooperation, environmental protection and clean energy. The U.S., for example, has multiple opportunities to promote U.S. technology transfer to China to help solve the P.R.C.'s food security problems and to better tackle the problems of global climate change as well as other similar global issues. The advantage of broad-based government promotion is that it is led by government agencies at all levels to encourage participation of specific targeted groups or geographic areas. However, this mode of cooperation must ensure that it is sustainable. Incentives to attract the required types of private sector and academic participants must be well designed to ensure that there are meaningful gains for both sides from the proposed cooperation.

Cooperation between U.S. and Chinese universities and research institutes

U.S. universities and research institutes engaged in overseas S&T cooperation can be divided into two categories. First, there are those who are driven by government-led promotion efforts; they often are attracted by some type of project-oriented cooperation in a specific research field. The second category of participants often engage in cooperative activities that emerge opportunistically rather than through a concrete plan or promotional effort. Within the framework of U.S.-China S&T cooperation, the first form of cooperation accounts for the majority of cases; they tend to be highly targeted, have strong resource support and thus usually yield more substantial results. Within the Clean Coal Technology League formed under the framework of the U.S.-China Energy Efficiency Alliance, for example, the U.S. side is represented by a group of universities and research institutes – led by the University of West Virginia – that also includes the University of Kentucky, the University of Wyoming, the Los Alamos Laboratory, the Lawrence Livermore International Laboratory, the U.S. National Energy Technology Laboratory and the World Resources Institute. The Chinese side is led by Huazhong University of Science and Technology in Wuhan, with the other participants including Tsinghua University, Zhejiang University, Shanghai Jiaotong University, the China University of Mining and Technology, Northwestern University, Jinan University and the Shaanxi Energy and Chemical Research Institute.[26] American universities and research institutions have core strengths in the R&D area; these advantages form the crux of their attractiveness within the framework of U.S.-China bilateral cooperation. Through this approach to cooperation, the two sides are working together to address critical global energy issues; they are leveraging outstanding S&T talent from both the U.S. and China. In addition to developing a mutually productive dialogue and participating in world class R&D activities, both sides hope to achieve substantial technical progress that results in meaningful commercial breakthroughs.

It is not difficult to recognize from the above discussion that the focus areas and priorities select-

26 China's Ministry of Science and Technology, "US-China Clean Energy Research Center 2011 Annual Report", 2011.

ed for bilateral cooperation have a strong linkage to the key fields and sectors mentioned in China's MLP. As noted, the MLP gives strong emphasis to advances in agriculture, clean energy, bio-medicine, communications, IT and other key industries – all of which are specific S&T strengths in the U.S. As suggested earlier, America's advanced technology base, combined with China's huge 'market surge' can yield significant benefits to both sides; clean energy, bio-medicine and nanotechnology are the 'Blue Ocean' sectors for U.S. and China cooperation in the 21st century. If properly managed and kept reasonably insulated from the often cantankerous ebb and flow of political relations, U.S.-China S&T cooperation can bring substantial benefits to both countries and the world as a whole.

Case study: U.S.-China energy cooperation – mutual benefit and win-win cooperation

With respect to the promotion of clean energy technologies, the U.S. and China share a plethora of common strategic and economic interests. The U.S. and China both face many common challenges in the energy field; both countries recognize that safe, economical and clean energy is extremely important to their future economic prosperity and sustainability. To address their common challenges, the U.S. and China have recognized the need to adopt a forward-looking energy strategy based on harnessing the potential gains from joint research and technological innovation. The future economic growth and development of the two countries depends heavily on the use of innovative production techniques and the efficient use of clean fuel and clean electricity; energy S&T cooperation between the two countries has the potential to create a series of mutually beneficial outcomes and win-win results[27].

The U.S.-China Clean Energy Research Center (CERC) is a consortium that was established in 2009 as a joint effort between the U.S. and Chinese governments. The center was inaugurated to build a solid platform to deepen U.S.-China cooperation in energy S&T; its existence reflects the strategic importance that both countries attach to collaborate on approaches for developing new and clean energy technologies. Under the CERC framework, both sides have confirmed the center's three core components: industry, education and research. The core areas of cooperation include the Advanced Coal Technology Consortium (ACTC), the project on Building Energy Efficiency (BEE) and the Clean Vehicle Coalition (CUC); the two countries have invited nearly 100 companies, universities, research institutes and national laboratories to participate in the work of the three units.

The CERC is actively engaged in the process of developing clean coal technology, building energy-saving technologies and clean vehicle technology; these technologies are the core elements of the two countries' respective energy strategy. These technologies will ensure a cleaner, more energy-efficient future for the U.S. and China by reducing dependence on imported crude oil, improving air quality, promoting economic growth by reducing energy costs and also reducing total global energy production and use – all of which will have a positive impact on the overall global environment[28].

While the work of CERC only formally began in 2011 – after the completion of a path-breaking, major agreement on IP rights – the center already has produced some tangible achievements, including the following:

- The formation of a strong management system, including the establishment of a formal leadership and supervision mechanism;
- Development of a detailed implementation plan

27 Ibid.

28 Ministry of Science and Technology Evaluation Center, "Mid-term Evaluation Report of the U.S.-China Clean Energy Research Center", 2012.

that was drawn up jointly to strengthen overall coordination;

- Outline of a joint investment program for the private sector and the respective governments;
- Promotion of a series of long-term research partnerships; and
- Output of a collection of significant technical results in terms of both R&D and pre-commercial technologies.

The total investment by the U.S. and China will reach US$150m spread over five years[29]. Clearly, this is a relatively modest investment; what is more important is the chance to prove the long-term utility of meaningful and deeper S&T cooperation. CERC will promote collaborative approaches in clean energy technology research, development and commercialization. With complementary advantages in both technology and talent, the jointly managed center will help the two countries ensure a prosperous future by reducing dependence on fossil fuels and expanding reliance on clean, efficient new types of new energy.

Problems and Frictions in U.S.-China S&T Exchanges and Cooperation

Due to the apparent differences between the sociopolitical systems and development experiences of these two continental-sized economies, it is probably inevitable that a number of significant frictions and tensions have emerged in the context of their overall bilateral scientific and technological exchange and cooperation activities. In many respects, these frictions can be considered quite normal and understandable as the two countries hold different values and priorities as a result of their different histories and cultures. At the same time, it is essential that the two countries also do not allow their disagreements to damage the overall potential for expanded bilateral engagement and cooperation; this necessarily will require the two countries to use wisdom and common sense to negotiate and explore mutually acceptable solutions to pressing problems so that they are not allowed to spiral out of control.

Towards this end, and to promote deeper and more extensive exchanges and cooperation between the two countries in the field of S&T, following some preliminary efforts in 2008 and 2009, in October 2010 the U.S. and China formally inaugurated an ongoing 'innovation dialogue' that is held annually in alternate years in Beijing and Washington D.C. The dialogue involves the joint participation of both governments as well as representatives from industry and academia. The dialogue serves as a platform for frank, in-depth discussions regarding issues of mutual concern regarding innovation-related topics. A key aspect of the innovation dialogue is the inclusion of a joint group of 'innovation and S&T policy experts' that, broadly defined, meet and exchange views regarding specific problems and challenges in U.S.-China S&T relations. The so-called 'expert group' is also responsible for conducting in-depth policy-related research and analysis as well as offering recommendations for ameliorating obstacles to future U.S.-China cooperation. So far, the innovation dialogue has achieved fruitful results; it has become one of the new mechanisms for enhancing the quality and depth of U.S.-China S&T exchanges and cooperation. Moreover, as part of the SED, it has helped ensure that S&T issues are integrated at the highest levels into the larger fabric of the overall bilateral political relationship. And, while the initial outcomes of the innovation dialogue so far have been somewhat limited up to now, it is clear that this type of mechanism will become an increasingly significant part of the bilateral relationship as collaborative research in basic, applied and commercially oriented fields continues to grow and deepen over the coming years.

29 Ministry of Science and Technology of China, "U.S.-China Clean Energy Research Center 2011 Annual Report", 2011.

Through this channel and other new forms of exchanges, both sides have enhanced their mutual understanding of each other's innovation policies and practices, reduced areas of difference and increased consensus, albeit gradually. Yet, at the same time, in a number of areas, there remain fundamental, seemingly intractable differences in understanding and perspective. From the U.S. point of view, the main issues[30] include:

- Concerns that China's innovation policies are dominated by too much formal and informal government intervention. There is an ever-present anxiety among many American policymakers and corporate officials about Chinese policies – past and present – that promote greater indigenous innovation through preferred government procurement and related regulations essentially discriminate against foreign enterprises.
- China's government lacks sufficient commitment to the enforcement of IP rights protection and the P.R.C. government is using unfair pressures to 'force' foreign enterprises to transfer technology as a price for market access.
- Steadily growing concerns across government, industry and even academia about cyber-security violations and industrial espionage.

From China's perspective, the main issues include:

- The U.S. remains unwilling to reduce many of the remaining Cold War-linked restrictions on high technology exports to China. Chinese officials believe that the U.S. should fulfill its promise to lift current controls on high-tech exports to China as soon as possible[31].
- Existing 'controls' on investments by Chinese enterprises in the U.S. economy are highly discriminatory and are often political rather than substantive in nature[32].
- The fields and content of U.S-China S&T cooperation should be made broader and deeper, for example, cooperation in space technology.

Nevertheless, despite such concerns from both sides, U.S.-China cooperation in S&T seems to have remained as one of the hallmarks and anchors of the U.S.-China relationship. During the third round of the SED held in 2011, for example, the two sides agreed to expand cooperation in selected fields, including energy, environment, transportation, climate change and S&T. The two governments signed the "Comprehensive Framework for Promoting Strong, Sustainable and Balanced Growth & Economic Cooperation". During the SED, the U.S. and China reached several specific agreements regarding energy, agreeing to work under the existing frameworks, including the "China-U.S. Energy Cooperation Projects", "China-U.S. Renewable Energy Partnership" and "China-U.S. Shale Gas Cooperation Memorandum of Understanding". They also committed to carry out cooperation regarding the smart grid, the development of large-scale wind power, natural gas distributed energy, shale gas and aviation biofuels, etc. and also agreed to share energy regulatory experiences and related practical information. From the list of 48 key outcomes announced by both sides from the SED, 15 are directly related to energy cooperation; the two sides also signed agreements for six new green partnerships.

Policy Recommendations

1 U.S.-China cooperation in S&T has continued to play an important role in the U.S.-China bilateral relationship during the past several decades. Cooperation and collaboration in the S&T sphere

30 US concerns about indigenous innovation policies, IPR protection and cyber security are addressed in more detail in Part II, Chapter 14.
31 High tech export control issues are addressed in more detail in Part II, Chapter 9.
32 China's concerns about possible politicized and unfair treatment of Chinese investments in the US are discussed in more detail in Part II, Chapter 13.

remains one of the cornerstones of overall cooperation between the two countries. Given present trends regarding the globalization of innovation and cross-border R&D growth, U.S.-China S&T cooperation promises to play a unique and important shaping role, with respect to the onset of a new foundation for sustaining the U.S.-China bilateral partnership. Accordingly, both governments and their senior leaders need to recognize the actual and potential strategic importance of deepening U.S.-China S&T cooperation.

2 The U.S. and China remain highly complementary in terms of their respective S&T capabilities. The existing complementary mix of skills and available resources holds great potential for expanding the breadth and depth of U.S.-China cooperation in S&T. At the same time, there are some serious differences and frictions between the U.S. and China in the area of S&T cooperation that simply cannot be glossed over. Both sides should pay attention to and take positive measures to strengthen serious communication and understanding, seek common ground while reserving differences and strive for cooperation that is less hierarchical and more oriented in the win-win direction. Even though this may seem like a lofty goal, it reflects the new realities of China's rise and the changing complexion of the bilateral relationship in all areas of importance.

3 The U.S. and China should promote new forms and patterns of scientific and technological cooperation in key areas. These new approaches to cooperation need to be based on a shared understanding of the characteristics of various industries, greater emphasis on market-oriented models and a greater willingness to take advantage of America's established and recognized strengths in marketing, distribution and promotion, and China's availability of investment resources. Strong emphasis should continue to be given to the solid relationships that already have been built in the field of agricultural S&T, clean energy and environmental management; enhanced importance should be given to such fields as healthcare, life sciences and medicine, where both nations face many challenges and could benefit from more knowledge sharing.

4 There is great potential for U.S.-China cooperation in space exploration. The U.S. Space Shuttle has been retired from service since it accomplished its final flight in July 2011. At present, Russia is the only participating country in the International Space Station (ISS) program that is capable of transporting U.S. astronauts to and from the Low Earth Orbit. As some experts have stressed recently[33], it may be more efficient for the U.S. to maximize its utilization of the ISS given that the assembly of the station is now complete. To achieve a higher utilization rate, the U.S. could consider cooperating with China in order to gain additional access to the station. In this regard, the U.S. may wish to consider inviting China to join the ISS program, and offering assistance to China to adapt its Shenzhou Spacecraft to become compatible with the station.

We share the view of George Abbey and Leroy Chiao[34] that "a partnership with China could be developed along the same lines as was done with integrating the Russia space program into the ISS partnership". Under this cooperation model, no U.S. militarily sensitive technology of the U.S. would be transferred to China. China's growing space budget supported by its rapid economic growth allows it to not only fully fund its own space programs, but also to bear a larger share of the expenditure involved in joint projects with the U.S. The U.S. is therefore expected to incur only minimal monetary and implicit costs in cooperating with China in space exploration.

33 George W.S. Abbey and Leroy Chiao, "Time for the U.S. to Partner with China in Space?", December 2012, http://news.discovery.com/space/private-spaceflight/opinion-nasa-partner-china-politics-spaceflight-gap-121127.htm
34 Ibid.

A successful joint U.S.-China manned space flight could have great symbolic value and political significance in both countries. Closer bilateral cooperation in space could enhance mutual trust between the two countries by improving the transparency of each other's space policies and goals. It also would allow further leverage to each other's apparent technological complementarities as noted throughout this article.

What space program partners of the U.S. and space experts say

Dr Joan Johnson-Freese

a professor of national security affairs at the Naval War College and the author of many books and journal articles on space programs and cooperation, shared her views with CNN on 20 June 2012.

"The United States largely knows what space technology China possesses, but it doesn't know what China's intentions are. The United States should try to better understand China's space goals.

However, NASA is prohibited by law from working with China. This makes no sense. If one believes that China and the United States are not inherently enemies, then working together on space projects – with technology transfer controls – will benefit both countries. If one believes that China is inherently a threat to the United States, then the adage 'keep your friends close and your enemies closer' comes to mind.

The script for U.S.-China relations – and space relations in particular – is constantly evolving. The United States can influence the direction, but only if we engage and persuade the Chinese to engage with the U.S. It's one way of preventing a scenario of a galactic Wild West in which China has become the world's leader in space."

At the ISS Heads of Agencies Meeting on 1 March 2012 in Canada, two leaders of space agencies commented on the cooperation with China in space exploration:

Vladimir Popovkin, General Director of the Russian Federal Space Agency, believed that China will collaborate with the five current partners – the United States, Canada, Japan, Russia and the European Space Agency – in the coming future. "We are not a closed club; our doors are wide open", he said.

Jean-Jacques Dordain, Director-General of the European Space Agency said, "I am in favor of seeing how we can work together with China. It will take some steps, but it will come, I am sure. … This is not a closed partnership, it is an open partnership and anyone who can help support this partnership is more than welcome," he added.

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Joan Johnson-Freese, "Will China overtake America in space?", CNN, June 2012 http://edition.cnn.com/2012/06/20/opinion/freese-china-space

Herald News, "Space station 'not a closed club,' would welcome China, India", March 2012 http://thechronicleherald.ca/canada/69141-space-station-not-closed-club-would-welcome-china-india

5 The U.S. and China should continue to utilize and improve the consultation mechanisms built into the U.S.-China Joint Commission on Science and Technology Cooperation; continue to support, deepen and institutionalize the U.S.-China innovation dialogue through expanded high-level bilateral exchanges and communication; provide greater exchanges of experts in the field of S&T policy and development strategy; and engage in a deeper and broader array of interactions regarding the dynamics of emerging industries. All of these actions will help guide U.S.-China S&T cooperation in directions and fields that explicitly benefit not only each other, but also the rest of the world.

6 The U.S. and China should initiate a dialogue to examine their common interests regarding globalization of the pool of high-end talent, further encourage the exchange of visits by scientists – junior and senior – from the two countries, carry out truly collaborative joint research projects and identify new ways to work together to train the next generation of S&T personnel and teachers. The importance of exchanging ideas about 'the global talent pool' promises to become more pressing in view of proposed changes in U.S. immigration policies and regulations.

7 The U.S. and China should further strengthen exchanges and dialogue regarding IP protection and information security, establish more effective communication channels for exchange of information and data, and strengthen the strategic foundations of mutual trust by exhibiting a willingness to take on sensitive issues – for example, on cyber security – that potentially threaten the integrity of the bilateral relationship. In response to ample progress on this front, the U.S. and China should enter into an explicit dialogue regarding the potential reduction of high-tech export controls and the removal of unwarranted trade barriers. In this regard, the U.S. needs to acknowledge the broad implications of China's rise as a global power, while China must understand that with greater power comes increased responsibilities and obligations on a regional and global level.

8 The U.S. and China should consider establishing bi-annual bilateral S&T expos in each country, intensify knowledge about the positive outcomes of U.S.-China S&T cooperation, and work together more closely to promote public understanding of the S&T achievements taking place in the U.S. and China. The two countries also need to identify mechanisms to ensure the emergence of a new generation of China S&T policy experts on the U.S. side and U.S. S&T policy experts on the Chinese side. Regular meetings and exchanges among such 'expert groups' should become a regular feature of their bilateral engagement.

9 Finally, the U.S. and China need to recognize that as they grow the level and extent of their S&T cooperation, the increase in the number of touch points between the two countries will need to be accompanied by a concomitant focus on quality and effective project management. In some cases, some exchanges between the U.S. and China have proven to be less than rewarding or successful because of mismanaged expectations, cross-cultural misunderstandings, and excessive government red-tape or communication problems. Recent efforts at cooperation in geology, mapping and seismic evaluation, for example, have run into an assortment of snags that have left both sides wanting, especially in terms of access and the overall productivity of their fieldwork. Both countries need to do a better job in putting concerns and issues – security or otherwise – on the table before specific exchanges begin so that neither side will be disappointed in the results of their collaboration. Fortunately, these types of problems have not dominated the overall S&T relationship, but their sporadic presence is a bothersome reminder that adequate preparation must precede all projects and programs.

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Chapter 13

Facilitating Cross-Border Direct and Portfolio Investment

John ZHAO
Founder and CEO, Hony Capital
Executive Vice President, Legend Holdings

With contributions from Nicholas KWAN, WANG Peng, WANG Tianlong, ZHANG Huanbo

Executive Summary

China and the U.S. are among the world's largest investment hosts, as well as sources of cross-border direct and portfolio investments. The stock of U.S. direct investment in China amounts to six times China's direct investment in the U.S., while China's direct investment in the U.S. has begun a rapid increase in recent years, as China's economy continues to develop and with Beijing pursuing a 'go global' policy. Although Sino-U.S. cross-border investment has experienced significant growth over the past five years, U.S. and China's mutual foreign direct investment (FDI) only constitute a small part of each country's total outward FDI, indicating significant room for further growth.

Recent Chinese investment in the U.S. also shows positive trends: greenfield investments account for the majority of deals by volume relative to mergers and acquisitions (M&A); the investment focus is diverging from traditional resource and trade, looking to manufacturing and value-added services; and the private sector is becoming an increasingly important source of Chinese FDI in the U.S. A special feature of many Chinese investors in the U.S. today is that they are looking to mobilize the technology, resources and management knowhow from the U.S. to develop the market back home in China.

For both the U.S. and China, increased bilateral openness to cross-border investment is mutually beneficial for several reasons: cross-border investments provide capital, create jobs, allow firms to operate more efficiently globally, and reduce production costs and consumer prices. In addition, global integration increases consumer welfare by promoting specialization, achieving greater economies of scale and encouraging healthy competition in the marketplace. Moreover, increased economic cooperation is critical to continuously improving mutual understanding between the two countries and promoting mutual openness.

China's cumulative direct investment overseas is projected to reach US$1tr to US$2tr in the next decade. Annual flows of Chinese investment to the U.S. are likely to exceed U.S. flows to China in the next few years. At the enterprise level – thanks to the transformation of China's economic development pattern, including industrial upgrading and the 'go global' strategy – securing resources, improving global competitiveness, and seeking new markets and strategic assets will become increasingly important drivers of China's investment abroad.

Yet obstacles to the bilateral investment flows remain, with some real, while others perceptional. These include concerns about investments being rejected on national security or strategic industry grounds; operating in an uneven playing field; non-transparent and discriminatory regulations; tight visa restrictions; lack of communications and trust; cultural differences; and interference from domestic politics.

To facilitate bilateral investment flow between China and the U.S., both governments are advised to adopt fundamental changes in strategic thinking and approach. Specific suggestions include, but are not limited to:

- Promoting understanding and bilateral ties through mutual investment review process and cultural exchange.
- Systemizing the promotion of investments via the establishment of local investment promotion agencies and investment funds.
- Improving investment climates in both nations by increasing transparency and the level of com-

munication of investment regulations, removing administrative restrictions, as well as strengthening the commitment to and application of non-discriminative investment rules.

- Increasing cooperation in financial market development and reform to ensure economic growth and facilitating portfolio investment.
- Leveraging Hong Kong's close connection to both economies and using its expertise in international finance.

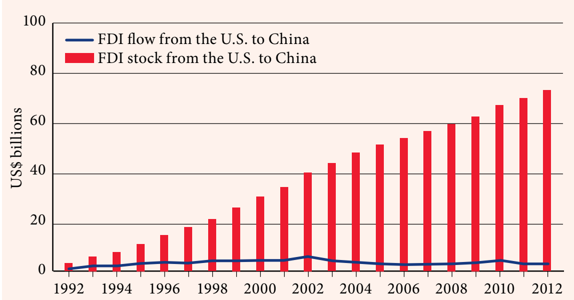
Facilitating Cross-Border Direct and Portfolio Investment

Present State of Direct Investment Flows between the U.S. and China

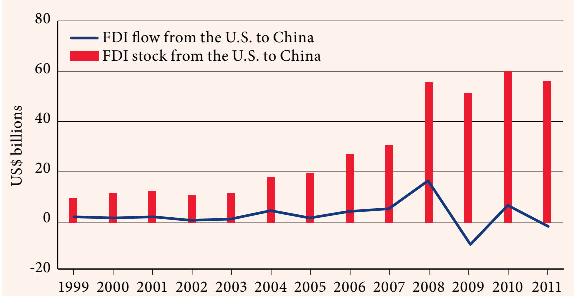
The U.S. was the world's largest host and source of foreign direct investment (FDI) in 2011, while China was the second largest host and seventh largest source[1]. Latest statistics show that China was the world's largest destination of FDI in the first half of 2012[2]. The global financial crisis hit FDI flows in both countries in 2008/09. But they have started to rebound in 2010, though FDI flows to the U.S. have yet to recover to their pre-crisis level.

The U.S. was an early direct investor in China since China's opening up and reform, with the first FDIs made in the mid 1980s. Chinese direct investment in the U.S. probably began in the late 1990s. The U.S. Department of Commerce and the Chinese Ministry of Commerce (and its predecessors) maintain statistics on the flows and stocks of bilateral U.S.-China direct investment. However, the two sets of data often do not completely agree.

Figure 1: **The Net Flow of U.S. Investment in China**



Source: Chinese Ministry of Commerce



Source: U.S. Bureau of Economic Analysis

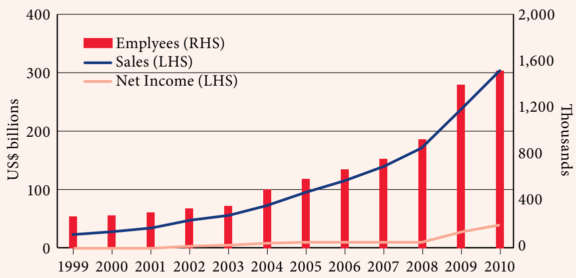
U.S. direct investment in China

U.S. companies have been investing heavily in China for over three decades and held 61,000 direct investment projects in China in 2011, set up over 20,000 enterprises, affiliates or joint ventures (JVs), and employed hundreds of thousands of Chinese workers. By 2011, the stock of U.S. investment in China amounted to US$70.1bn, 7.8 times larger

1 "China has been the world's largest destination of foreign direct investment in the first half of 2012". United Nations Conference on Trade and Development (UNCTAD), *World Investment Report 2012: Towards a New Generation of Investment Policies*, United Nations, 2012.

2 "Foreign Investment in China: A Tale of Two Statistics", Thilo Hanemann, Rhodium Group, 4 January 2013.

Figure 2: Contribution of U.S. Investments to China's Gross Domestic Product and Employment



Source: U.S. Bureau of Economic Analysis http://www.bea.gov/international/xls/all_affiliate_cntry.xls

Figure 3: Top 10 U.S. enterprises investing in China

Rank	Enterprise
1	Exxon Mobil
2	General Motors
3	Intel
4	Caterpillar
5	Walmart
6	General Electric
7	Coca Cola
8	Procter & Gamble
9	Goldman Sachs
10	Ford

Source: China's Ministry of Commerce, 2012

than Chinese investments in the U.S.[3] This reflects U.S. strength in funding and technology and China's comparative advantage in labor cost and its considerable market potential.

Nevertheless, FDI flows from the U.S. to China have been declining in recent years (see Figure 1), with U.S. direct investment in China amounting to US$4.1bn in 2010, but dropping to US$3bn in 2011, according to the Chinese Ministry of Commerce[4]. This was mainly due to China's slower economic growth in recent years, various concerns expressed by American companies about the investment climate in China and, more importantly, the increasingly tough competition and sometimes excessive capacity in more and more industries in China. Despite this, an annual survey conducted by the United States-China Business Council (USCBC) shows that 89% of U.S. firms operating in China realized profitability, 66% saw their 2011 revenue from businesses in China increase by double digits, 75% expected 2012 revenue to increase and 66% planned to increase investment in the next year[5].

FDI from the U.S. accounted for 9.5% of China's overall FDI stock by the end of 2011[6]. According to the U.S. Bureau of Economic Analysis (BEA), there were 1,189 U.S. shareholding companies in China with total sales of US$304bn and net income of US$39bn, and they employed 1.541 million workers in 2010[7]. According to the Research Institute of China's Ministry of Commerce, U.S.-invested companies in China paid US$14.9bn in taxes in 2010 and employed 1.842 million people. In addition, China has benefited significantly from FDI through both the 'spillover effect' and 'discipline effect'[8], highlighted by the fact that U.S. companies have set up over 250 research and development (R&D) centers in China.

China's direct investment in the U.S.

Chinese direct investment in the U.S. is only a recent phenomenon, with an accumulated stock of about US$9bn[9]. However, the balance of investment

3 Sourced from China's Ministry of Commerce (MOFCOM). Since U.S. and Chinese investment data are not completely consistent, if not otherwise specified, all data of two-way investment stock and flow in this chapter are quoted from MOFCOM (Chinese official source). According to the BEA, the investment stock from the U.S. to China amounted to US$54bn.

4 According to the BEA, the amount of U.S. net investment flow in China declined by US$1.6 bn.

5 "USCBC 2012 China Business Environment Survey Results: Continued Growth and Profitability; Tempered Optimism Due to Rising Costs, Competition, and Market Barriers", USCBC, 2012. This is conducted every year to survey member companies of USCBC to gauge business climate in China and to assess the top concerns of doing business in China.

6 According to *2012 World Investment Report* from UNCTAD, the total stock of Chinese inward direct investment amounted to US$712bn in 2011.

7 These statistics only count the affiliates with assets, sales or net income greater than US$25m http://www.bea.gov/international/xls/all_affiliate_cntry.xls

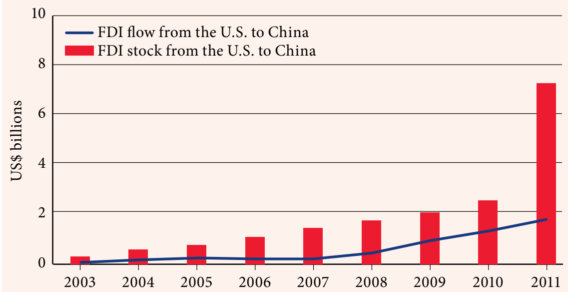
8 "The benefit analysis and future outlook of Sino-U.S. trade cooperation", The Research Institute of the Ministry of Commerce, October 2011.

9 Data sourced from the US BEA.

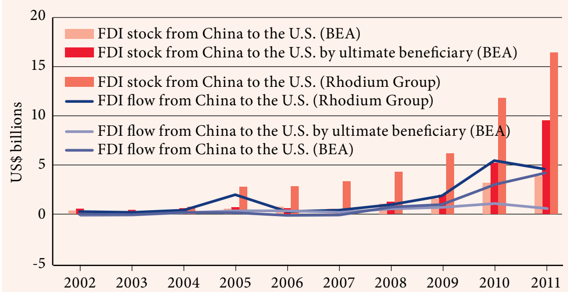
flows between the U.S. and China is changing, with rapid growth of Chinese direct investment into the U.S. but slowing U.S. flows to China. Chinese direct investment in the U.S. increased almost 28 fold between 2003 and 2011 – from US$65m to US$1.8bn[10]. When accounting for flows through offshore financial centers, the increase was even more significant: by nearly 1300% over five years, according to U.S. data[11]. According to statistics compiled by the Rhodium Group[12], the amount of Chinese investment in the U.S. reached a record US$6.5bn in 2012. Chinese companies operated in at least 35 of the 50 U.S. states in 2010 (see Figure 4)[13].

10 Data sourced from MOFCOM.
11 The BEA figures are likely to be underestimated because they do not account for flows through offshore financial centers. "Foreign Investment in China: A Tale of Two Statistics", Thilo Hanemann, Rhodium Group, 4 January 2013.
12 "Foreign Investment in China: A Tale of Two Statistics", Thilo Hanemann, Rhodium Group, 4 January 2013.
13 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment," Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center for Scholars, May 2011.

Figure 4: The Stock and Flow of China's Investment in the U.S.



Source: Chinese Ministry of Commerce



Source: U.S. Bureau of Economic Analysis, Rhodium Group

Case Study: General Motors

General Motors (GM) is one of the earliest foreign automobile makers to enter China, in 1991. Unlike most foreign automobile makers, GM established operations in manufacturing and sales as well as in automobile research, design, financing, distribution, and automobile security and communication through 11 JVs.

Today, GM is the leader in China's automobile market, with 14.6% market share. China has become GM's largest market, contributing over 30.53% of 2012 global sales by volume and 51.7% of GM's global net income. GM's JV partners in China also provided much needed cash flow during GM's restructuring in 2009 with China's state-owned automotive manufacturing company SAIC purchasing a 1% stake in GM for US$85m. GM's JV operations in China also generated US$1.52bn in income equity. In addition, GM's China operations serve as an R&D, manufacturing and testing platform for other Asian countries, introducing several new automobile models to the Asia market and supplying products for other Asian countries such as India.

China also benefited tremendously from GM's investment. In addition to GM's significant capital injection, its JVs in China created 35,000 new jobs and provided the Chinese market with access to modern automobile products, manufacturing expertise, technology and repair services. GM's JV partners in China, such as SAIC and Wuling, also significantly increased their manufacturing, R&D and operational capabilities through collaboration with GM.

Figure 5: **Top 20 Destinations for Chinese Direct Investment in the U.S., 2003-10**

Rank	State	Total investment (US$ millions)	Number of deals	Rank	State	Total investment (US$ millions)	Number of deals
1	Texas	2719	20	11	Missouri	170	5
2	New York	1874	24	12	Georgia	154	12
3	Virginia	1771	5	13	Minnesota	151	1
4	Illinois	1540	7	14	Maryland	118	4
5	California	824	55	15	Hawaii	95	2
6	Michigan	599	12	16	New Mexico	80	1
7	Oregon	282	5	17	Florida	77	4
8	Delaware	264	12	18	Idaho	62	1
9	New Jersey	227	6	19	Arizona	61	3
10	Mississippi	175	1	20	Nevada	59	6

Source: "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for US-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center for Scholars, May 2011, p. 32.

Figure 6: **Sector Distribution for Chinese Direct Investment in the U.S. by Number of Deals, 2007-12**

Number of deals	2007	2008	2009	2010	2011	2012	2007-12
Information technology	7	13	10	19	21	6	76
Industrial and electronic equipment	12	6	15	14	12	12	71
Energy	6	3	14	20	15	10	68
Automotive and aviation	11	4	8	10	14	7	54
Consumer products and services	6	6	13	9	13	3	50
Finance and business services	3	6	6	6	7	6	34
Basic materials	7	4	5	4	9	3	32
Health and biotechnology	1	8	5	7	8	3	32
Entertainment and real estate	1	2	1	5	7	5	21
Transport and construction	5	0	0	8	1	3	17
Agriculture and food	1	2	0	2	3	4	12

Source: China Investment Monitor, Rhodium Group

Chinese investment in the U.S. exhibits several unique and positive trends. First, the preferred entry mode is greenfield investments, accounting for the majority of deals by volume. There were 436 greenfield investments completed from 2000 to 2012, compared with 184 non-greenfield deals[14]. This trend continues to increase, although greenfield investments still lag behind in terms of U.S. dollar value (US$3bn in greenfield investments versus US$19bn in non-greenfield investments)[15]. Greenfield projects create more employment opportunities and contribute more to the community, including tax income and consumer welfare compared to traditional mergers and acquisitions (M&A) investments.

Second, industry selection is gradually changing. Unlike earlier Chinese investment in the U.S. which focused on energy-related fields, there has been a growth in manufacturing-related industries since 2008. Although there have been cases of ac-

14 Data sourced from China Investment Monitor, Rhodium Group. http://rhg.com/interactive/china-investment-monitor

15 Ibid

Figure 7: Sector Distribution for Chinese Direct Investment in the U.S. by Deal Value, 2007-12

Deal value (US$ millions)	2007	2008	2009	2010	2011	2012	2007-12
Energy	245	28	214	2,977	2,079	2,966	8,509
Entertainment and real estate	8	4	6	222	931	2,795	3,966
Industrial and electronic equipment.	84	20	422	1,298	108	69	2,001
Automotive and aviation	101	9	127	478	591	213	1,519
Basic materials	37	9	1,043	43	126	173	1,431
Information technology	22	105	15	199	535	14	890
Health and biotechnology	1	381	10	61	84	3	540
Finance and business services	41	92	25	154	38	165	515
Consumer products and services	15	215	62	51	52	15	410
Agriculture and food	1	16		30	29	34	110
Transport and construction	6			16	1	5	28

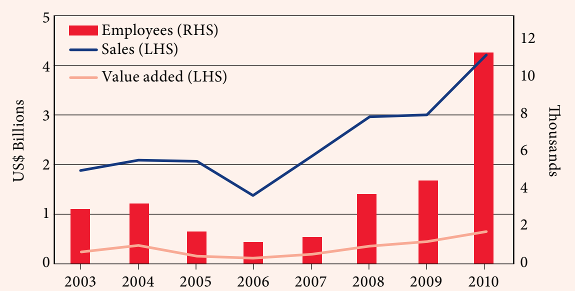
Source: China Investment Monitor, Rhodium Group

quisition for the purpose of transferring assets back to China, the majority of Chinese firms continue to expand local facilities purchased in the U.S. Chinese investments are not only seeking resources, they are becoming an increasingly important part of the U.S.'s new industrial strategy. Past Chinese tertiary-industry direct investment was aimed at facilitating massive U.S.-China merchandise trade flows such as wholesale services and trade finance. Today's service sector investments target higher-value-added services such as software development. Investment in real estate and infrastructure remains small, but interest is growing quickly.

Third, a distinct feature of Chinese investments in the U.S. today is that many Chinese investors are tapping into the technological capabilities, resources availability and management knowhow from the U.S to develop the market opportunities back home in China. This means that these Chinese investors in the U.S. will not only help to boost U.S. exports of goods and services to China, but also enhance the market value of U.S. technological and management capabilities, as the market for such capabilities would be increased substantially, given the attractive future market potentials in China.

Finally, there is a misconception that all investments made by Chinese firms are state related. The

Figure 8: Contribution of Chinese Investment to U.S. Gross Domestic Product and Employment



Source: US Bureau of Economic Analysis

reality is that ownership in China is diverse and this is reflected in Chinese investment abroad. The majority of sources of Chinese outward FDI is from the private sector rather than state-owned enterprises (SOEs) – 435 private deals versus 185 SOE deals with values of US$14bn and US$8bn respectively[16]). In addition, Chinese SOEs are becoming increasingly more profit oriented and commercial in their investment decision-making[17].

Similar to capital inflows from other countries to the U.S. and U.S. investments in China, China's investments into the U.S. not only offer investment

16 Ibid
17 "China Goes Global: The Implications of Chinese Outward Direct Investment for Canada", Yuen Pau Woo and Kenny Zhang, Vancouver: Asia-Pacific Foundation of Canada, 2006.

funds and create jobs, they could also improve product competiveness in the U.S. market and promote bilateral trade. For example, the entry of China's largest white-goods producer, Haier, into the U.S. has fostered greater competition and improved product choice in the U.S. white-goods market, bringing cheaper and more innovative products. Haier's mini fridges are now standard items in American college dorms and hotel mini-bars.

In terms of job creation, the U.S. Department of Commerce estimated that over the last decade, inward direct investment into the U.S. – totaling over US$1.7tr – has created over 5 million high-end jobs and raised staff incomes by 30%[18]. Although the number of jobs created by investment from China remains small – because China is still in the early stage of developing its outward investments – it has been growing rapidly. The BEA shows that Chinese non-bank U.S. affiliates obtained sales income of US$4.2bn, created value added of US$663m and hired 11,200 employees in 2010 – 5.6 times more than five years ago (see Figure 8). According to a study by the U.S.-China Economic and Security Review Commission, jobs created by investments by Chinese SOEs in the U.S. increased by 10,000-20,000 over the last five years[19].

A study by a private company[20] also shows that there were fewer than 2,000 jobs associated with Chinese investment 12 years ago, and this figure has grown to 27,000 in 2012. Of this total of 27,000, US$3.5bn worth of greenfield investments has created about 8,000 U.S. net jobs since 2000[21]. Although the jobs created by Chinese FDI – only accounting for less than 1% of the six million jobs provided by U.S.-based foreign affiliates – is still relatively small compared to long-time foreign investors such as Germany and Japan, the potential is tremendous. According to the study, if Chinese investment remains on track, Chinese firms will employ 200,000-400,000 U.S. workers by 2020.

For example, Haier – which invested US$30m in a refrigerator plant in Camden, South Carolina – now employs about 600 people. Wanxiang Group – an auto-parts manufacturer that started investing in the U.S. in 1994 – created 5,600 jobs in its 28 operations across 14 states in the U.S. It paid US$32.4m in U.S. tax and US$250m in local employee benefits in 2010[22]. Sany – a private Chinese heavy machinery manufacturing enterprise – employs 200 people in its R&D/manufacturing factory in Peachtree, Georgia[23]. The number of jobs created would be higher by several thousand if firms with Chinese minority equity stakes are also included.

Other indirect benefits from Chinese direct investment in the U.S. can be demonstrated by Lenovo's acquisition of IBM's personal computer business, which enabled IBM to dispose of its misaligned business lines and re-focus its business on more promising areas[24]. Tianjin Pipe Corporation (TPCO) is estimated to have employed 1,000-2,000 construction workers to set up a new steel plant in Texas[25]. Even the analysis and preparation of making an investment can benefit U.S. businesses as Chinese investors need to employ U.S. consultants and professionals to provide legal, tax, accounting, technical, financial and other services – as illustrated by the case of TPCO's investment in Texas[26]. Tax

18 "New Commerce Department Report Shows Foreign Direct Investment Supports Millions of High-Paying Jobs", Gary Locke, press release, U.S. Department of Commerce, 14 June 2011, http://www.commerce.gov/news/press-releases/2011/06/14/new-commerce-department-report-shows-foreign-direct-investment-suppor

19 "An Analysis of Chinese Investments in the U.S. Economy", Andrew Szamosszegi, *Capital Trade FDI Study*, U.S.-China Economic and Security Review Commission, October 2012.

20 "The Employment Impacts of Chinese Investment in the United States", Thilo Hanemann and Adam Lysenko, Rhodium Group, 27 September 2012, http://rhgroup.net/articles/the-employment-impacts-of-chinese-investment-in-the-united-states

21 Ibid.

22 "Case study on China Wanxiang Group's investment in the U.S.", Wang Tianlong, unpublished manuscript.

23 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center for Scholars, May 2011, pp. 45-46.

24 Ibid.

25 "The Employment Impacts of Chinese Investment in the United States", Thilo Hanemann and Adam Lysenko, Rhodium Group, 27 September 2012, http://rhgroup.net/articles/the-employment-impacts-of-chinese-investment-in-the-united-states

26 See SelectUSA video about doing business in the U.S. at http://beijing.usembassy-china.org.cn/doing-business-usa.html

Case Study: Wanxiang Group

Wanxiang Group is a China-based global automotive and clean energy company. Wanxiang America was established in 1994 and is based in Elgin, Illinois, with the aim of establishing manufacturing, research and sales operations in the U.S. Currently, Wanxiang America operates 27 manufacturing facilities across 14 states, combining expertise in manufacturing and sourcing with local U.S. talent in engineering, design and technology partnerships to deliver industry leading products in automotive parts, industrial components and clean technology such as solar panels. Today, one in every three vehicles running on the roads in America is using components made by Wanxiang's U.S. operations – becoming a model successful Chinese greenfield investment in the U.S.

As of 2011, Wanxiang has invested over US$500m in its U.S. operations, creating 5,600 new jobs. In 2010, Wanxiang America paid US$32.4m in taxes and US$250m in U.S. employee benefits. In addition, Wanxiang America is a strong supporter of local communities – for example, undertaking a program in San Francisco to train teachers in clean energy and supporting President Obama's '100,000 Strong Initiative', which aims to send 100,000 American students to study in China over four years.

paid by the Chinese enterprises will also benefit local education which is funded by local government revenue. According to the Rosen and Hanemann Study (2011), U.S. local communities have as much to gain or lose from Chinese FDI as they do from other nations' FDI: so far, there is no evidence that the effects will be qualitatively different[27].

In addition to the economic benefits, Chinese investments also bring a positive intangible impact. Chinese firms investing in the U.S. inadvertently absorb the global business norms and habits characteristic of the markets of the Organisation of Economic Co-operation and Development (OECD). As these firms' global presence increases, it is reasonable to expect them to lobby for stricter compliance with global business norms as they realize that this is required to give them a stronger competitive advantage over homebound rivals. Another benefit of Chinese companies moving abroad is that they have to comply with local laws and regulations, and they are subject to litigation in U.S. courts brought about by their competitors if they engage in improper behavior. Such exposure to foreign regulations and a compliance culture should create a positive feedback loop back into China, putting pressure on the Chinese government to increase the pace of reforms in order to help Chinese companies successfully compete overseas.

Growing Chinese investment in developed economies may also accelerate the new opportunities in the Chinese market. China still maintains significant controls on capital inflows and many sectors of the economy remain closed to foreign investment, especially in services. The Chinese government emphasizes that it will continue to open these sectors to private and foreign investment, but in a gradual manner. The growing interest in outward investment in developed economies is an incentive for China to accelerate the pace of investing at home, leading to wider opportunities for foreign multinational companies in industries which were previously off-limits.

27 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center for Scholars, May 2011, p. 45.

Figure 9: **China Portfolio Holdings of U.S. Securities in 2011 (US$ millions)**

Types	Total	Treasury	Agency	Corporate
Long-term equity	158,781	/	/	/
Long-term debt	1,562,948	1,302,405	244,747	15,796
Short-term debt	4,891	4,571	41	279
LT+ST total	1,726,621			

Source: U.S. Federal Reserve, 2012.

Present State of Portfolio Investment Flows between the U.S. and China

The U.S. is the world's top cross-border non-reserve portfolio investor and recipient, holding US$6.7tr in non-reserve portfolio assets and received US$8.3tr in foreign portfolio investment at the end of 2010[28]. In contrast, China's position in cross-border non-reserve portfolio investment lags far behind the U.S. ranking seventeenth at the end of 2010 with US$498bn portfolio inflows, about 6% that of the U.S. There is no official data on China's non-reserve portfolio outflow, but it is likely to be very small given tight capital account restrictions and China's relatively short history of outward investment. However, China is the world's largest holder of international reserves, amounting to US$3.31tr at the end of March 2012.

Given China's capital controls, bilateral portfolio investment flows between China and the U.S. are highly regulated. Out of the US$6.7tr non-reserve portfolio assets held by the U.S. at the end of 2010, China only accounted for US$102bn or 1.5% of the total. However, the U.S. – with US$77bn of portfolio assets in China – is China's second largest portfolio investor, accounting for 31% of the total foreign portfolio holdings at the end of 2011[29]. Like other foreign portfolio investors, U.S. portfolio investment in China is mainly channeled through the program of Qualified Foreign Institutional Investors (QFII) that permits certain licensed international investors to participate in China's financial markets. By the end of 2012, 33 U.S. companies – out of a total of 201 companies[30] – have obtained QFII qualifications. Many of these companies have reached the investment cap of US$1bn.

The Chinese government's holdings of portfolio assets, however, have experienced explosive growth over the last decade with an average annual growth rate of 35.8%. China has surpassed Japan as the world's largest holder of U.S. government securities since 2008. Portfolio assets held by China are classified into four types: treasury securities, agency securities, corporate bonds and stocks. In June 2011, China's holdings of the U.S. portfolio assets amounted to US$1.7tr, about 54% of total foreign exchange reserves. Of this total, long-term treasury securities and long-term agency securities amounted to US$1.3tr and US$0.24tr respectively, representing almost 90% of China's total portfolio investment in the U.S.

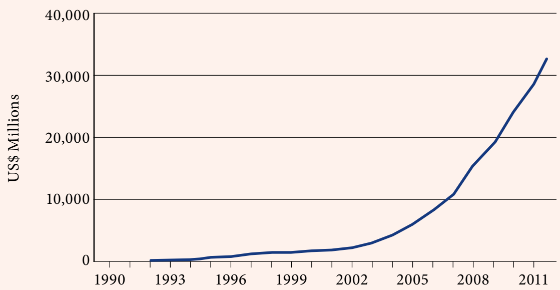
Looking back at the last decade, China's large purchase of U.S. securities has been well recognized as a double-win strategy that provided benefits to both sides. It is consistent with China's interest in reducing its foreign exchange reserves risk and maintaining financial stability in terms of liquidity and credibility. On the other hand, China's persistent investment in U.S. securities provides strong demand for treasury securities to drive down the long-term rate of interest and the necessary funding to finance large U.S. budget deficits. This was particularly important to help the U.S. deal with the 2008/09 global financial crisis. From 2008 to 2010, China's government has lifted the

28 "Coordinated Portfolio Investment Survey, 2011", International Monetary Fund, http://cpis.imf.org

29 The U.S. data is obtained from U.S. Department of Treasury and the Chinese data is obtained from China's State Administration of Foreign Exchange (SAFE).

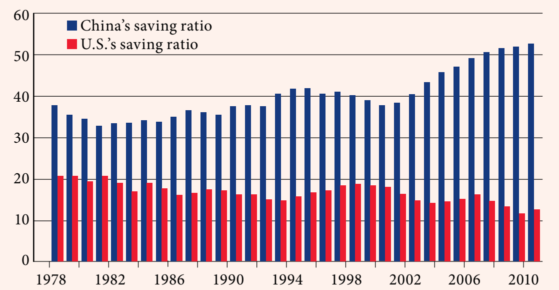
30 The complete QFII list as of November 2012 is on: http://www.china.com.cn/guoqing/zwxx/2012-12/14/content_27412677.htm

Figure 10: **Growth of China's Official Foreign Reserve**



Source: State Administration of Foreign Exchange (SAFE), China

Figure 11: **Comparison of China and U.S.' Savings Ratio**



Source: U.S. Bureau of Economic Analysis; National Bureau of Statistics of China

holdings of U.S. securities by US$577bn, an equivalent of 73.3% of total expenditure of the U.S. stimulus package in February 2009.

Drivers of U.S.-China Bilateral Investment

FDI, including those from the U.S., played a very important role in China's successes in the earlier part of its reform and opening-up process since 1978. Foreign investors brought not only funds that China desperately wanted, but also management and technical expertise, export markets for China's products or goods that China needed for its domestic market. Foreign investors also benefited in the process, as China helped to enhance their global competitiveness by reducing their costs of production or providing the resources or products they needed. Furthermore, foreign investors gained significantly from the rapid growth in the domestic market, particularly for companies such as General Motors and Procter & Gamble.

As China enters the second decade of the twenty-first century and becomes a middle-income country, conditions in China have changed and a new complementary relationship of investment flows between China and the U.S. is called for.

China's excessive savings versus the U.S.'s need for more savings

China has accumulated over US$3tr of official foreign exchange reserves (see Figure 10). Furthermore, as wealth is created in China, private-sector savings has also increased. China is now a nation of surplus savings. According to the National Bureau of Statistics of China, China's saving ratio was about 35% in the 1980s, rose to around 40% in the 1990s and up to 52.6% in 2010. Meanwhile, China's investment ratio averaged 45% of gross domestic product (GDP) during 2002 to 2011. In the ten years between 2002 and 2011, China ran an average net saving surplus – or current account surplus – of 5.7% of its GDP despite a high investment rate.

In the U.S., according to data from the U.S. BEA, the U.S.' savings rate has dropped from about 20% of gross national income (GNI) in the early 1980s to about 12.4% in 2010 (see Figure 11). During 2002 to 2011, the U.S. investment rate averaged 18.1% of GNI. This means that in the ten years between 2002 and 2011, the U.S. had an average net savings deficit – current account deficit – of 4.5% of GNI.

As highlighted by the 2008/09 global financial crisis, many countries in the West will have to deal with a high level of public and private sector debts. To restore market confidence, deleveraging in the private sector and fiscal consolidation in the public sector are called for. These adjustments will typically take a long time. Meanwhile, China has been dealing with the problem of having too much savings. Surplus saving is the underlying reason for China's current account surpluses, which in turn – given China's desire to maintain exchange rate stability – encourages an excessive growth in money supply.

Therefore, a new complementary relationship of investment flows has gradually emerged as China exports its surplus savings to the West where new sources of foreign investment funds could help to mitigate the contractionary effects of fiscal consolidation and private sector deleveraging, and stimulate the sluggish economies.

China's need to 'go global'

The surge in China's outward investment in recent years has been stimulated by favorable policies. The implementation of the government's 'go global' strategy has gradually led to an improvement in the business environment for Chinese companies to invest abroad, such as the simplification of the approval procedures, easier financing arrangements and better foreign-exchange services. The *Overseas Investment Management Regulations*, announced in 2009, states that most outward investment projects are not required for review by MOFCOM.

China's outward investment is primarily driven by the country's needs at the macro level and the business needs of companies on an enterprise level. As the country becomes more developed, many Chinese companies have matured, become much bigger in terms of assets and much stronger financially. China needs to look overseas to buy natural resources – including energy, minerals and agricultural products – to support the country's rapid growth, and investing in such sectors abroad is a good way to secure long-term supplies. Having become the world's largest exporter, China needs to explore new markets and to better grow its overseas markets by relocating production to foreign countries or fostering global partnerships with overseas companies. Investing in new markets also helps Chinese firms to reduce costs of logistics, learn more about overseas markets, react faster to changes in demand in foreign markets and reduce the impact of trade restrictions. Cross-border M&As also enable many Chinese companies to acquire technological, management and operational skills. The appreciation of the RMB in recent years has also increased the financial capabilities and raised the cost advantages of many Chinese companies to invest overseas. The much stronger capability of Chinese banks to support financially Chinese companies to go overseas is also important.

The new investment opportunities in China

As costs rise, China is no longer attractive as a base for low-cost production. But rising incomes of workers is turning China into a more important market. Based on decades of investment experience in China, the target of U.S. firms in China is straightforward: the great potential of the Chinese market and strong consumption ability by the rising middle class. A more developed economy and rising prosperity also led to an increase in demand for various kinds of producer or consumer services, sectors in which many U.S. firms are strong. The rapid increase in the availability of Chinese workers with higher levels of education and more sophisticated technical skills have also led more U.S. companies to tap into this large pool of knowledge workers.

USCBC's survey shows that China is estimated to be a US$250bn market for U.S. companies, and 94% of companies conduct business in China to primarily access the domestic Chinese market, instead of developing an export platform. A similar percentage of U.S. companies consider China as either their top global market priority or among their top five priorities[31].

The Potential of U.S.-China Investment Flows in the Future

U.S. direct investment in China

China's national development strategy of economic transformation and structural adjustment provides greater potential for bilateral investment. China's

31 "USCBC 2012 China Business Environment Survey Results: Continued Growth and Profitability"; Tempered Optimism Due to Rising Costs, Competition and Market Barriers, 2012.

economy is going through fundamental restructuring: from an export-driven, labor–intensive, energy-intensive, industry-based economy, to one that is driven more by innovation and technology, domestic consumption and the service sector. This will no doubt result in a larger appetite for high-tech products and services. The Chinese government could also be expected to introduce more favorable policies to encourage direct investment into these sectors so as to promote the process of economic structuring and upgrading.

Urbanization – another of China's crucial development strategies in the next decade – probably presents the greatest growth potential for China's economy. China's urbanization rate just surpassed 50%, 20 percentage points lower than the average level of developed countries. The continuous urbanization process will drive RMB40tr of investment including RMB1tr of infrastructure investment in the next decade[32]. This will create many new opportunities for FDI.

Chinese direct investment in the U.S.

China's 12th Five Year Plan stated that promoting the 'go global' strategy will be extremely important in the country's future development. The government is set to provide strong support to companies in various industries – including finance, energy, construction, wholesale and education – to invest abroad. With abundant financial resources and the investment experiences built up over the past years, there is no doubt that China's outward investment will speed up in terms of amount and scope. A study by a U.S. private company projected that over US$1tr of Chinese direct investment could flow overseas in the decade 2010 to 2020, with a significant share likely to be heading to the U.S.[33]

The U.S. consumer market continues to be of interest to Chinese enterprises. Following the successful entry of Haier and Lenovo – who manufacture their products in the U.S. – there will be similar FDI into the U.S. in those industries. Investment in energy and agriculture – whether in collaboration with science and technology research or with production – will attract Chinese FDI into the U.S. Real estate is another area where there may be keen Chinese interest. The U.S. needs to build new infrastructure, or rebuild infrastructure, which will be very attractive to Chinese companies. It is entirely possible that, within a few years, China's annual FDI flows into the U.S. will match or exceed U.S. annual FDI into China[34].

The potential of job creation from the inflow of Chinese investments should not be underestimated. According to estimates made by the Office of the U.S. Trade Representative, each US$500,000 of foreign investment would create around 10 job opportunities in the U.S.[35] Therefore, if Chinese enterprises' investments in the U.S. reach US$200bn in 2020, it will create four million job opportunities.

Portfolio investment flows between China and the U.S.

Portfolio investment flows into the U.S. from China are likely to remain dominated by Chinese sovereign wealth funds such as the China Investment Corporation (CIC) and State Administration of Foreign Exchange (SAFE), given China's large foreign-exchange reserves and capital restriction. Such investment will keep rising as long as U.S. national credit remains strong and equities are attractive.

The great potential of Chinese households'

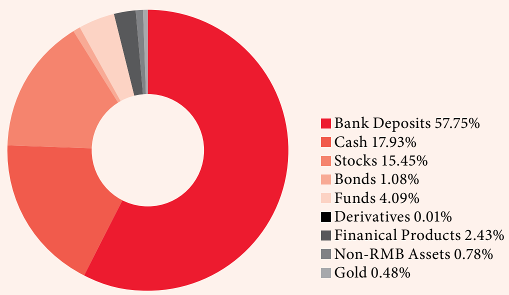
32 *National Plan of Promoting Urbanization Healthy Development (2010-2020)*, Chinese National Development and Reform Commission (NDRC), 2012.

33 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center for Scholars, May 2011.

34 According to the U.S. BEA, Chinese FDI into the U.S. was US$3.2bn in 2010, which is already greater than the U.S. FDI into China of US$3.02bn. However, the Chinese Ministry of Commerce reported a different story: Chinese FDI into the U.S. was only US$1.3bn in 2010, while U.S. FDI into China was US$4.05bn in the same year. The discrepancy in data from both governments is nothing surprising as they adopt different definitions and are based on different sources. Yet, both sets of data indicate the same trend, i.e. Chinese FDI flows to the U.S. is rising and the gap between flows is narrowing.

35 *Chinese FDI in the U.S., Causes, Case Studies, and the Future*, The American Chamber of Commerce in Shanghai, 2010.

Figure 12: Chinese Households' Financial Assets Allocation



Source: "Investigation Report of Households' Financial Assets", Investigation and Research Center of China's Household's Financial Assets, Southwest University of Finance and Economics, China.

foreign investment will be realized as foreign-exchange control regulations are gradually relaxed. Chinese household wealth has been growing fast as household incomes rise and the size of high-income groups increase, but most of their wealth is in RMB because of foreign-exchange controls.

According to the 2012 China's "Investigation Report of Households' Financial Assets"[36], the total amount of households' financial assets is estimated to be US$9.5tr[37], very little of which is invested overseas. Of the total, deposits account for the highest proportion (57.75%), followed by cash (17.93%), stocks (15.45%), funds (4.09%) and banking and financial products (2.43%).

The large proportion of risk-free asset holdings reflects not only the conservative investment habit of many Chinese families and the poor performance record of the Chinese stock market in the past two decades, but also the lack of channels to investing abroad. Given the fact that the Chinese government is gradually relaxing foreign-exchange restrictions, the portfolio diversification of Chinese households will result in a rapid growth in demand for investments in foreign currencies, if only because of portfolio re-balancing needs. The approximate projection of such investments could be estimated by comparing with the trends of Japanese households that have similar savings habits: about 55% of total Japanese household assets are held in bank deposits, and the amount of their foreign assets is about US$502bn or 3% of total financial assets[38]. If China's foreign-exchange restrictions are highly relaxed in next decade – and Chinese households hold the same proportion of foreign assets in their portfolios as the Japanese – the amount of foreign assets held by this group will amount to US$570bn[39], with the average growth rate estimated to be roughly 28.8%[40]. It is obvious that the U.S. – with a developed financial market and abundant financial products – will attract a substantial proportion of such investment flows from Chinese households.

Concerns of the U.S.-China bilateral investment

The U.S.'s main concerns on investment in China

Despite their historical success in investing in China, U.S. companies have become increasingly concerned about the investment climate in China. According to the 2012 survey of the USCBC[41], 45% of company respondents are less optimistic about China's current business climate than they were three years ago.

Figure 13 shows that the major U.S. investors in

36 "Investigation Report of Households' Financial Assets", Investigation and Research Center of China's Household's Financial Assets, Southwest University of Finance and Economics, China.

37 The *2012 China Statistical Yearbook* shows that the total amount of Chinese households' banking deposits is US$5.5tr and the China's 2012 Investigation Report (ibid) indicates that banking deposits account for 57.75% of the total households' financial assets. Moreover, the data from the speech of the 2013 Chinese People's Political Consultative Conference (CPPCC) shows that China's household financial assets and banking deposits amount to RMB50tr (US$8tr) and RMB41tr (US$6.6tr) respectively, which is not very different from our estimates.

38 Data sourced from: http://business.financialpost.com/2011/03/29/why-japan-wont-repatriate/

39 According to the report of the eighteenth National Congress of the Communist Party of China, households' income will double by 2020. Given the fact that the purchase of financial assets mainly depends on the households' income, it is thus reasonable to assume that the total amount of households' financial assets will double as well.

40 According to China's 2012 "Investigation Report of Households' Financial Assets" (see note 4), the proportion of non-RMB assets in total households' assets is 0.78%. Because of the restrictions of capital outflow and foreign exchange, most of the households' foreign assets are believed to be in foreign-currency deposits, and the amount of households' foreign assets is estimated to be roughly US$31.2bn in the base year for calculating the average growth rate in the next decade.

41 "USCBC 2012 China Business Environment Survey Results: Continued Growth and Profitability; Tempered Optimism Due to Rising Costs, Competition, and Market Barriers", U.S.-China Business Council, 2012.

Figure 13: **The U.S.'s Top Concerns on Investment in China**

1	Human resource – talent recruitment and retention
2	Administrative licensing; business and product approvals
3	Competition with Chinese enterprises (state-owned or private)
4	Cost increases
5	Intellectual property rights enforcement
6	Inconsistent local enforcement and implementation of laws and policies
7	Investment restrictions
8	Competition with foreign companies in China
9	Competition with foreign or Chinese companies not subject to U.S. Foreign Corrupt Practices Act
10	Standards and conformity assessment

Source: "USCBC 2012 China Business Environment Survey Results: Continued Growth and Profitability; Tempered Optimism Due to Rising Costs, Competition, and Market Barriers", U.S.-China Business Council, 2012.

China face significant difficulties in finding, training, hiring and retaining employees, especially for skilled technical and managerial talent at reasonable salary levels, dealing with licensing and approvals, fighting against increasing competition and rising costs. According to the survey, 57% of companies experienced wage increases between 5% and 10% in 2012. Despite the higher salaries, turnover rates of qualified workers still reached 10-20%.

Five of the top concerns are related to unfair competition, protectionism and restrictions on market access (points 2, 3, 6, 7 and 10). The survey indicates that half of the companies that reduced or stopped planned investment in China did so because of increased market access restrictions. Furthermore, 85% of companies said they have yet to see any improvement in discriminatory practices arising from 'indigenous innovation' policies, though this policy has officially been dropped by China's central government and local government is supposed to treat foreign companies in a fair and open manner in government procurements.

Regulatory transparency and intellectual property rights (IPR) protection continue to remain top concerns because improvements have been slow, even though many U.S. companies agreed that progress has been made in the last few years. 95% of companies indicated they are either somewhat concerned or very concerned about IPR enforcement, with trade secrets, trademarks and patents as the top three intellectual property infringement concerns. The lack of a practical criminal deterrent is seen to be a significant obstacle for China to develop an effective intellectual property protection regime.

China's *Catalogue Guiding Foreign Investment in Industry* has been a particular focus of market access and foreign ownership restrictions. It categorizes investment in different sectors as 'encouraged', 'restricted' or 'prohibited', and imposes ownership restrictions on over 90 sectors (enumerated in a recent USCBC publication[42]). As the U.S. Chamber of Commerce noted in an April 2011 submission to China, "China's approach towards foreign investment is frequently changing, somewhat unpredictable, and seemingly reveals an undue skepticism to foreign investment except insofar as it advances China's economic development goals at the time."[43]

U.S. companies have also expressed concerns about China's new system of national security screening for inbound M&As outlined under the *State Council Notice Regarding the Establishment of a Security Review Mechanism for Foreign Investors Acquiring Domestic Enterprises*. In addition to a lack of procedural transparency, the U.S. Chamber also stated that the criteria to determine which transactions will be subject to screening are not

42 "China's Ownership Restrictions on U.S. and other Foreign Investors", USCBC, May 2011.
43 U.S. Chamber of Commerce and American Chamber of Commerce in China Submission to the National Development and Reform Council (NDRC) and Ministry of Commerce (MOFCOM), April 2011.

clearly defined[44]. For example, sectors such as 'important agricultural products', 'important energy and resources' and 'key technologies' are described as 'related to national security'. The U.S. Chamber argues that these terms suggest the application of an economic interest test rather than the narrow criteria of national security.

China's response and moves

China has been working actively to address some of the U.S. concerns. The most recent example looks at the concerns on market access. China committed in the May 2012 U.S.-China Strategic and Economic Dialogue (SED) that it will focus its "security review over mergers and acquisitions (M&A) by foreign capital solely on national security concerns and adhere to specific timelines and review standards."[45]

China has committed to improve IPR-related laws and regulations, and further consider strengthening measures for the pursuit of criminal liability for IPR infringement. It would also continue efforts to impose the use of legitimate software by government agencies, and to implement its earlier commitment that technology transfer and technology cooperation is to be decided by businesses independently and not to be used by the Chinese government as a pre-condition for market access. China also agreed to include trade secret misappropriation in the 2012 Annual Work Plan of the State Council Leading Group on Intellectual Property Enforcement[46].

Furthermore, China would continue to approve applications by qualified auto financing companies (AFCs) and financial leasing companies – including foreign-invested entities – to issue financial bonds in China at the same SED meeting. It would offer impartial treatment of foreign and Chinese-invested financial institutions in issuing credit asset-backed securities during the trial period of asset securitization in China. The Chinese authorities agreed to amend relevant regulations to allow foreign investors to hold up to a 49% equity stake in securities JVs, which are allowed to engage in underwriting and sponsoring the listing of stocks – including common shares denominated in RMB and foreign shares – and the issuing of bonds – including government bonds and corporate bonds. China would also allow qualified securities JVs that have been operating continuously for a minimum of two years to acquire additional licenses and broaden their business scope. In the SED meeting, China also committed to allow foreign investors to hold up to a 49% equity stake in futures brokerage JVs[47].

In response to incessant requests for China to open up the country further to foreign investment, China has insisted that this has to be gradual to ensure economic stability, given China's immature markets. For example, there has been criticism from both in and outside China about the government's conservative attitude towards liberalizing and opening up the financial sector. However, the Chinese government has pursued a cautious approach to the process of liberalization and opening up as China's financial markets are still underdeveloped and fragile. The government's regulatory and supervisory capabilities, and the market's risk management and governance systems have yet to meet the demands of fully open markets. Successive financial crises around the world in the past few decades have highlighted the perils of prematurely opening up financial markets and therefore China should adhere to a prudent pace of reform.

China's main concerns on investment in the U.S.

The main concerns of Chinese investors regarding direct investment in the U.S. are government regulations and policies that restrict foreign investment in specific sectors. For example, foreign investments are prohibited or restricted in some energy sectors,

44 Ibid
45 Joint U.S.-China Economic Track Fact Sheet, May 2012, p. 6.
46 Joint U.S.-China Economic Track Fact Sheet, May 2012, p. 4.
47 Joint U.S.-China Economic Track Fact Sheet, May 2012, p. 9.

Figure 14: **China's Top Concerns on Investment in the U.S.***

1	**Market access and foreign ownership restrictions**
2	**Unpredictable national security screening**
3	**SOE discrimination**
4	**U.S. visa policy**
5	**U.S. domestic politics**
6	**Compliance with the same laws and regulations that apply to U.S. firms**

** Author's own research; not listed in order of priority.*

telecommunications, public media, railway construction, mining exploration and water and electricity utilities. Foreign-built and foreign-owned vessels are prohibited from engaging in passenger or commercial transport business within and between U.S. ports. Foreign entities are not allowed to own more than 25% of the voting interest of any U.S. airline or control the U.S. airline by other means. There are also complaints about strict U.S. regulations on foreign banks to establish subsidiaries in the U.S. and/or acquire U.S. banks, which have limited Chinese investment in U.S. finance[48].

Some investors in China have raised concerns that the legislatively mandated process for screening FDI transactions managed by the treasury-chaired Committee on Foreign Investment in the United States (CFIUS) is unpredictable. Some acquisition cases that encountered strong adverse reaction from a coalition of congressmen, businesses and media failed while similar cases passed with little public comment[49]. Such unpredictability and ambiguous standards of assessment have caused Chinese investors' concern – from the potential rise in pre-investment costs, uncertainties and possible damage to their reputation, thus discouraging them from investing.

It is not uncommon for governments to restrict foreign investment in 'strategic' industries or sectors sensitive to national security. Unlike China, the U.S. does not publish a formal list to guide foreign investment into domestic industries, relying instead on the general principle that it welcomes all kinds of investment except those that involve national security issues. To many Chinese investors, however, this approach seems more ambiguous and lacks transparency because many high-tech or energy deals could be refused on the pretext of national security.

Such concerns are complicated by the active role played by Chinese state-owned enterprises (SOEs) in China's outward investment, as not many private companies in China have the scale, resources and capacity to make large-scale investments overseas, particularly in asset-heavy investment projects. A highly politicized environment in the U.S. towards China makes the situation worse, particularly when the U.S. enters election seasons[50]. For example, the last U.S. mid-term election saw at least 29 candidates engaged in some form of anti-China campaign. The handling of a few high-profile transactions in the

48 "The State, Issues and Reasons of China's FDI in the U.S.", Development Research Center of the State Council, June 2011, http://bbs.jjxj.org/thread-1087112-1-1.html.

49 Refer to"An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center, May 2011, p. 62. CNOOC's bid for Unocal (2005) vs CNOOC's bid for shale gas extraction in Texas (2010); Huawei's bid for 3com (2007) vs Lenovo's bid for IBM (2005); Anshan Steel's bid (2010) vs Tianjin Steel's bid (2010).

50 One recent case that may be seen as an example reflecting a highly politicized environment is the "Investigative Report on the U.S. National Security Issues posed by Chinese telecommunication companies Huawei and ZTE," published on October 8, 2012 by Chairman Mike Rogers and Ranking member C.A. Dutch Ruppersberger of the Permanent Select Committee on Intelligence of the U.S. House of Representatives. The report concludes that 'the risks associated with Huawei's and ZTE's provision of telecommunication equipment to the U.S. of critical infrastructure could undermine core U.S. national security interests'. Among the report's various findings behind its conclusion was that 'neither company was forthcoming with detailed information about its formal relationships or regulatory interactions with the Chinese authorities.'

past few years – notably China National Offshore Oil Corporation's (CNOOC) withdrawal of its bid for Unocal in 2005 in the face of political opposition in the U.S. – has fed negative Chinese investor perceptions of the U.S. investment climate. According to a Rosen and Hanemann study, interference in the approval of China-related deals appears to have increased in recent years, often due to concerns about 'national security' and/or due to lobbies by specific groups in the U.S. with vested interests[51].

While Chinese SOEs account for a large amount of China's outward direct investment, the SOEs' share of Chinese outward investment is shrinking and they are outnumbered by private investors. According to the Chinese Ministry of Commerce, the share of China's outward direct investment conducted by SOEs in 2010 dropped by 3 percentage points to 66.2% in 2009[52]. Meanwhile, the Rosen and Hanemann study reported that 170 out of 230 (or 74%) recorded Chinese investment in the U.S. between 2003 and 2010 actually originated from private firms[53].

Another major concern of Chinese investors is the U.S. visa policy. Complaints focus not just on the application process, but also on the attitude of U.S. immigration officers. Among the frequent complaints are the long visa application period, its complex and user-unfriendly procedures, the permitted short durations of stay, the small visa quota, high refusal rate and ambiguous approval criteria. Occasional reports of unfavorable encounters with U.S. immigration officers also reinforce the Chinese perception of a discriminatory visa policy in the U.S. Some of these problems have been addressed by the U.S. government in recent years. According to U.S. Ambassador to China Gary Locke, over the past two years, wait time for a U.S. visa interview has been cut from 100 days in Beijing and 70 days in Shanghai to two days anywhere in the four U.S. visa-issuing offices in China, despite a 40% increase in visa demand and zero staff increase during that period[54]. While this is a commendable achievement, it also underlines the room for improvement in the visa application and processing arrangements, such as increasing the number of visa issuing offices.

U.S. response and moves

At present, China's investment in the U.S. flows to a wide range of industries, including the strategic and high-tech areas, natural resources and infrastructure. The vast majority of actual and prospective Chinese investments in the U.S. – including all greenfield investments and most acquisitions – do not need to go through the CFIUS process, and those that do are rarely blocked. Some independent observers argue that "there is no indication that Chinese firms formally were discriminated against when their investments were subject to a CFIUS screening."[55]

The U.S. regards the CFIUS regime of screening well designed and "reflects a tradition of openness to both the economic benefits and enhanced competition from foreign firms that it entails."[56] The responsibility of CFIUS was enhanced in 2007 by providing a legislative mandate and was extended to review critical infrastructure and foreign-government-controlled entities unless it is exempted by the Treasury Department or the CFIUS' lead agency. The right that CFIUS is authorized to review all suspicious deals is then clarified.

51 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Ce 2011,p. 59-64.

52 MOFCOM, *2010 Statistical Bulletin of China's Outward Foreign Direct Investment*, September 2011.

53 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center, May 2011, p. 33.

54 Information sourced from: http://www.carnegieendowment.org/2012/09/13/forging-u.s.-china-relations-with-ambassador-gary-locke/do64

55 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center, May 2011, p. 61.

56 "An Open American Door? Maximizing the Benefits of Chinese Foreign Direct Investment", Daniel H. Rosen and Thilo Hanemann, Center for U.S.-China Relations, Asia Society, and Kissinger Institute on China and the United States, Woodrow Wilson International Center, May 2011, p. 65.

In the fourth meeting of the SED held in Beijing last May, the U.S. reiterated its policy to "welcome foreign investment in all sectors, including the financial sector, and remains committed to apply the same prudential and regulatory standards to applications made by Chinese banks, securities, and fund management companies as they apply to other foreign financial institutions in like circumstances."[57] The U.S. authorities also committed to act expeditiously on pending applications by Chinese banks that are under active review and consideration. Both sides also committed "to strengthen cooperation on information of financial market infrastructure and specialized financial institutions, and enhance communication and collaboration on building exchanges and the exchange system."[58]

The U.S. has set up SelectUSA, a program to encourage, facilitate and accelerate foreign and domestic firms investing in the U.S. Furthermore, many investment promotion programs at different levels have been organized to help Chinese investors to overcome the endemic difficulties. Chambers of business – including the U.S. Chamber of Commerce and the U.S.-China Business Council – also helped to foster two-way investments between the U.S. and China.

U.S.-China portfolio investment concerns

To complement the country's economic reform and opening-up policies since 1978, China started to introduce financial sector reform gradually since the 1980s. However, financial market liberalization over the years has been widely seen to be lagging behind the rapid pace of China's modernization. Today, China still maintains a comprehensive system of capital controls that regulates the flow of capital both into and out of China. Financial markets in China are also generally underdeveloped in comparison to the needs of the country at the current level of development. Portfolio investment flows into and out of China, particularly by the private sector, is very small in comparison to the scale of China's economy and the size of China's savings.

But given the rapid accumulation in wealth by the Chinese people, and the needs of a rapidly modernizing economy, the potential of a significant surge in portfolio investment, both into and out of China, have been built up. Indeed, while China's capital markets are still immature and generally closed to outside investors, the size of many markets and the amount of turnover involved are already amongst the largest in the world. For example, in the A-share market, there are 78 million retail investors with over 168 million trading accounts, and the electronic trading technology adopted is one of the most advanced in the world[59]. Meanwhile, China has over 13 million incorporated enterprises, more than 40 million self-employment businesses and a great deal of innovative start-up activities that need to raise funds in the capital market[60].

Giving more freedom to capital flows into and out of China will encourage a more efficient allocation of capital that is important in China's next stage of modernization, providing not only more channels for Chinese savings to invest profitably, but also new sources of risk capital to finance the growth of many different kinds of businesses.

The significant potential of a rapid surge in cross-border portfolio investment flows will be realized as China continues to liberalize its capital flow restrictions and as China continues to reform and modernize its financial markets.

Response and moves

In the May 2012 SED, China committed to increase the total quota for QFII to US$80bn and to raise the quota for Renminbi Qualified Foreign Institutional Investors (RQFII) to RMB70bn (US$1.13bn). It also

57 Joint U.S.-China Economic Track Fact Sheet, May 2012.
58 Ibid

59 Speech by Guo Shuqing, Chairman of China Securities Regulatory Commission, at the Asian Financial Forum on 14 January 2013. (http://www.csrc.gov.cn/pub/csrc_en/newsfacts/release/201301/t20130114_220400.htm)
60 Ibid

promised to expand financial cooperation with U.S. institutions into the insurance business.

The same SED meeting has seen China reaffirming its commitment to follow the generally accepted principles and practices of Sovereign Wealth Funds (SWFs), while the U.S. reaffirmed its commitment to upholding the open and non-discriminatory principles toward sovereign wealth funds as described in the Declaration on Sovereign Wealth Funds and Recipient Country Policies announced by the OECD in June 2008.

Regarding the recent instances of reverse mergers, little evidence shows that Chinese SOEs were directly involved. Most reverse mergers are small and medium private firms simply set up for raising capital and thus few U.S. valuable assets were purchased with strategic intention. This approach seems to be a symptom of shallow capital markets in China instead of a threat to U.S. economic security. Besides, discussions and communications between the Public Company Accounting Oversight Board (PCAOB) and MOFCOM are in progress for tighter supervision of Chinese accounting and auditing firms[61].

Proposals on China-U.S. Cooperation to Facilitate Cross-Country Investment

Other than strong complementarities of the two countries, it is also very important that both the Chinese and U.S. governments have publicly committed to an open, non-discriminatory investment climate and have taken recent action to promote this objective. In their joint statement issued after the May 2012 SED meeting, the two governments "reaffirmed the importance of fostering open, fair, and transparent investment environments to their domestic economies and to the global economy." The U.S. said it "welcomes business investment from all countries, including China, and including from state-owned enterprises." Both governments stated that their investment screening processes are focused exclusively on national security and agreed to discuss each other's concerns in this regard through the U.S.-China Investment Forum. And the two sides agreed to schedule a seventh and subsequent round of negotiations on a bilateral investment treaty (BIT) and to 'intensify negotiations'.

Following through on these statements and taking additional steps to improve the investment climate in both countries will be critical to the U.S. and China's ability to maximize the benefits of their economic relationship in the decade ahead. Removing these and other FDI impediments will bolster U.S. business support for Chinese investment in the U.S., making it a 'win-win' proposition for both sides.

It is hard to overestimate the benefits of investment cooperation between the U.S. and China. The challenges lie in how to overcome the hurdles and promote bilateral investment flows. We hereby briefly outline some of the key suggestions, divided again by direct and portfolio investments. Some of them are being raised and tackled by the authorities, especially through the SED platform, but clear progress and breakthrough may require a more fundamental change in strategic thinking and approach.

Promote further mutual understanding

Protect the investment review process from interference from politicization

The U.S. investment screening process is generally well designed. However, efforts should be made to better protect the screening process from politicization and further improve the transparency of the formal decision-making process. For instance, terms such as 'national security', 'critical infrastructure' and 'foreign-government control' are somewhat loosely defined and ambiguous. It is important to ensure that investment screening outcomes accord with the goal of openness, and not be jeopardized by spurious arguments against such investments.

61 Ibid

Enhance cultural exchange to develop bilateral ties and avoid misunderstanding

No relationship between two countries in this century is more important than that of China and the U.S. With different cultural backgrounds, people from China and the U.S. have to carry out educational, cultural as well as political and commercial exchanges in order to enhance their long-term collaboration and strive for an in-depth understanding. Non-profit organizations may organize programs to improve the language skills of both sides. Legal terms – definitions and terminology – need to be clarified to avoid legal disputes.

Systemize the promotion of investment

Review and improve investment guides

China's *Catalogue Guiding Foreign Investment in Industry* and other investment guides are seen as too broad and vague to serve as clear references for investors. Specifically, review process is long and complex, while the scope of assessment stretches into sensitive but poorly defined areas like economic security, business confidentiality and social order. The U.S. could also consider compiling some user-friendly investment guidelines – for example, Chinese-translated versions – addressing issues commonly encountered or raised by Chinese investors, including labor, tax, visa, IPR and other regulatory and operating issues.

Establish local government investment promotion agencies

Aside from top-level official dialogues, there is a need to strengthen cooperation and dialogue between the local governments and between local business groups from the two countries. Currently, each U.S. state has its associations stationed in China, which mainly consist of representatives from the state government, municipal government, tourism bureau and harbor authority. The main purpose of these agencies is to promote U.S.-China cooperation in various areas. Both countries can consider setting up local investment promotion agencies and form a network of local investment and promotion agencies. The U.S. government recently launched an effort known as SelectUSA to assist Chinese and other foreign investors in the U.S. market, and has committed to encouraging subnational cooperation between Chinese provinces and municipalities and U.S. state and local governments. Such moves are encouraging and need to be reinforced.

Convene investment project meetings

Both governments may encourage the organization of regular or ad-hoc U.S.-China direct investment project meetings, for local governments and enterprises, with special incentives to encourage participation.

Encourage the establishment of investment funds

Both governments may encourage the establishment of specific funds to support bilateral investment. Specifically, China may consider supporting the development of more sophisticated venture capital and private equity funds to play a more active role in corporate restructuring and financing in China, and to encourage qualified foreign investors to be listed on the Chinese stock markets.

Improve investment climates in both nations

Publish 'safe harbor' lists and raise policy transparency and its communication

Both governments may consider publishing their own 'safe harbor' list of industries or criteria for foreign investment – such as an ownership ceiling for the investment in question – that will be free from regulatory scrutiny. Improving U.S. policy transparency – both by means of publishing more refined policy guidelines and applying more user-friendly and effective communication channels – in areas like national security, environment and antitrust – could reduce investor uncertainties and perception about undue discrimination to Chinese investors. Similarly, China should also improve its transparency in investment-related policies.

Remove foreign investment restrictions in certain industries

China's *Catalogue Guiding Foreign Investment in Industry* still has a number of restrictions over multiple sectors such as energy, infrastructure, finance and media among others. Even in those off-limits sectors, regulations do not ensure fair competition for foreign investors. China should create a more FDI-friendly environment by giving foreign investors more market access and by creating a more level playing field in the local market.

Accelerate the negotiation and signing of a bilateral investment treaty

U.S.-China relations are the most important bilateral relations in the world and a U.S.-China bilateral investment treaty (BIT) could reflect that. While both governments have committed themselves in the latest SED meeting to schedule a seventh and subsequent negotiating round, it would be prudent to use this as an opportunity to intensify BIT negotiations following the conclusion of the U.S. model BIT review in April 2012. However, it remains unclear how long the process will take and how the two governments will put into practice their commitment to foster open, fair and transparent investment environments to their domestic economies and to the global economy. To complete a BIT with the U.S., China will need to reduce its foreign ownership restrictions, in order to meet the 'pre-establishment' national treatment standard. Clear progress in the signing of a U.S.-China BIT could raise mutual trust and send a strong message that the two largest economies in the world are committed to working together for the mutual benefit of both countries. Both sides may also consider leveraging development in other bilateral or multilateral investment platforms, such as the recently concluded Canada-China Foreign Investment Promotion and Protection Agreement (FIPA), the ongoing Trans-Pacific Partnership engagements, or even the proposal to explore a U.S.-China-EU trilateral investment treaty.

Relax visa rules

Both sides should work on clarifying and expediting visa application procedures for residents from both – as well as other – countries. It would also be beneficial to look at simplified procedures and longer duration or pilot schemes to be offered to frequent and/or business visitors.

Cooperation in financial market development

The U.S. has some of the world's largest and most sophisticated and internationalized capital markets. Lessons learnt from the recent financial crises are also highly valuable. While China's financial system stays strong and stable in the global crisis, its capital market remains underdeveloped. To ensure economic growth and financial stability/security, both countries have a lot to learn through cooperation. Broadly speaking, there are three aspects of cooperation:

- Domestic capital market development: Financial systems in both countries are undergoing significant changes and reforms. In the U.S., the latest financial crises have exposed many fundamental weaknesses of the U.S. financial system and raised new challenges to regulators and market participants. In China, external shocks and uncertainties also add pressure to its efforts to steadily promote and deepen a market-based financial system. While each country will have to adopt reforms and changes according to its own reality and fundamentals, the fact that these two largest economies in the world will ultimately have their financial systems interacting with and influencing each other closely means they need to work and cooperate as closely and as early as possible, especially at times of systemic reforms. Issues such as China's interest rate liberalization, supervisory and risk management reforms, financial system deregulation, capital market deepening and the improvement of the monetary policy transmission mechanism may benefit from U.S. experience and support. Conversely, China's improved understanding and support of U.S. monetary policy and management, fiscal consolidation and financing, and other issues will help to foster better cooperation and policy coordination.

- External finance and bilateral exchange rate stability: This has always been an eye-catching topic in U.S.-China bilateral relations. In the latest SED, China specifically stated that it remains committed to continue exchange-rate regime reform, enhance RMB exchange-rate flexibility in both directions, and allow market supply and demand to play a more basic role in the formation of the exchange rate. While the development of a market-based exchange rate system is important, it is also critical that monetary authorities of major currencies work together to avoid undue financial market volatility. China's effort to internationalize the RMB is an important development of international finance that needs close cooperation with other major economies, especially the U.S. Conversely, the trend of Chinese companies listing overseas as well as the opening up of China's fast-growing financial markets should not be missed by the U.S. authorities.

International financial reforms

Development of new and better international financial architecture cannot succeed without active participation and close cooperation of the world's two largest economies. In the latest SED, both countries have reinstated their support to Europe's efforts to restore financial stability and growth. They also reaffirmed their support to the IMF's role and efforts in promoting global economic and financial stability, including the timely implementation of 2010 reforms with the IMF, and efforts to improve surveillance on exchange-rate policies, global liquidity, capital flows and other external sector analysis. The two governments promised at the SED to effectively implement the international financial regulatory framework based on the G-20, including the supervision of systemically important financial institutions and risk resolution, develop effective resolution regimes for financial firms and enhance the regulation of the financial derivatives, deepen the compensation reform of financial institutions, and support the objective of a single set of high-quality global accounting standards. They also agreed to enhance cooperation in combating money laundering, counterfeiting and the proliferation of terrorist activities.

Better leverage on Hong Kong's Experience and Resources

Hong Kong's close connection with both economies and its expertise in international finance and business is a unique and invaluable asset for both countries. For China, Hong Kong is building on its traditional role as a major trade and finance center to become a key offshore market for the RMB and a conduit for 'go global' Chinese investors. For the U.S., Hong Kong not only remains a major outpost for China/Asia-related business, but also gaining new importance in connecting China with the global financial system. If China's entry into the WTO in 2001 signifies China's formal integration with the global trading system, China's recent move to internationalize the RMB and gradually open up its capital account can be seen as its next important move to formally integrate with the global financial system. In this respect, Hong Kong's emerging role as the key offshore RMB center and the testing ground for China's capital account opening is highly significant in the economic development of China, the U.S and the world.

Chapter 14

Intellectual Property Rights and Information Security

Edward J. SHAO
Chairman of International Economic Law Institute, Peking University

With contributions from Ronald MAK, XU Zhanchen

Executive Summary

The inadequacies of intellectual property rights (IPR) protection in China have been a major concern of many U.S. businesses. Some of the key issues are:

- The ineffective enforcement of existing IPR laws.
- A low level of public awareness of the importance of IPR protection.
- The inadequacies of the judicial system and processes in dealing with IPR cases.
- The decentralized nature of the court system, leading to the necessity of litigation in more than one jurisdiction and potential inconsistencies in the judgments and decisions.
- Dissatisfaction related to China's implementation of its indigenous innovation and technology transfer policies.
- The use and potential misuse of compulsory licensing.

In addition, there are also increasing concerns about cyber security. The U.S. alleges that the Chinese authorities have directly or indirectly organized cyber attacks against the U.S. The Chinese government strongly denies this. In fact, China views itself as a victim of cyber attacks as its ability to wage cyber warfare is primitive. Recognizing the enormous damage that can be done through cyber attacks, hacking has been made illegal in China. Nevertheless, the Chinese authorities cannot rule out the possibility that individuals in China are involved in cyber attacks. There are also allegations of commercial and industrial espionage via the cyber space.

However, over the last decade, China has made great efforts to improve IPR protection. China's legal and other institutional arrangements are being strengthened, while entrenched practices that infringe IPR are being changed. To have meaningful impact on the society as a whole, such initiatives will take time to take effect and even then, more needs to be done. Recent actions taken by the Chinese government include enforcing the use of legal software and eradicating the use of pirated products in all government departments, delinking government procurement from the source of ownership of intellectual property (IP), making steady improvements in its judicial track in enforcing IPR, and reinforcing its commitment to address the problem of cross-border trade in IPR-infringing goods.

Both the U.S. and Chinese governments have agreed to continue working together to enhance IPR protection. Various bilateral cooperation mechanisms between the two economies are continuing. More recently, the Beijing Treaty on Audiovisual Performances is regarded as a milestone for China and the international intellectual property system.

In the future, China is expected to strengthen the protection of IP owners' interests, not only because it is aware that it has to meet international standards, but also because it is in its own interests to do so. China has reached the stage of economic development when the emphasis has gradually shifted from the growth of tangible inputs to innovation and technological progress as the main economic driver. To encourage and promote innovation in China, IPR protection is very important. The number of patent registrations in China has been rising rapidly in recent years and many Chinese companies are acquiring and filing for patents abroad. The owners of these patents will demand a more effective system of IPR protection in China. It is therefore hoped that in the near future, rapid progress can be made in this area.

This study recommends a few measures to deepen U.S.-China cooperation in IPR and information security:

- Mutual recognition of processing documents in IP registration;
- Wider use of site licenses as a way to promote the use of legitimate software;
- Software legalization at state-owned enterprises;
- Establishment of a national IPR court that has jurisdiction over all such cases in China;
- Strengthening the role of the cross-ministerial IP organization within the State Council;
- Improving the market for technology transfer arrangements; and
- Enhancing cyber security through closer bilateral exchange and cooperation, and through promoting international cooperation.

Intellectual Property Rights and Information Security

Introduction

China has actually achieved significant progress in its IPR enforcement efforts in recent years, despite the grievances expressed by many U.S. businesses about its inadequacies in this area. For example, according to a 2012 survey conducted by the U.S.-China Business Council[1], more than half of the executives of its member companies surveyed indicated that China's IPR protection was either greatly improved or somewhat improved in 2011.

It is expected that the protection of IPR in China will continue to be enhanced in the future, not only because of pressure from China's trading partners and direct investors, but more importantly, because it is in the interests of China to do so. One of the major goals of China's 12th Five-Year Plan (2011-2015) for National Economic and Social Development is to transform its mode of economic growth from input driven to technical progress or innovation driven. This in turn implies that China must increase its investment in human and research and development (R&D) capital, so as to generate more inventions, patents and knowhow. In order to achieve this goal, a good system of IPR protection is essential.

This shift of emphasis to innovation has already been occurring in China. This is reflected in the rapidly rising numbers of applications by Chinese enterprises for patents and their authorizations (see Figures 7 and 8). In addition, many Chinese enterprises have been actively purchasing technology, patents and trademarks overseas. These developments show that a substantial group supporting the adoption of more stringent efforts to protect IPR is developing within China itself. Efforts by the government to enhance the effectiveness of the IPR protection regime in China are expected to be stepped up rapidly. Such a pattern of development is similar to the past experiences of many other economies, such as Taiwan in the 1980s.

Global IPR Protection Developments and China's Increasing Participation

International IPR protection developments

The multilateral system governing the protection of IPR at the global level has gradually developed from

1 "USCBC 2012 China Business Environment Member Survey Report", US-China Business Council, October 2012.

Figure 1: **Accession of the International IP Agreements by China and the U.S.**

Convention/System/Treaty	Accession by China	Accession by the U.S.
WIPO Convention	1980	1970
Paris Convention for the Protection of Industrial Property	1985	1887
Berne Convention for the Protection of Literary and Artistic Works	1992	1989
Patent Cooperation Treaty	1994	1978
Madrid System for the International Registration of Marks	1995	2003
WIPO Copyright Treaty	2007	2002
Beijing Treaty on Audiovisual Performances	2012	2012

Source: WIPO website

the Paris Convention for the Protection of Industrial Property of 1883, the Madrid System for the International Registration of Marks – which is governed by two treaties adopted in 1891 and in 1989 – and the Berne Convention for the Protection of Literacy and Artistic Works, that concluded in the late nineteenth century. 1967 witnessed the formation of the World Intellectual Property Organization (WIPO), an agency affiliated with the United Nations. The Patent Cooperation Treaty, which was concluded in 1970, is now administrated by the WIPO.

The Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement – promulgated in 1994 – is one of the most comprehensive and influential international agreements for IPR protection in the world to date. Following the principle of national and most-favored-nation (MFN) policies, the TRIPS agreement has established minimum levels of IP protection that each WTO member country has to provide for other fellow member countries, and has introduced the rules for IP trading in the multilateral trading system. Compulsory licensing, an arrangement under which "a government allows someone else to produce the patented product or process without the consent of the patent owner" (World Trade Organization, 2006) is permissible in the TRIPS agreement in public health crises situations, such as HIV/AIDS, malaria and other epidemics. The Doha Declaration on the TRIPS and Public Health adopted in 2001 basically clarified that the TRIPS agreement should be flexible for its member countries to promote access to essential medicines. The 2005 Ministerial Declaration further set up a legal framework allowing WTO members to export generic versions of patented drugs produced under compulsory licenses to meet the emergency needs of countries that lack the manufacturing capacity in their pharmaceutical sectors.

In the last decade, efforts to promote IPR protection globally have been stepped up despite controversies that arise from time to time. The Patent Prosecution Highway – an initiative launched in 2006 to speed up examination processes of patent applications amongst a group of participating countries – has been well received in many countries. On the other hand, the Anti-Counterfeiting Trade Agreement (ACTA) signed by the U.S. was not endorsed by many developing countries including China and India as well as some European countries[2]. In particular, there has been criticism that the negotiation process leading to the ACTA was undemocratic and that its provisions set an unacceptably low threshold for invoking criminal sanctions. A host of end-users worry that their ordinary activities on the internet would be spied on by the authorities under some broad and harsh definitions of infringement in the agreement. Facing significant protests in var-

2 The signatories to the Anti-Counterfeiting Trade Agreement (ACTA) as at 30 June 2012 include Australia, Canada, Japan, Morocco, New Zealand, Singapore, South Korea, the U.S., the E.U. and 22 of its member countries.

ious member countries, the European Parliament finally voted to reject the agreement in July 2012[3].

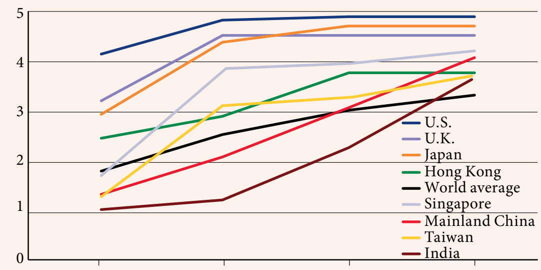
More recently, the diplomatic conference of the WIPO held in Beijing in June 2012 was a milestone both for China and the international system of IP protection. The Beijing Treaty signed at the conference by the WIPO's member states would establish a long overdue international legal framework for the protection of the economic rights of film actors and other audiovisual performers, especially in the digital world. This was the first time for China to host a conference that brought an international IP treaty to conclusion since the start of its economic reform in 1978[4]. Importantly, the conference has also demonstrated that it is in the interests of China to enhance IPR protection. According to Michele Woods, Director of the Copyright Law Division for the Culture and Creative Industries Sector of WIPO[5], China and other developing countries have "made tremendous gains in their film industries and started to see the real need to protect their performers and their overall film industry".

China's progress in IPR protection

Being a latecomer in the game, China has learned the basic IPR frameworks from the West and created, within a short period of three decades, a relatively comprehensive IP system, which took some western countries more than two centuries to complete. As a former WIPO director-general, Dr Árpád Bogsch said[6], "China had accomplished all this at a speed unmatched in the history of intellectual property protection".

His view has been borne out by the Index of Patent Protection compiled by Walter Park, a leading scholar in IPR studies (Park, 2008). The Index of Patent Protection[7] is an indicator of the strength of the system of patent protection facilitating comparison across 122 countries. It ranges from 1 to 5 with a lower value implying weaker protection. As shown in Figure 2, the score for mainland China rose sharply from 1.33 over the period 1960-1990 to 4.08 in 2005, by which time its score was significantly higher than the world average (3.34), and higher than India, Taiwan and Hong Kong. However, it is not easy for China to eradicate all illegal IPR-related practices and catch up with the modern standards overnight, partly due to many economic and social realities. China's IPR protection performance is therefore worse than those of the U.S. (4.88), Singapore (4.21) and the U.K. (4.54). Nevertheless, its remarkable progress in recent years and ongoing efforts to enhance IPR protection are apparent and commendable.

Figure 2: **Index of Patent Protection, 1960-2005**



Source: "International patent protection: 1960-2005", Walter G. Park, Research Policy, *37, p. 761-66, 2008.*

The surge in IP registration, the issue of foreign and domestic grants and Chinese IP applications in China

As a result of the gradual maturity of China's IPR protection regime as well as the rising importance of China as a market, a noteworthy pattern of the

3 "ACTA: Controversial anti-piracy agreement rejected by EU", BBC News, July 2012.
4 "International IP Protection from 'Beijing Agreement'", State Intellectual Property Office of the People's Republic of China, 2012.
5 Ibid
6 "Report on Intellectual Property Protection in China", State Intellectual Property Office of the People's Republic of China, White Paper, 1994.

7 Specifically, the index is an unweighted sum of five separate scores for: coverage; membership in international treaties; protection duration; enforcement mechanism; and restrictions. Two sensitivity issues of the index discussed in Ginarte and Park (1997) are that: there may be gaps between actual and statutory protection (i.e. laws may not be carried out in practice); and the weight attached to each separate score may affect cross-country/region comparisons. It is not a measure of the quality of patent protection.

increasing IP registration/grants awarded globally (see Figure 3) is that China's IP office contributed significantly more to the growth in patent applications worldwide between 2009 and 2011 than over the period 1995-2009 (see Figure 4).

The number of patent applications (see Figure 5) and patent grants (see Figure 6) originating from foreign countries at the Chinese patent office showed an upward trend in the last few years: the largest portions were from enterprises from Japan, the U.S. and Germany.

Meanwhile, reflecting the gradual shift of emphasis of China's economic development towards innovation and technology, the numbers of patent applications by and grants to Chinese enterprises in both the domestic market and the U.S. have shown a rapidly rising trend (see Figures 7 and 8). However, China's number of utility patent grants in the U.S. (3,174 in 2011) is still small in comparison with other developed economies such as Germany (11,920 in 2011), Japan (46,139 in 2011) and the U.S. (108,626 in 2011) (see Figure 9).

Cyber security

With hyper connectivity between computers, mobile phones and other network equipment, individuals, enterprises and governments have become more vulnerable to different sorts of cyber crimes, including espionage, sabotage, subversion and theft of commercial and industrial secrets, bringing huge potential losses to the victims. Cyber attack has been identified as a major global risk at the World Economic Forum Annual Meeting 2012 by government officials, business executives and academics. It is hard to ascertain accurately its cost to the industry or to a country. Nonetheless the problem is, to some extent, reflected in the rising premiums in the developing insurance market for cyber risk in the U.S.

The Budapest Convention on Cybercrime – open for accession since 2001 – is the first international treaty dedicated to the protection of societies against crimes committed through computer networks and on the internet, with the objective to harmonize related criminal policies across countries. While the U.S., Canada, Japan, South Africa and most European countries are signatories to or have ratified this treaty, support from most emerging economies is thin. Given the rising economic power of the developing world and the increasing complexity of computer technology, it remains to be seen whether the convention has the potential to develop into the most effective collaboration promoting international awareness and cooperation[8] in this field.

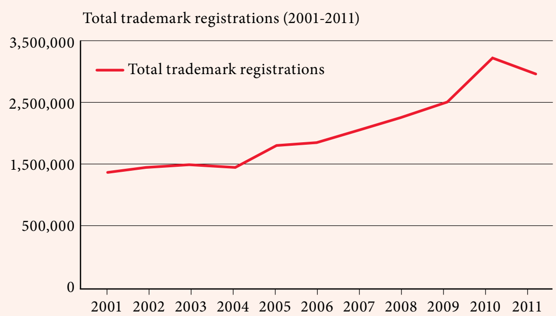
Kenneth Rogoff, an international economist at Harvard University, has pointed out that cyber security and financial stability are similar in a number of respects[9]. In particular, they are both highly intricate issues developing very rapidly and hence it is difficult for government regulators to keep up. Furthermore, as with financial market developments before its recent crisis, many stakeholders in information technology regard the regulatory policies of governments unnecessary or as barriers dampening the growth of their industry. According to Eugene Kaspersky[10] – the founder of well-known antivirus company Kaspersky Lab – cyber-weapons are the most dangerous innovation of the 21st century. Both Rogoff and Kaspersky have commented on the latest super-viruses Stuxnet and Flame, and share the view that viruses originally created by well-intended governments may also be exploited for other perverse purposes. If the viruses are adapted to illicit uses by other parties in the future, the unintended consequence could be the disruption in the operation of key infrastructural systems such as financial

8 Neither China nor Russia is a signatory to the Budapest Convention. The principle of 'transborder access' embodied in the convention is their main concern: sovereignty and domestic legislation of an individual country would potentially be violated due to the transnational collection of evidence by other countries.

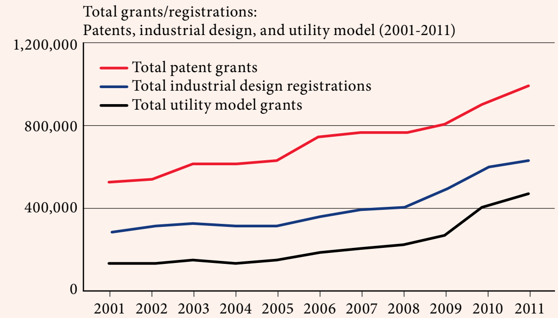
9 "Will Governmental Folly Now Allow for a Cyber Crisis?", Kenneth Rogoff, 2012, http://www.project-syndicate.org/commentary/will-governmental-folly-now-allow-for-a-cyber-crisis-

10 "Expert Issues a Cyberwar Warning", Andrew E. Kramer and Nicole Perlroth, *New York Times*, 3 June 2012, http://www.nytimes.com/2012/06/04/technology/cyberweapon-warning-from-kaspersky-a-computer-security-expert.html?pagewanted=all

Figure 3: Global Trend in Intellectual Property Registration/Grants, 2001-2011

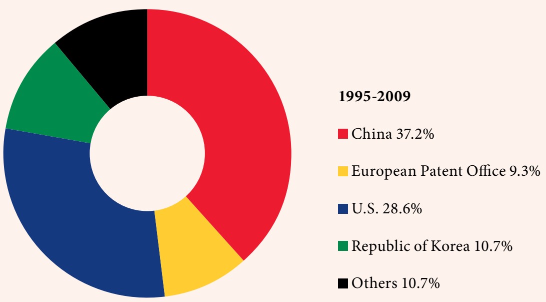


Source: WIPO

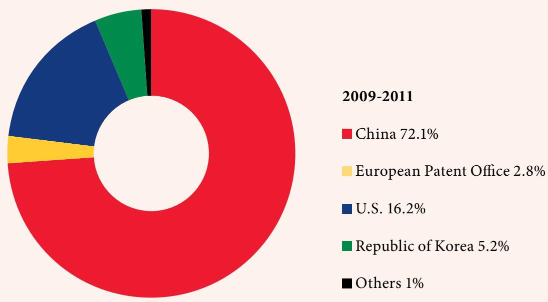


Source: WIPO

Figure 4: Contribution of National/Regional IP Offices to Growth in Patent Applications Worldwide



Source: World Intellectual Property Indicators 2012



Source: World Intellectual Property Indicators 2012

Figure 5: Patent Applications at the Chinese Patent Office by Country of Origin

Country or Region	All years	1985-2006	2007	2008	2009	2010	2011
Japan	417,991	223,545	38,188	34,480	34,381	38,241	45,228
U.S.	282,600	143,748	25,908	27,656	24,629	28,636	32,023
Germany	105,974	52,354	9,388	10,145	9,694	11,297	13,096
South Korea	93,647	48,971	9,601	9,320	7,113	8,782	9,860
France	43,022	23,278	3,697	3,854	3,624	3,994	4,575
U.K.	24,822	14,304	2,012	2,233	1,911	2,087	2,275
Canada	10,223	4,937	953	1,016	989	1,137	1,191

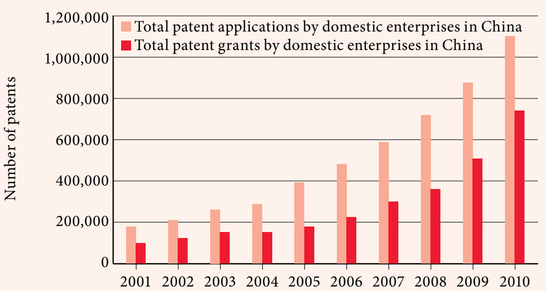
Source: China's State Intellectual Property Office

Figure 6: Patent Grants at the Chinese Patent Office by Country of Origin

Country or Region	All years	1985-2006	2007	2008	2009	2010	2011
Japan	241,640	100,190	21,123	26,370	33,804	29,516	30,637
U.S.	117,881	50,944	9,709	11,195	15,273	14,938	15,822
Germany	50,393	21,393	4,064	4,729	6,658	6,451	7,098
South Korea	49,276	17,591	4,373	5,605	7,950	7,117	6,631
France	22,191	10,259	1,861	1,849	3,004	2,690	2,582
U.K.	11,640	6,021	918	1,000	1,266	1,164	1,271
Canada	4,397	1,666	335	443	599	677	677

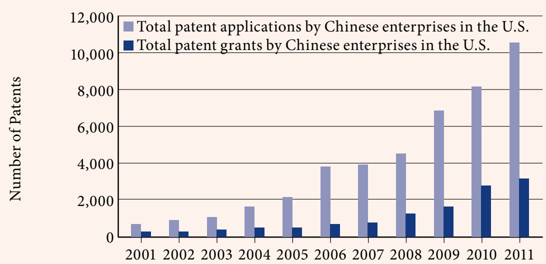
Source: China's State Intellectual Property Office

Figure 7: Patent Applications and Grants in China Made by Chinese Enterprises



Source: China's State Intellectual Property Office

Figure 8: Patent Applications and Grants in the U.S. Made by Chinese Enterprises*



** The above U.S. patent statistics refer to 'utility patent', but exclude 'design patent' and 'plant patent' to facilitate international comparison.*

Source: Patent Technology Monitoring Team of the United States Patent and Trademark Office

Figure 9: Utility Patent Grants in the U.S. Patent and Trademark Office by Country of Origin

Country or Region	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
U.S.	87,600	86,971	87,893	84,270	74,637	89,823	79,526	77,502	82,382	107,792	108,626
Japan	33,223	34,858	35,515	35,348	30,341	36,807	33,354	33,682	35,501	44,813	46,139
South Korea	3,538	3,786	3,944	4,428	4,352	5,908	6,295	7,548	8,762	11,671	12,262
Germany	11,260	11,280	11,444	10,779	9,011	10,005	9,051	8,914	9,000	12,363	11,920
Taiwan	5,371	5,431	5,298	5,938	5,118	6,361	6,128	6,339	6,642	8,239	8,781
Canada	3,606	3,431	3,427	3,374	2,894	3,572	3,318	3,393	3,655	4,852	5,012
France	4,041	4,035	3,868	3,380	2,866	3,431	3,130	3,163	3,140	4,450	4,531
U.K.	3,961	3,831	3,622	3,443	3,142	3,581	3,292	3,087	3,174	4,302	4,307
China	195	289	297	403	402	661	772	1,225	1,655	2,657	3,174
Israel	970	1,040	1,193	1,028	924	1,218	1,107	1,166	1,404	1,819	1,981

Source: Patent Technology Monitoring Team of the United States Patent and Trademark Office systems or power plants. Undoubtedly, the issue of information security calls for broader and more international discussions and cooperation in the coming years.

The Protection of Intellectual Property Right in the U.S. and in China

The U.S.

According to the U.S. Department of Commerce, in 2010 IP-intensive industries[11] supported about 40 million American jobs (27.7% of all jobs in the U.S.), 34.8% of the U.S.'s GDP and up to 60% of its merchandise exports. The vigorous protection of IPR in both the domestic and foreign markets has therefore long been a key policy of the U.S. government. Measured by the Index of Patent Protection[12], the U.S. protection system is regarded as the strongest and most comprehensive one in the world. In recent years, it has made further progress in agency coordination to enforce more effectively its laws fighting piracies and counterfeits, and in reducing online infringement through voluntary practices by the private sector. Building on its longstanding legal and administrative measures, the U.S. underwent a thorough patent reform in accordance with the 2011 Leahy-Smith American Invents Act. One of the provisions of this act will lead to a replacement of the first-to-invent rule by the first-to-file rule widely adopted in other countries, which would contribute to a more harmonized global patent standard.

Furthermore, to promote the interests of American companies overseas, the U.S. has been carrying out two major investigations into the conditions of IPR protection in foreign countries. First, the "Special 301 Report" is an annual analysis of the IPR protection status of America's trading partners, conducted by the U.S. Trade Representative (USTR) since 1989. Assessing the countries on a case-by-case basis and giving corresponding recommendations, the "Special 301 Report" groups countries into three categories, namely Priority Watch List, Watch List and Section 306 Monitoring, according to their levels of IPR protection and enforcement. Secondly, the U.S. International Trade Commission is responsible for the Section 337 Investigations that look into unfair competition of U.S. imports, most of which have been related to IPR infringement in recent years.

China

China is a latecomer to the subject of IPR. In order to accede to the World Trade Organization (WTO) in 2001, the Chinese government devoted a great deal of effort to improving its IPR legislation during the 1990s. Such efforts have intensified since the turn of the century when China started introducing policies to change its development model from an export and tangible-inputs-driven economy to a domestic demand-driven economy with an emphasis on innovation and technology as an essential source of growth.

The recent progress made by the Chinese government is remarkable and encouraging. For example, the Special IPR Enforcement Campaign introduced in 2010 was made permanent by the Chinese government in 2011[13]. It also released a 'China's Action Plan on Intellectual Property Protection' in the same year[14]. Taking the concerns of other countries into account, China has removed the regulation that government procurement has to be sourced from firms with domestic ownership of IP[15]. It was announced at the Fourth Meeting of the U.S. China Strategic and Economic Dialogue that,

11 Patent-intensive industries are defined as the industries whose patent-intensities (i.e. patent/job ratios) are above the average intensity of all industries. Trademark-intensive industries are those with trademark intensities (i.e. trademark registration/employment ratio) above the average intensity of all industries. Essentially all industries related to the production of copyrighted materials are copyright-intensive industries (U.S. Department of Commerce, 2012).

12 "International patent protection: 1960-2005", Walter G. Park,. Research Policy, 37, p. 761-766, 2008.

13 "Ambassador's Roundtable on Intellectual Property Protection", Gary Locke, speech at the event, Beijing, 12 April 2012.

14 "China's Action Plan on Intellectual Property Protection 2011", State Intellectual Property Office of the People's Republic of China, 2011.

15 "Intellectual Property Rights", 2012 American Business in China White Paper, American Chamber of Commerce in China, 2012.

"consistent with the Legislative Plan of the State Council and government procurement working plan of the Ministry of Finance for 2012, China is to issue the Implementation Regulations for the Government Procurement Law and the final Administrative Measures for the Government Procurement of Domestic Products as soon as possible."

Moreover, the Chinese government has pushed forward the program of using legal software in government agencies, setting out the objectives that: the central government and all provincial governments have accomplished the task by 30 June 2012; and the inspections and rectification works at governments at the provincial level and those at the *xian* (county) level are expected to be completed by the end of 2013[16]. The Chinese government has incorporated the software assets into the government assets management system, and reflected the expenditure on information network and software procurement and updates in the budget accounts. Building on the initial priority enterprises pilot project, it is also prepared to extend its legal software efforts to the enterprise sector.

The efforts made by the Chinese government to further improve its judicial track to safeguard IP owners' rights have also been appreciated by the American Chamber of Commerce in China[17]: a number of American patent trial principles and techniques have been adopted by the Supreme People's Court in its recent judicial interpretations.

U.S.-China cooperation in IPR and discussions on safeguarding information security

The U.S. and China have initiated various discussions and bilateral cooperation mechanisms in the last few years. One event of particular significance was the launch of the Patent Prosecution Highway pilot program between the two countries in 2011[18]. This signifies U.S. recognition of the improving quality of China's patent examination process. Under this program, when at least one claim of an applicant is deemed patentable by either China's State Intellectual Property Office or the U.S. Patent and Trademark Office, the applicant may request the other office to fast track the examination of corresponding claims in the corresponding applications.

During the fourth U.S.-China Strategic and Economic Dialogue, both countries committed to tackle the problem of cross-border trade in IPR-infringing products, and attached great importance to the protection of trade secrets. The Chinese government has affirmed that its Annual Work Plan of the State Council Leading Group on Intellectual Property Enforcement would include provisions fighting against the misappropriation of trade secrets.

In addition, the signing of the U.S.-China Intellectual Property Rights Cooperation Framework Agreement, the launch of the U.S. Information Technology Office Ambassador's Roundtable on IPR Protection, the identification of IPR as a key issue in the Joint Liaison Group on Law Enforcement Cooperation and the introduction of the U.S.-China Intellectual Property Adjudication Conference during the last two years have all exemplified the intensification of intergovernmental collaboration in enhancing IPR protection.

It is also encouraging that the U.S.-China Security Dialogue – which started in 2009 and is organized by the research institutes of the two countries – has been providing a constructive platform for formal discussions and informal exchanges on information security between U.S. and Chinese government officials and scholars.

Major Concerns about China's IPR Protection and Cyber Security

Notwithstanding the efforts of the Chinese government to enhance IPR protection in recent years, it

16 "China: provincial level authorities accomplished software legalization", Ministry of Commerce of the People's Republic of China, 2012.
17 2012 American Business in China White Paper, American Chamber of Commerce in China, 2012.
18 "USPTO and SIPO Announce Launch of Landmark Patent Prosecution Highway Pilots", United States Patent and Trademark Office, 2011.

is understandable that, due to the relatively short history of IPR enforcement efforts in the country, the large size of China, a legal system that is still in the process of maturing, and the complex nature of many IPR issues, the inadequacies of IPR protection in China remain a major concern of many American businesses.

Enforcement of IPR laws

Over the last decade, U.S. enterprises and government have continued lodging complaints about the seriousness of IPR infringements in China. Even though the Chinese government has been carrying out a series of reforms, U.S. stakeholders cast doubt on whether the Chinese attitude is genuine and whether its announcements are credible. One major reason for this problem is the complexities of the political, social and economic environment in China. Even though the central government is truly sincere in stepping up its IPR protection, the outcomes depend largely on the effectiveness of enforcement by local governments and courts. Because of the vast differences in the economic and social conditions in different parts of China, and the devolution of government authority to local governments since the reform, some degree of local discretion is inevitable. It is not uncommon that the effective implementation of the well-intended reforms in IPR laws at the local level is delayed or frustrated by some vested interests or by bureaucratic red tape. For instance, the central government has decided to delink government procurement from domestic ownership of IP since 2011, but complaints about the continuation of such practices in many provinces or cities still arose in 2012. Another practical constraint giving rise to a time lag between announcement and implementation is that there is a shortage of experienced and well-trained professionals in local governments to settle IPR disputes and cases. A lack of sufficient resources for comprehensive IPR investigation, together with the abovementioned factors, delay the realization of commitments made by the central government leading to negative impressions of some American businessmen.

A related problem in IPR enforcement has to do with cultural and historical factors. The role of IPR protection in economic development did not receive adequate emphasis in China until recent years. Chinese IPR laws to a large extent are a legal transplant of those of developed countries; its indigenous formulation and development process was basically non-existent in the early stage of economic reform in China. Despite its gradually improving legal framework, modern laws pertaining to IPR were not in place until as late as the early 1980s: the Patent Law was enacted in 1984, and revised in 1992, 2001 and 2008; the Trademark Law was formulated in 1982, and was revised in 1993 and 2001; and the Copyright Law was enacted in 1990 with two revisions made in 2001 and 2002. The inclusion of the entry 'intellectual property' in *Xinhua Zidian* – the best-selling Chinese dictionary first published in 1957 – was done in 2000 and this could be a proxy measure of the level of awareness of such concepts for an average Chinese citizen. This puts into perspective the dissatisfaction of many American businesses that have high expectations in evaluating Chinese performance. China is on the Priority Watch List of the "U.S. Special 301 Report", being criticized for a host of problems including, but not limited to, trademark squatting, online piracy, junk patents arising from a low level of inventiveness requirement for a utility model patent, and the disclosure of trade secrets in the process of new product approval.

Need to improve judicial process in dealing with cases on IPR infringement

The IPR protection in China features a 'two-track' system with an administrative track comprising the offices of relevant commercial and cultural departments at different levels and regions, and a judicial track under which disputes could resort to the rulings or reconciliations of courts. China has been relying on the former to play a dominant role in enforcement and safeguarding the interests of IPR holders in recent years because its judicial track is underdeveloped relative to those in many developed countries. Another problem with the judicial track that is a source of complaint from U.S. businesses is the insufficient compensation for victims of patent infringement in China.

According to the American Chamber of Commerce in China[19], due to the lack of a discovery-type process in proceedings, gathering evidence to prove changes in profit caused by infringing behaviors could be an arduous task. The difficulty in collecting evidence to prove the violations of rights is also not uncommon in cases of trade secret theft or copyright infringement.

Progress exemplified in 2009 copyright infringement case

Despite these concerns, the case of Tomato Garden over copyright infringement handled by the Suzhou Huqiu District Court in 2009 was well received by American enterprises. Four individuals involved in distributing popular pirated versions of Microsoft's Windows XP on their tomatolei.com website were sentenced to prison and required to pay compensation of around RMB3m (US$441,000). According to a statement by the Business Software Alliance[20], "the verdict of this case represents the end of China's largest online software piracy syndicate and marks a milestone in China's efforts to crack down on Internet piracy". Liu Fengming, Vice President of Microsoft for the Greater China region, applauded the decision and said that "it shows the government is really taking action"[21].

19 "Intellectual Property Rights", 2012 American Business in China White Paper, American Chamber of Commerce in China, 2012.

20 "Chief Criminals in Tomatolei.com Case Sentenced to Prison", Business Software Alliance, 20 August 2009, http://sc-cms.bsa.org/country/News%20and%20Events/News%20Archives/en/2009/en-08202009-tomatolei.aspx

21 "Chinese Court Jails and Fines Pirates of Windows Software", *New York Times*, 21 August 2009, http://www.nytimes.com/2009/08/22/technology/22piracy.html

Technology transfer and indigenous innovation

The Chinese government has promulgated the Medium- and Long-term National Plan (MLP) for Science and Technology Development (2006-20) in an attempt to encourage firm-level R&D for commercial purposes, and to raise international competitiveness. In other words, the indigenous innovation policy is regarded by China as a stepping stone to benefit its economy and – through the increased economic activity – develop a better society. Nonetheless, from the perspective of some Americans, the policy symbolizes illiberal techno-nationalism adversely impacting on their economic welfare. For example, there have been complaints that China's indigenous innovation policies have resulted in unfavorable treatment and market access problems for foreign firms in the software, automotive and wind energy sectors. Some American businessmen have complained that their technologies are transferred involuntarily to their Chinese partners in the form of mandatory licensing of technology in joint ventures or through the requirement to set up R&D centers in which Chinese researchers may transfer their technologies to Chinese firms when they leave. They are also concerned that they will be required to supply source codes, product designs and other sensitive information to government-owned or operated laboratories in the mandatory testing and certification processes. Other regulations in line with Chinese government policy on domestic technical standards may also hurt the interests of U.S. IPR owners.

Compulsory licensing issues

China's State Intellectual Property Office (SIPO) announced measures concerning compulsory licensing in 2003 and 2005, and amended corresponding provisions in its revision of the Patent Law in 2008. Having integrated previous versions of legislation, the office released a draft of new measures for public consultation in October 2011. Following India's lead – who granted its first compulsory license in

March 2012 to a pharmaceutical company to manufacture generic drugs to treat cancer – the Newly Revised Measures for Compulsory Licensing of Patent Implementation came into force in May 2012 in China. The overall policy move does not violate the TRIPS Agreement and is also completely consistent with the provisions of other international treaties. According to Kajal Bhardwaj[22] – a legal expert specializing in HIV, health and human rights' issues – it is very encouraging to see the Chinese government overhaul relevant articles and incorporate this legal right into its maturing IPR regime. Notwithstanding the fact that relevant measures have already been in place for a number of years, Chinese pharmaceutical firms have not requested any compulsory licenses.

However, in the eyes of foreign pharmaceutical companies that produce the original drugs, the new measure could harm their interests. According to Article 49 of Chinese Patent Law, "where a national emergency or any extraordinary state of affairs occurs, or public interests so require, the patent administration department under the State Council may grant a compulsory license for exploitation of an invention patent or utility model patent". Besides, one requirement for a compulsory license is whether the patentee has fully exploited the patent or met market demand. Some American stakeholders complain that the aforementioned provisions are vague in the sense that some terms, such as 'public interests' and 'full exploitation', are not clearly defined. The problems of lack of transparency and the imbalance of bargaining power between the Chinese government and an individual company in the course of closed-door negotiations put foreign pharmaceutical firms in a very unfavorable position. They worry that compulsory licensing could effectively become a powerful strategy that the Chinese government could use to twist the arm of foreign pharmaceutical companies into cutting prices, which is inconsistent with the original intention of the WTO agreements.

22 "China changes patent law in fight for cheaper drugs", Tan Ee Lyn, Reuters, 8 June 2012, http://www.reuters.nl/article/2012/06/08/us-china-medicines-patents-idUSBRE8570TY20120608

Cyber security issues

From time to time, the U.S. government makes allegations that the Chinese authorities have directly or indirectly organized or supported cyber espionage against American corporations and government departments. U.S. concerns about cyber crimes coming from China are complicated by the blurred dividing line between the public and the private sector in China. There is a suspicion that some Chinese enterprises may illegally obtain information from the U.S. with the aid of or for the Chinese government. The Chinese government strongly denies this and has reiterated that China is also a victim of cyber attacks; notwithstanding its rapid technological development, the ability of the Chinese government to wage cyber warfare is primitive and therefore is unlikely to do so with other countries. Indeed, recognizing the enormous damage that can be done through cyber attacks, hacking has been made illegal in China. The narrow coverage of related laws in China and its lenient penalties for these sorts of crimes could also be sources of mistrust by the U.S. The two countries lack an identified communication channel in response to a cyber crisis, although they have their own formal procedures to handle an emergency. In addition, infrequent bilateral meetings between related bodies for law enforcement cooperation and mutual investigative support in cyber crime cases are a stumbling block to an effective resolution.

When part of the production process of telecommunications equipment and devices takes place in a foreign country, the end-user country is inevitably exposed to a certain degree of risk that vulnerabilities or unauthorized capabilities have been introduced to its related networks or infrastructures. This supply chain risk is the concern of not only Chinese users importing hi-tech goods from the U.S., but also

U.S. companies utilizing the manufacturing capacity of factories in China[23]. The dissolution of the joint venture between Symantec and Huawei Technologies – which was the only major alliance between American and Chinese network security firms in 2011 – reflects the tensions associated with IPR infringement and network intrusion by China, as perceived by the U.S.

Our Recommendations

There are a number of ways for both countries to reduce the conflicts or misunderstandings arising from IPR protection issues. The suggestions given below are expected to serve the interests of both the U.S. and China and create a business environment conducive to enhancing economic cooperation and development.

Mutual recognition of the processing documents required for IPR patent registrations

While the Berne Convention and the WIPO Copyright Treaty have set up harmonized standards for the international protection of copyright, a system for patent protection with effectiveness comparable to the above arrangements has yet to be established. The overall patent backlogs at the trilateral offices – namely the European Patent Office, Japan Patent Office and United States Patent and Trademark Office – rose over the period 2004 to 2009. Partly due to the rapid growth in patent applications in China, Korea and India, the aggregate backlogs in major IP offices around the world are expected to increase in the coming years. Ideally, it would be best to have a unified system of patent registration that applies globally – or to acceding countries – and administrated by a multilateral organization. However, this is difficult to achieve in the short and medium term.

The next best alternative is to have reciprocal recognition of patent registrations, by agreements either bilaterally or among a group of countries. According to a study published by the Intellectual Property Office of the United Kingdom[24], mutual recognition could significantly reduce the time costs of examining duplicate applications. For example, the backlogs could be lowered by about nine backlog months (from 48 backlog months in the baseline scenario) after five years of implementation if the mutual recognition system results in a 25% reduction in the amount of time spent on processing duplicate applications. Notwithstanding its potential benefits, reciprocal recognition is difficult to achieve in the near future. For example, there is no such agreement between the U.S. and countries in the E.U. The probability of China and the U.S. reaching such a bilateral agreement is quite low.

It would, however, be useful for the two countries to start with a bilateral agreement allowing the processing papers used for patent applications in one country to be used in applications in the other country. This would greatly facilitate the registration of U.S. patents in China and vice versa. The Patent Prosecution Highway pilot program between the two economies serves as a good testing ground and it would be interesting to monitor and evaluate its progress and effectiveness. It would be prudent for government officials from the two IP offices to meet regularly to exchange information on the latest progress and to look into the possibility of expanding the existing program. Given the rapid rise in Chinese patent applications and as the Chinese IPR protection regime moves towards international standards, closer cooperation could lead to the reduction in patent backlog and therefore processing times in the two countries.

23 Despite these concerns, a report released by the US Government Accountability Office (GAO) in April 2013 found that "no cyber-based incidents involving the core and access communications networks had been reported using [three established reporting] mechanisms to the federal government from January 2010 to October 2012". For details, please refer to the report "Communications Networks: Outcome-Based Measures Would Assist DHS in Assessing Effectiveness of Cybersecurity Efforts".

24 "Patent Backlogs and Mutual Recognition: An Economic Study Prepared by London Economics", Intellectual Property Office of the United Kingdom, January 2010, http://www.ipo.gov.uk/p-backlog-report.pdf

Wider use of site licenses

There are various business arrangements under which both the U.S. and China may reap the benefits from trading IP-intensive goods. An American software company could, for example, sell its software at a bulk purchase price to a university in China, and allow all its students and staff to use the software legally.

Site licenses could satisfy the needs of Chinese users, as well as provide American IP owners with reasonable and certain returns. By allowing an organization to copy and use the software on multiple computers within a specific site after it buys the license – at a bulk discount price – from the software company, a site license is an effective means to achieve software legalization in private and public sectors of China. Similar arrangements have taken place with electronic magazines in China. For example, in the case of U.S. publication *Science*, the National Natural Science Foundation of China and the American Association for the Advancement of Science reached an agreement in 1997 permitting internet users in mainland China free access to the magazine after the Chinese government paid a usage fee. In another similar deal in 2002, the National Science and Technology Library bought electronic periodicals from academic publishing house Maney and Royal Society Publishing in the U.K. These transactions essentially involve the acquisition of national licenses, which could be viewed as an extension of a site license to the country level.

Experience from Australia shows that, by asking drug suppliers to compete for a government subsidy by lowering the prices of their drugs, consumers would benefit from lower prices and a much wider use of the drug[25]. Such a program has the potential to transmute an economic deadweight loss – lower output and higher prices under a monopoly – to a significant consumer surplus – lower prices and larger market consumption. The government subsidy on the other hand helps to maintain or even slightly improve the profits of the drug companies.

25 "The Australian Pharmaceutical Subsidy Gambit: Transmuting Deadweight Loss and Oligopoly Rents to Consumer Surplus", Mark Johnston and Richard Zeckhauser, *Prescribing Cultures and Pharmaceutical Policy in the Asia-Pacific*, Karen Eggleston (ed), Shorenstein Asia-Pacific Research Center, 2009.

Software legalization at state-owned enterprises

It is recommended that the Chinese government's commitment to eradicate the use of pirated software is applicable not only to the central, provincial and municipal governments, but also to the centrally-owned and locally-owned SOEs.

Establish a national IPR court in China

Currently, Chinese courts operate in each of the thirty one provinces, municipalities and autonomous regions, each with its own jurisdiction over IPR cases in its respective territory. This means that companies may need to litigate in all the different courts across the country in order to protect its interests. For various reasons, the decisions of the different local courts could vary between one another and this creates confusion and complications. For instance, the ruling on a recent dispute over the trademark of iPad in China between Proview Technology (Shenzhen) and Apple in the Shanghai court was different from that in the Shenzhen court.

China could simplify its IP processes by setting up a national court under which all IP cases would be tried and the decisions binding and enforceable in every province, municipality and autonomous region in China. It would be useful to learn from the experience of countries with more mature development of their IP sector. In Japan and the U.S., certain types of IPR appeal cases are tried in their courts of appeal for IPR. The U.S. Court of Appeals for the Federal Circuit – playing the role of final judge over IPR cases – is a prominent example. Some other countries including South Korea and the U.K. have independent IPR courts or patent courts processing all or major IPR cases. Setting up a nationwide IPR court in China could improve the efficiency of its judicial track through pooling the manpower in different regions and provinces; and legal and technical experts would agglomerate and form a powerful and unified legal framework for IPR protection. In addition, both domestic and foreign IP owners can save on the resources litigating in different local courts in China, as well as avoid the risk of inconsistent rulings.

Strengthen the role of the cross-ministerial IP organization within the State Council

Recognizing the need for a single cross-ministerial intellectual property organization within the State Council to fully implement government IPR policies, the Leading Group for National IPR Protection was formed in 2004. Now is the time to further strengthen the enforcement and coordination role of this organization to ensure full compliance.

Improve market for technology transfer arrangements

In the 4th U.S.-China Strategic and Economic Dialogue, both countries have committed to, "intensive, on-going discussions, including all relevant agencies, of the implementation of China's February 2012 commitment that technology transfer and technology cooperation is to be decided by businesses independently and not be used by the Chinese government as a pre-condition for market access". Improving the market for technology transfer arrangements – thus making business deals a voluntary arrangement – creates a mutually beneficial business environment. The principle of national treatment would allow foreign and domestic firms to compete on a level playing field.

Promote information security through exchange and cooperation

Both the U.S. and China have expressed concerns about cyber security issues in some key government documents:

- The draft guidelines of *Information Security Technology – Guide of Personal Information Protection* was published by the Ministry of Industry and Information Technology in China for public consultation in 2011.
- The report "International Strategy for Cyberspace" was released by the White House also in 2011.
- The Strategic Security Dialogue (SSD) under the framework of the Strategic and Economic Dialogue provides a platform for discussion between the U.S. and China in order to reduce misunderstandings. As the former U.S. Defense Secretary Leon Panetta said, it is crucial for the two sides to cooperate and develop ways to avoid miscalculations which may adversely affect the bilateral relation.

Besides the SSD, the two governments have been advised to establish additional high-level communication channels for civilian and military officials to exchange views over information security and handle cyber contingencies. More participation by the private sector in bilateral meetings would also be beneficial. Both parties have been encouraged to push forward cooperation between their Computer Emergency Readiness Teams (CERTs)[26].

In fact, there has been an ongoing "Sino-U.S. cybersecurity dialogue" between the Center for Strategic and International Analysis (CSIS) in the U.S. and the China Institute for Contemporary International Relations (CICIR) since 2009. They have issued a joint announcement in June 2012, summarizing their agreements and differences.

Cyber security is a rapidly evolving global challenge, and is an important issue to not only the U.S. and China, but also the rest of the world[27]. However,

26 This view was shared by the China Institute of Contemporary International Relations and the Center for Strategic and International Studies after their bilateral meeting on cooperation on cyber security held in June 2012.

27 See also the discussion in a recent article by Zbigniew Brzezinski, "The World Needs New Rules of War for its Cyber Age," Financial Times, 25 February 2013.

the issues of cyber security are extremely complex and do not lend themselves to easy solutions[28]. A new international governance mechanism is probably needed to safeguard it. However, the disagreements over the Budapest Convention amongst different countries demonstrate the challenges involved in getting a global agreement on this subject. During Secretary Kerry's visit to Beijing in April 2013, it was agreed by the two countries that a special working group will be established under the Strategic and Economic Dialogue (S&ED) to begin discussion on the issue of cyber security. The group should work toward developing a road map on how the two countries can a) collaborate on cyber security, and b) collaborate to develop an international agreement on cyber space. It is recommended that the two governments aim at completing the negotiations within 18 months.

Section from *Cyber Standoff*

By John J. Hamre, the President and CEO of the Center for Strategic and International Studies[29]

Every businessman that I know has experienced serious cyber attacks on his/her company. One CEO told me recently his company gets 60,000 attacking emails a day. Most companies do not want to discuss it because it invites unwelcome press attention and too often club-footed government oversight.

And in recent years, the words 'cyber attacks' and 'China' have become virtually linked. Cyber criminals are everywhere, but China has become the bogey man of cyber insecurity. It is becoming a genuine source of instability in Sino-American relations.

Several years ago, CSIS started a quiet dialogue with Chinese security elements on the cyber security problem. No one is naïve about this. Neither China nor the United States is prepared to forego spying on each other using cyber tools. Neither country will deny itself the ability to use cyber-attack tools if we get into a war with each other. God knows a war with China would be enormously destructive and counterproductive, but we and China will always reserve cyber-attack tools for future use if we need to. No one is naïve about this.

But that doesn't mean that we can't find tangible areas where we can cooperate. Neither country would want to let a third country propel us into a war or serious tension through cyber techniques. It is quite easy for cyber attackers to masquerade their identity by capturing an unwitting computer in another country to launch attacks. One of my nightmares is that a hostile foreign intelligence service would design a clever attack against a US public utility – the famous "turn out the lights in Chicago scenario" – but mask the attack by launching it from China. Indeed, when the United States experienced the frightening attack using anthrax against US Senators, the letters containing the anthrax were crudely designed to suggest that the attack came from Muslim terrorists. Our Chinese counterparts are just as concerned on this front as are we.

Neither China nor the United States wants to let criminal gangs in our respective country attack the other country's banking system. We are inextricably linked in a network of daily financial transactions that are highly beneficial to both countries. We don't want that put at risk by criminal gangs or hostile intelligence forces.

Neither country wants to let its computers be used by terrorists acting against the other country or against a third country.

In short, there many areas where we genuinely share common interests in dealing with cyber insecurity, even when as sovereign nations we reserve the right to harm the other for

28 See, for example, the excellent discussion in Dave Clemente, "Cyber Security and Global Interdependence: What is Critical? Executive Summary." Chatham House, February 2013.

29 John J. Hamre, "Cyber Standoff", Center for Strategic and International Studies (CSIS), Dec 2012.

national purposes.

The great problem, of course, is the ambiguous status of attackers who have working ties with government entities. When an American firm finds it has lost the design of important products to a foreign hacker, was that attack an act of a government intelligence-gather or of criminal theft of intellectual property for financial gain? There are several countries in the world where you can't tell the difference, honestly, including China.

But I believe that there are opportunities to work more creatively with China to lessen this great problem. In one sense, it is not entirely unlike the problems we endured for many years—and still do for that matter—where Chinese private sector elements stole the design of American products—or simply created counterfeited labels of American products on containers of adulterated local products for sale to gullible Chinese consumers. Ten years ago this was a rampant and rising problem. It is now significantly better because American companies directly confronted Chinese political leaders, demanding action. And there has been action to lessen the problem. It is by no means solved, but it is moving in the right direction. And American companies have become smarter in protecting their product lines, and have captured handsome market shares in China because their products are known for safety and effectiveness.

As I said, no one is naïve about the massive problem we face. Yelling at China is no substitute for American companies and private citizens doing a much better job protecting their computer networks. Computer experts say that fully half of the computers on the world-wide internet have no effective security features. This is a problem that has been vividly before us for more than a decade. And, yes, US Government officials do need to challenge China to bring discipline to cyber space within China's control. These activities are becoming serious impediments to closer relations.

But I also believe that we have an opportunity for genuine dialogue and constructive work with Chinese counterparts on problems that we do share. The problem is exceptionally hard, but it is not hopeless.

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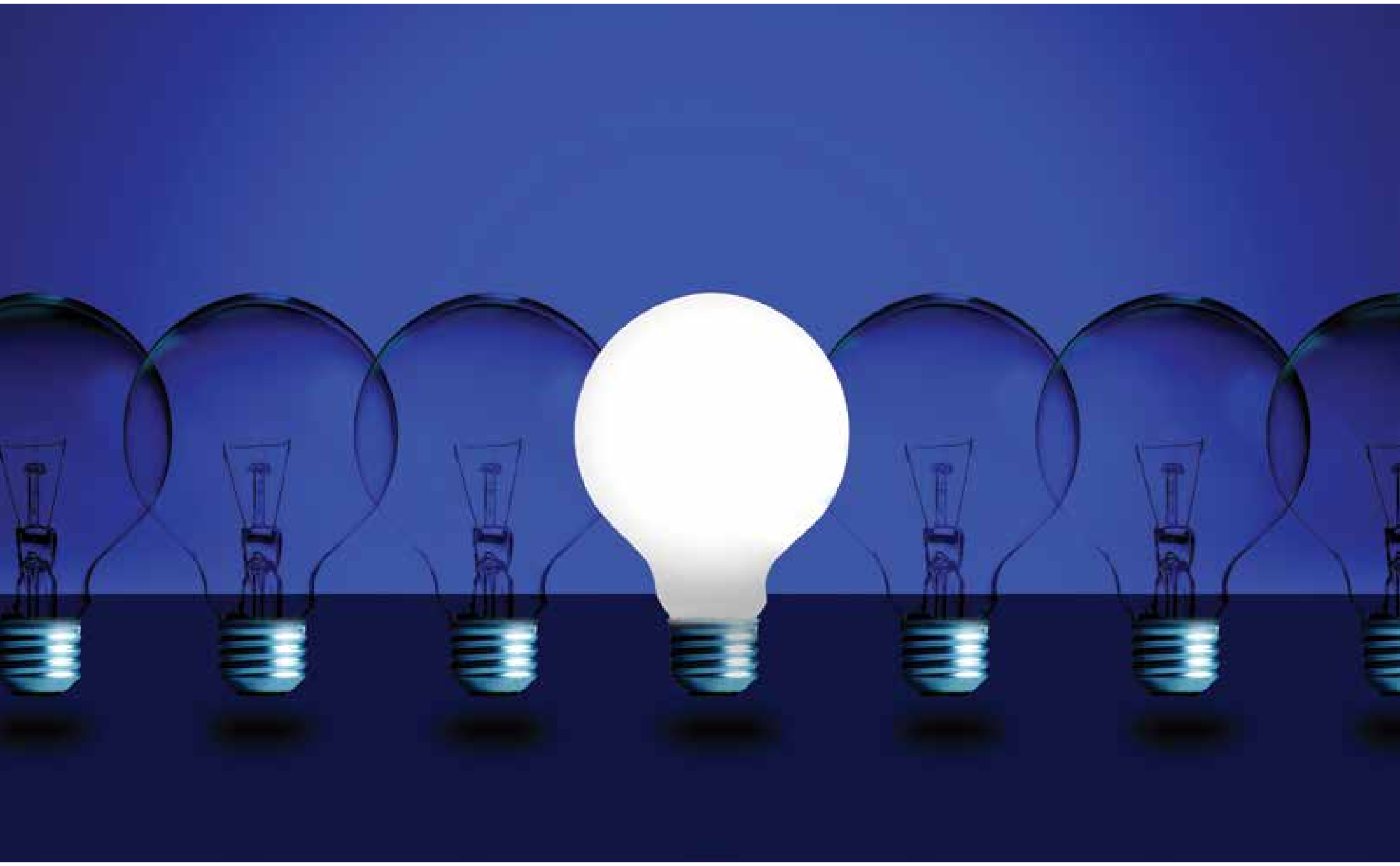


Chapter 15

Intellectual Property in Larger Context: Challenges to U.S.-China Relations

Robert A. KAPP
Principal, Robert A. Kapp & Associates, Inc.
Former President, U.S.-China Business Council

Executive Summary

Intellectual property rights (IPR) have long occupied a prominent position within the broader U.S.-China relationship – especially in commercial relations. The topic has seen intense U.S.-China government-to-government engagement for many years. As time has passed, intellectual property (IP) questions have taken on both a routine quality – both countries know the issues and use the concepts and vocabularies of this complex field with ease – and a somewhat gloomier aspect as IPR has become a staple in a never-ending dialogue of the nearly deaf. Much of the discussion has settled into a familiar "glass-half-full/glass-half-empty" argument, characterized by charges and counter-charges, complaints and direct or diversionary retorts.

In this short essay, I want to take relatively little time discussing the daily 'state of play' in the ongoing process of conflict and cooperation, determination and resignation, consultation and exclusion. I want primarily to place the IP situation in a few larger contexts, most of them specific to China, but all of them deeply relevant to today's and tomorrow's U.S.-China relations.

To me, as both a student of China's modern history and a modest participant in the development of U.S.-China relations over many years, particularly business relations, the IP story is really a mini-drama in the broader story of China's emergence as a modern nation state and a world power. The U.S., as one of the world's principal technology and creative-industry powers, feels the effects of China becoming – almost overnight – the world's second largest economy. As China races toward economic advancement – both qualitative and quantitative – neither country's evaluation of the other remains static. Massive benefits continue to accrue to each from the ever-expanding economic relationship, but new differences emerge as well – and longstanding ones – like IPR, broadly defined, defy simple and rapid resolution.

The ultimate fate of U.S.-China IPR issues will depend on the course China charts, far beyond the confines of IPR itself. The 150-year-old Chinese debate over how to master the challenges of a modernity not hitherto defined by China itself, without sacrificing the profound core of Chinese identity, is still very much alive, now expressed in the slightly defiant rhetoric of 'Chinese characteristics' and the more recent and more confident evocation of 'the China Dream'. Statesmen continue to reaffirm that China will chart its own path, and not simply adopt 'Western' forms, especially in the development of its political system. Similar impulses appear, as we will see below, as China defines its role in the global economy.

What those rhetorical constructs will turn out to mean in practice – domestically and in China's relations with the world – remains unclear. Applied to the more concrete issues of U.S.-China IPR problems, the broad looming questions are these:

- As China continues to amass the economic and technological weight to make its presence clearly felt around the globe, will it strive to predicate its practices on the need for maximum compatibility with the world it has by now so decisively joined?
- Will China conclude that the urgency of national needs and the sheer administrative and cultural burdens of the continued acceptance of externally-derived norms require it to demand others'

acceptance of 'Chinese characteristics' and standards instead? And

- What mixture of the two not altogether compatible instincts will emerge?

This is a process of fundamental significance to China, to the world and indeed, to human history. As the world's largest economy, the most technologically advanced nation and the possessor of the most industrially and technologically potent military force on the planet, the U.S. has a huge stake in the outcome of China's evolution. It behooves the United States to explore, with China, the path of intensive consultation and cooperation on all major concerns, just as it behooves China to deal openly and cooperatively with the United States

Openness and cooperation, however, do not mean that the U.S. should turn away from its traditions, including its notions of the rule of law, while American IP holders lose their most valuable economic assets to IPR violators, in China or anywhere else. While the U.S. and China must continually 'seek common ground' on these issues, the U.S. – both in the government and private sectors – also must concentrate on practical ways of defending vital economic assets from unauthorized expropriation, whether by adversaries, competitors or even partners.

The good news is that China has come a long way in a short time, by constructing a legal framework and a nascent institutional framework, beginning to embed a broad conceptual understanding of the vital function of IPR in its development strategy, and maintaining an active dialogue with the U.S. and other nations in its efforts to preserve progressive economic relations, while advancing its own global interests. The U.S. and China must continue to build on that foundation over the long term.

Intellectual Property in Larger Context: Challenges to U.S.-China Relations

The U.S.-China Dialogue on Intellectual Property Rights in a Nutshell

Today, the U.S. conversation with China on intellectual property (IP) usually boils down to this: The U.S. side notes – often in detail – the astonishing losses incurred by American companies at the hands of Chinese intellectual property rights (IPR) violators, small and large, who reproduce U.S. IP products without authorization and without payment. A major study by the U.S. International Trade Commission a few years ago, for example, put the size of U.S. companies' losses to IPR abuse in China, from both lost sales and unpaid royalties and licensing fees, at US$48bn in a single year and, using an economic model detailed in its report, estimated that nearly a million U.S. jobs would have existed were it not for IP theft by Chinese IPR abusers.

While noting the progress China has made since the 1980s in building a structure of IP law, the U.S. side regularly notes that:

- China's laws fail to provide penalties for IPR violations sufficiently painful to deter would-be pirates;
- Implementation of China's own laws remains weak, and local evasion of the laws pervasive;
- American patience is not unlimited; and
- The U.S. will take steps either at the multilateral level or under U.S. law to protect Americans' interests.

Whether spoken or unspoken, the U.S. conveys the message that IPR violation is a highly politically sensitive issue in the U.S. The U.S. side – whether the government or representatives of the private sector – then goes on to recommend, in increasing detail, steps that the Chinese government ought to take to improve IP protection and especially IP protection for non-Chinese firms. The IP topic is on the agenda of virtually every government-to-government discussion at the highest levels, such as the U.S.-China Strategic and Economic Dialogue (SED) and the longstanding U.S.-China Joint Commission on Commerce and Trade (JCCT).

The Chinese side responds by pointing out:

- Foreign critics must be patient as great changes in law and social behavior, such as the cultivation of an IPR-oriented culture, take time.
- China has come a long way in little more than three decades and deserves greater credit for its efforts.
- The Chinese government attaches great importance to the development of effective IPR protection in the interests of China's own economic development.
- China's leading organs have infused the latest strategic guidelines for national development with the imperatives of an effective IPR regime.
- China has not only passed a raft of IP legislation, but has set up specialized IP agencies in the administrative sector and in the judiciary.
- The PRC has conducted several high-profile public campaigns to popularize acceptance of IP protection and to prosecute violators.
- Powerful government agencies at senior levels have been created to focus on IPR preservation.
- China has joined with the U.S. – through a multiplicity of bilateral and multilateral fora – in efforts at IPR protection and better 'mutual understanding'.

Definitions, Qualifiers and Emphases Upon the Positive

Let me start with several preliminary observations, so as to forestall predictable protestations and debunk any notion that IP issues are simple problems amenable to simple solutions.

First of all, the whole concept of IPR is in perpetual flux, and remains something of a cultural artifact, whose shifting definitions reflect, above all, technological change and national circumstance. Moreover, within any given nation, the definition and treatment – whether in law or in social custom – of what is defined as IP, is often the subject of heated debates, whose partisans' certainties vary with vantage points and material interests: consider, for example, the monumental debate in the U.S. about musical file sharing. In the U.S.-China context, where each nation's image of itself (America's self-image as the rightful creator and owner of valuable, costly, hard-earned and privately-held economic assets, and China's as a poor and disadvantaged society seeking to break out of the excessive domination by the techno-economic power of U.S. multinationals so as to create an opportunity for China to develop), shared certainties about IPR have proven difficult to reach.

For most American corporations, the many inadequacies of IP protection are still – as they have been for years –a central concern of doing business in China, a serious negative aspect of the Chinese business environment and the cause of complex and costly efforts to prevent losses. The list of 'best practices' now recommended for corporate prevention of IP loss, carried out to varying degrees by different firms, is as remarkable for its costly complexity as for its imperfect effectiveness. The dialogue on IPR between U.S. businesses, individually or through trade associations, and the U.S. government's executive branch, is active and ongoing.

IP by now subsumes so many topics that its usefulness as an organizing concept may bear reexamination. Trademarks, copyrights, patents of various descriptions, trade secrets – all fall within the IPR denominator, but each is vastly complex in its own right, within any one country's economic and legal systems, and even more arcane in bilateral or multilateral environments

Moreover, because of these complex specializations, IPR has become an industry of its own, not only in terms of the legions of legal, technical and government specialists whose jobs focus on IP, but in terms of the degree to which IP problems define the conduct of governments, corporations and societies more generally. We learn, for example, that small American companies, unaccustomed to the dangers posed by loss of IP or financially ill-equipped to bear the costs of adequate IPR protection – whether by prevention or prosecution of IPR abuse – have intrinsic vulnerabilities.

We learn, as well, just how deeply the internalization of a responsible IPR culture demands the building of human resources at all levels of Chinese government and society. We will ask, below, just how much the Chinese system in particular can bear.

On IPR, China has made significant strides, albeit from a very 'low base'.

It is becoming harder to remember, as the years pass by, what China was like before its "Reform and Opening up" policy came into force in late 1978, that is, before the introduction of domestic market economic processes and integration with the global economy. But we should never forget how far China has come. In the late 1970s, the legal scholar Victor Li was able to publish a slim but important volume called *Law without Lawyers: A Comparative View of China and the United States* (Westview Press, 1978) which reflected the underdeveloped nature of China's legal system and the nearly complete absence of a legal profession after decades of Maoist 'politics' and the depredations of the Cultural Revolution. Imperfect as the rule of law may remain in China today, the P.R.C. possesses a vast catalogue of law and regulation, particularly with respect to the economy.

By any accepted definition, IPR abuse is found in most countries, even those with underdeveloped industrial or less internationally connected economies, which – in the age of the internet – means everybody. Even as the U.S. and China ponder the mixture of accommodation and confrontation that the IP situation presents to them, they should point out to each other – and they often do – that the problem is not merely bilateral. This applies not only to 'traditional' forms of IPR abuse, but to its most current alarming form: computer hacking. In a recent eloquent article in the magazine *The New Yorker*, on the recent suicide of the precocious and complex young American computer genius and activist Aaron Swartz, the author notes, completely in passing, "At M.I.T. [Massachusetts Institute of Technology], hacking, broadly understood, was a tradition. It was taken to be a part of the culture that led to technological innovation and was rarely punished, even if it resulted in considerable annoyance and expense to the hackee." The point is obvious, but it needs to be kept in mind.

IPR in China's Changing Economic Environment

Thus far, the core of the IP problem for the U.S. in China has been primarily commercial, while for China it has been an issue of development strategy, both domestic and global. For the U.S., however, the problem is fast becoming a strategic national security issue as well.

We should not make light of the rampant piracy of successful international products and brands that has been a feature of the Chinese social landscape for decades – apparel knockoffs, cheap DVDs of foreign films, ubiquitous pirated software, and so on. These behaviors took root quickly after the start of "Reform and Opening." They persist today – artifacts, in part, of a legacy of isolation and impoverishment that still drives many people to find whatever living they can without undue regard for IPR niceties and induces many others to acquire replicas of otherwise unaffordable objects at prices they can pay. (The Chinese writer Yu Hua recently wrote an article entitled "Stealing Books for the Poor" in the *New York Times*, in which he argues that the demand for pirated books rests on the needs of vast numbers of people who cannot begin to afford to pay for the legitimate copies of books or anything else.)

But the heart of the IPR challenges in U.S.-China relations continues to shift, as China becomes wealthier and more powerful; its economy more sophisticated; its own IP management policies, laws and institutions more ramified; and its politics and foreign policies increasingly driven by a contemporary vision of a 21st century "rejuvenation of the Chinese people". What was once a nasty international conflict over implementation of China's early Opening policy has strikingly evolved – as China pursues a government-led strategy of increased global competitiveness in advanced economic sectors through the promotion of domestic 'innovation' and the reduction of Chinese dependence on products and technologies sourced abroad.

Some Thoughts on Older Issues in China

It is understandable that the Sino-American dialogue on IPR generally concentrates on problems in the 'here and now', which I have touched upon already. Let me offer a few comments on broader frameworks of understanding of contemporary IPR issues in China.

One Intriguing Speculation on 'Shanzhai' Piracy and the Culture of the 'Men of the Marshes'

The Chinese term for the vast, society-wide production and consumption of cheap imitations of branded consumer goods (such as mobile phones, athletic shoes, etc.) is Romanized in pinyin as '*shanzhai*', and is usually translated as 'mountain stronghold' or 'mountain redoubt'.

A fascinating paper by the scholar Paul Hennessey argues that behind today's *shanzhai* phenomenon lies an historical tradition of ingenious but courageous defiance of the oppressive abuse of power by tyrannical ruling elites. There has long been, Hennessey maintains, a deeply rooted romantic tradition of admiration for those who boldly flout the power of the state, as exercised through its corrupt and brutal local officialdom. Those who ingeniously skirt official orders in order to behave righteously – if in an unorthodox manner – thrive in a durable alternative universe. Thus, Hennessey suggests that today's *shanzhai* world is driven by a kind of nether-world gusto. It is animated by a contemporary relationship of the lower depths of Chinese society – to the official representatives of state power not so very different from that found in the 15th century. The Hennessey paper was not an economics or a business study, and of course, its creative interpretation can neither be 'proved' or 'disproved'. It raises, however, intriguing questions as to whether – beyond what we might term 'the universality of economic opportunism' that surely motivates the legions of contemporary knockoff artists and petty counterfeiters – certain forms of consumer-goods piracy find their roots in a longer-lived 'Little Tradition'.

The Confucian Heritage of Reverence for the Past and Imitation of Past Models

Among the cultural holdovers from the late traditional period in China, running right into the twentieth century, was the idea derived from classical Confucianism and later elaborations, that emulation models of social and aesthetic perfection were to be found in the past, and that the highest aspiration of the contemporary achiever must be the approximation, through imitation, of earlier exemplars. In this view, although many members of China's political and social elite had, by the end of the 20th century, accepted the contemporary challenge of 'self-strengthening' – a goal enunciated by late Qing dynasty reformers in the second half of the 19th century, and defined by the words 'wealth' and 'might'– they remained trapped by a culturally dictated bias against originality and a deeply rooted affinity for diligent but unoriginal copying.

Nowadays, Chinese planners still cannot conclude that China has escaped from the inherited inhibitions of originality and innovation, even with the creation of a complex legal and regulatory framework, backed by increasingly comprehensive central government policies aimed at ordaining from above a culture of innovation to meet the needs of rapid economic development; and even with the laying down of quantitative targets – for example, of patent applications and grants – as definitive measures on 'innovation' in the Chinese economy; and even with the vast crescendo of patent filings by Chinese companies over the past decade.

China's Governing Structure in light of Recent History

The collapse of imperial political and social institutions in the early 20th century, after millennia of enduring continuity; the turmoil of the Republican era, from the end of the last dynasty in 1912 to the establishment of the People's Republic in 1949; and then the near-constant political upheavals of the first 30 years of Communist rule (1949-1979) all left the task of building an effective structure of modern political power in China unfinished, and the task remains far from finished today. A central aspect of that incompleteness is the absence, thus far, of a new governing synthesis effortlessly connecting the mass of the Chinese population to its government, in spite of the Leninist disciplines exercised by the Chinese Communist Party. To the point here, a manifestation of this today is the paradox, on the one hand, of a unitary governmental structure, in which ultimate command authority resides at the apex of a vast pyramidal administrative system and flows downward through provinces, counties, townships and villages; and, on the other hand, the practical impossibility of ensuring full implementation of most central mandates across China's immense land mass and population.

In practical terms, this structural challenge left over from China's history manifests itself in such daily realities as the regional and local variations evident in the implementation of IPR policies and regulations, the persistence of personal particularisms as key factors in determining IPR outcomes at the local level, and the uneven levels of professionalism among lower-level bureaucrats and judicial personnel ostensibly responsible for implementing IPR policies and managing IPR disputes on the ground throughout the country.

This structural legacy means not only that issues to be decided at the top of the pyramid, in this post-'Great Man Rule' period, are subject to intense debate among representatives of various interest groups; it also implies that China's central political authorities have to pick and choose very carefully the issues on which they must lean most heavily on the hundreds of thousands or even millions of party members and government bureaucrats who hold the power to carry out or evade the center's will. Forging from the top an IPR system as it might be envisioned by foreign companies, and ensuring that that system applies with perfect even-handedness to domestic and foreign companies nationwide, is – at this stage of China's development – an ideal that has proven difficult to realize.

Sun Yat-sen – the early 20th century revolutionary usually credited with leading the uprising that brought down China's last dynasty after two millennia of imperial dynastic rule – once remarked with dismay that the Chinese people were a 'heap of loose sand', and lamented the difficulty of binding China's immense population together in pursuit of broadly shared understandings of nationhood and recovered national dignity. While his choice of words has remained in the public imagination, he was probably not the first or the last Chinese figure to express that general idea.

Changing China's Post-Cultural Revolution Socio-Ethical Compass

The Chinese nation, under the leadership of the Chinese Communist Party, has come a considerable distance in integrating the enormous population of China around a shared sense of modern national identity. But the task is far from fully accomplished, and is, perhaps, incapable of full realization.

In particular, at this moment in history, Chinese society still grapples with the erosion of ancient traditions mentioned above, but also with the legacy of the disruptive normative firestorms of the Maoist interregnum, particularly the violent and chaotic Cultural Revolution of the late 1960s and early 1970s.

The extent of damage to China's socio-ethical consensus during the Cultural Revolution, and indeed, the effects of the further undermining of social consensus in the early post-Cultural Revolution period – when the revolutionary truths of the preceding decade were rapidly jettisoned – has yet to be fully explored, and remains sensitive.

But one may speculate that, in addition to the historical and cultural legacies referred to already, another aspect of contemporary Chinese social behavior that is proving so difficult to manage – official corruption and abuse of power, and the intransigent resilience of networked particularism– has found fertile soil in this overarching environment of normative uncertainty.

In a host of ways – the zealous pursuit of wealth by any available means; the explosion of ostentatious display; the obsession with luxury branded goods; the commission of ingenious accounting frauds; the perpetration of food and medicine frauds, the 'marketization' of virtually all social services; the Chinese people's own fears of falling victim to unscrupulous counterfeiters; but also in the apparently wide acceptance of the attractions of engaging in this type of conduct when opportunities arise – we get a glimpse of the deeper challenges to establishing an effective IPR system in China, no matter what Beijing orders or the U.S. demands.

New Developments

IPR issues in U.S.-China relations in the past few years have seen both positive and negative developments.

Authoritative private sector statements from the U.S. business community have taken note, for example, of the growing extent of new IPR institutions, created in response to a continuing series of prescriptions from the top of the Chinese political pyramid. American business surveys suggest, for example, that U.S. companies are gradually coming to consider resorting to China's special IPR judicial institutions – especially, we may assume, in Beijing and Shanghai, since these institutions grow unevenly in both quantity and quality across the vastness of China – as a viable option for pursuing at least partial redress of IPR grievances. Many would find signs of progress in the recent vast increases in the numbers of patent filings by Chinese firms and IPR court disputes between Chinese companies; it is, after all, a staple of the American position that, as China's sophistication in science and technology increases and Chinese companies produce more of their own proprietary knowledge, China's commitment to IP protection through the legal system will deepen, to everyone's benefit.

There has, however, been another development, mainly since the turn of the present century, which is significantly transforming the Chinese IPR landscape and the nature of the ongoing U.S.-China IPR problem. It is the Chinese government's ongoing promulgation of far-reaching policies designed to secure the indigenous foundations of China's advanced industrial and technological development – in support of the nation's global economic competitiveness – and to ensure that Chinese domestic companies will compete successfully against foreign firms, within China and worldwide.

One can hardly blame the Chinese authorities, who have for the past 30 years, shown such exceptional skill in defining long-term strategic economic goals and then delivering on them, for their desire to propel China to the forefront of global economic and technological prowess as fast as possible.

The original strategy of drawing on Chinese supplies of abundant, inexpensive, generally low-skilled labor from the rural sector has borne enormous fruit; China's export system, backed by hugely successful investments in infrastructure, has until very recently proved successful, and China has leapt to the forefront of the world's trading nations, its overall gross domestic product second now only to that of the U.S. and soon to be the world's largest. Living standards for hundreds of millions of Chinese have risen, not only above dire poverty, but to levels of disposable income that define the term 'middle class'.

But Chinese strategic thinkers could perceive that, over time, further gains from the first version of the post-Mao development strategy would thin. For one thing, because of China's one-child policy, the growth of the working-age population was destined to slow. For another, the global market for low-technology goods from Chinese factories could not expand exponentially forever.

Most of all, China would need to break out of the low value-added role that it had initially so diligently carved for itself. It became commonplace that the value of China's contribution to the export price of many of the industrial products it shipped to developed country markets was a small fraction of the total, because the high-value inputs – those based in IP, including designs and sophisticated technological components – were created outside of China and merely sent to China for final assembly, packaging and distribution to world markets as China exports.

Furthermore, as China's economic strength and global interests grew, the regime recognized that the Chinese armed forces would have to cope with the challenges of the 21st century, which meant, above all, the immense technology driven power of the U.S. military. As frictions with the U.S. over trade, human rights, third-country issues, etc. continued, and U.S. military sanctions against China dating from the Tiananmen tragedy remained in place, P.R.C. planners realized again that China must look to its own efforts to escape from technological dependency on an uncertain 'outside world'.

Thus the past decade has witnessed the emergence of a structure of policy and regulation designed to stimulate the development of 'Invented in China' IP. This has taken the form of state delineation of economic sectors and industries deemed most essential to Chinese economic development; wide-ranging programs of government financial support, on concessional terms, for favored technology projects and 'strategic emerging industries'; and detailed government targets for IP generation. It has also witnessed early and, so far, inconclusive efforts to reformulate bureaucratic performance metrics to include evidence of innovative achievement.

The campaign to propel China to the forefront of the world's high value-added economies has taken as a foundational assumption the need for a well developed system of IP ownership functionally similar to that found in the world's advanced industrial economies. But there remain crucial differences, some of which underlie the continuing frictions characterizing current U.S.-China IPR relations.

First of all, as the state has sought to define the path to advanced technological greatness for the nation, it has retained and even expanded its role in the modern industrial economy. Thus far, despite the proliferation of small, often dynamic, non-state-owned companies in non-strategic economic sectors, state-owned firms dominate much of the Chinese economic landscape, especially with respect to worldwide business competition. The largesse bestowed by the state on Chinese companies, in support of high-speed, high-end technological development, has flowed overwhelmingly to state-owned enterprises, corporate or otherwise. One of the implications of this is that IP developed in China under government guidance is embedded in a fabric of state-dominated and state-supported economic activity that, when necessary, is different in kind from the activities of competing private foreign firms.

A second element arising from this system of state-directed technological innovation is the emergence of government policies, heatedly contested by foreign companies and their governments, to boost the economic success and competitiveness of domestic companies by mandating their utilization of domestically generated IP, and to discriminate against companies utilizing IP inputs developed outside of the P.R.C. This has become a particularly sensitive topic in the area of government procurement.

There are other aspects of China's now well-established development strategy with respect to advanced technology, domestic innovation, foreign participation in the Chinese economy and escape from dependency on international technology sources that provoke external concerns, but space does not permit further elaboration here. It is noteworthy, however, that China is able to use the now proven size of its huge domestic markets to bargain for, if not compel, the sharing of sensitive foreign corporate proprietary knowledge with Chinese partners or users as a condition of market access; while this is theoretically prohibited by the terms of China's World Trade Organization accession, in practice, it remains a familiar artifact of the Chinese business environment. Provisions for mandatory licensing of proprietary technologies or business secrets have been vigorously protested by foreign companies and their governments.

The overall point is that the anatomy of the IPR debate between the U.S. and China has changed with China's increasing economic maturity, and with shifts in economic and military balances worldwide. The Chinese model of development, with its continuing central role of the state both in strategic planning and in the use of economic resources to support state-defined goals, operates in marked contrast to the private sector-oriented pattern of technological development in the U.S. This, in turn, is an impetus for the U.S. private sector to cooperate ever more closely with the U.S. government in pursuit of key objectives in China, including both market access and the improvement of IPR protection.

The Cyber Situation and the Lurking Metaphor of Threat

To call the rapidly unfolding public drama over alleged cyber-hacking by Chinese operatives against numerous U.S. corporate, government and infrastructure networks, and the allegedly numerous attacks by U.S. hackers against China, an "IP dispute" will both weaken further any meaningful definition of IP and lend a very problematic new dimension to the discourse on IPR.

I have long felt that there is a lurking strain in American perceptions of China, dating from the 19th century, which sees China as a sort of fountainhead of noxious and threatening emanations, whether physical, medical, or even moral. This is most assuredly not the dominant element in American public thinking about China today, and many other more favorable perceptions of China and its people inhabit the forefront of popular imagination. Nevertheless, in my personal view, this nagging sense of lurking contagion from China remains a latent and potentially volatile current of popular uneasiness. As such, it remains potentially politically volatile as well.

Contaminated products from China that periodically make the headlines as threats to public health similarly contribute to that lurking sense of danger – definable or indefinable – spreading from China to the U.S. Images of contamination – of children's toys coated with lead paint, of pet foods adulterated with lethal chemicals, of the farmyard processing of porcine intestines to produce most of the Heparin used in American hospital operating rooms, or even, most recently, of thousands of bloated pigs floating in the greasy shallows of the Huangpu River that provides most of Shanghai's water supply – become a part of the reservoir of Americans' sense of China, leaving a residue of uneasiness and suspicion.

This is the terrain that the U.S., in its relations with China today, must avoid, and it is my greatest concern that the controversy over cyber-attacks has now escaped from the shadows of corporate reticence and government secrecy into public view.

The rapid rise of cyber intrusions – whether driven by technology, human aspirations to power, a human love of stimulation and amusement, or by undisclosed strategies of governments deeply distrustful of one another – goes far beyond the debates over IP that have preoccupied American and Chinese observers over the past few decades. Yet, because much of the alleged Chinese penetration has been directed at the trade secrets of American corporations, it still falls within the expanding parameters of the IPR discourse between the U.S. and China.

The outcome of this controversy cannot be foreseen, and hopefully the effects of the hacking assaults themselves will never be proven in a lethal crisis between the U.S. and China.

But the hacking crisis today is a further extension of the longer-running IPR situation. It raises to prominence the reality that information secrecy is, if anything, harder to protect now than it was even in the recent past; that the dividing line between the commercial and the strategic continues to blur; and that the old days of an American economic and technological colossus and a Chinese economic adolescent are gone forever.

A conclusion on the bright side

For all the continuing frustrations over IPR abuse, the formulaic readings of 'talking points' and the never-quite-definitive outcomes of U.S.-China engagement on IPR, we must remember how much has actually been achieved, and not wring our hands about the future.

Though the implanting of a culture of IPR awareness and rights protection remains a work in progress in China, there is little doubt that the leaders of the Chinese political system have moved toward embracing the necessity of viable national and global IPR protections. China's self-perceptions differ from those of the U.S., and within China, not all parties hold the same views on the long menu of IPR-related issues (nor do they in the U.S., for that matter). But I believe that China and the U.S. both understand that the alternatives to dogged engagement and to the search for common ground are worse than the hard work itself.

Moreover, for all the strategic distrust that now pervades the U.S.-China relationship, evidence pops up repeatedly to prove that, when push comes to shove, the two sides are still able to come to mutually acceptable arrangements; and that at popular and local levels, well-intentioned interests survive.

What the immense U.S.-China relationship shows is that neither side is driven primarily by altruism; each side is driven to achieve its own interests and goals. That has, in fact, produced US$0.5tr in annual two-way trade; it has produced full Chinese participation in the major multilateral economic bodies from which it once had been excluded; it has produced intellectual and cultural exchanges, especially of students, on a scale unimagined not long ago; and it has produced the beginnings of U.S.-China cooperation on a host of global issues, despite differences in national priorities and stages of development. It has even produced, in times of acute tension, peaceful and face-saving resolutions in ugly disputes.

Management of U.S.-China relations with respect to IPR is highly specialized, hard work. It demands legions of technically, linguistically and culturally trained individuals. Moreover, it requires a continuing flow of them; today's specialists are tomorrow's retirees and tomorrow's specialists always need to learn the basics. The human resource dimension to the U.S.-China IPR challenge is one of the biggest tasks, but it is also one of the most achievable. The two countries should be working together to support, through government and non-government resources, the building of an enduring cadre of IPR professionals, capable of managing their own countries' IP issues, but also of engaging with and learning from one another in the interests of managing the bilateral IP agenda. If there was a time to build, the time is now.

As we have noted above, the U.S. cannot be China's patronizing tutor on the P.R.C.'s fundamental development choices. It can, and should, however, continue to work with China on the development of educational programs designed to help a culture of responsible IPR protection take root at local levels of society and government, and within Chinese business. American companies must continue to implement comprehensive, sometimes costly, strategies for protection of their intellectual property, including close collaboration with educational institutions, supplier companies, and their own employees who carry out the daily work of business on the ground in the P.R.C.

For its part, we must hope that China will continue to deepen and strengthen the structures of IP protection that it has already erected, while making sure that discrimination in the treatment of Chinese firms and foreign (including American) companies is rigorously eliminated.

It is too much to expect a sudden, miraculous lightening of the burden of IPR conflict between the U.S. and the P.R.C. We should look, instead, for what, in a different context, I called 'reciprocal unilateralism', a process of gradual removal of irritants by each side's unilateral action, without any hint of coercion or concession to foreign pressure.

Finally, given the broader contexts discussed in this essay, Americans interested in the IPR dilemma should learn to take heart from progressive developments in other Chinese arenas. Because IPR solutions are part of a broader pattern of Chinese modernization, the indirect long-term effects of improvements in, for example, the oft-discussed rule of law in China, or in other dimensions of U.S.-China relations, are likely to be felt ultimately, if indirectly, in an improved IPR environment as well.

"These things take time", however, is not a sufficient answer, economically or politically, to the IPR problem of today. When Reform and Opening commenced in the 1980s, China was a newcomer in an established league. Its industries were backward, its population's spending power low and its engagement with the world only in its infancy. China opened the door and foreign companies poured in, mesmerized by hoary dreams of the China market, but also eager to do business helping Chinese industries to modernize. Much of that industrial modernization has now taken place, as has the creation of a huge domestic consumer market. The P.R.C. looks far more confidently at a world that needs China every bit as much as China needs the world, and it sets its sights on successful competition with the best the world can offer. In the IP sector, that often means competition with the U.S.

American companies now must make hard decisions on whether to submit to IP exploitation for fear of losing commercial opportunities in China's market, or to confront major abuses and pursue redress at the risk of Chinese government retaliation. They understand the inutility of perpetual confrontation, but little is left of the strategically charitable instinct that American businesses manifested in earlier Reform and Opening times. I think that U.S. companies will decide to pursue IPR redress in carefully selected cases. When they do, Chinese authorities would be well advised to listen carefully, and to establish mechanisms for the expedited resolution of U.S. complaints. A growing list of successful resolutions could prove, in and of itself, a significant factor in improving the IPR climate between the U.S. and the P.R.C.

CHAPTER 16

THE ROLE OF STATE-OWNED ENTERPRISES IN THE CHINESE ECONOMY

FAN Gang
Director, National Institute of Economic Research
Chief Researcher, China Center For International Economic Exchanges
Professor of Economics, Peking University and the Graduate School of Chinese Academy of Social Sciences

Nicholas C. HOPE
Director, Stanford Center for International Development (SCID) and its China Program

With contributions from Winnie HE (The Fung Business Intelligence Centre), HUANG Zhilong, ZHANG Huanbo

Executive Summary

China's state-owned enterprises (SOEs) have a long history. When the People's Republic of China was established in 1949, the country had been devastated by a long period of war and underdevelopment. As there was neither private wealth nor any organized structure to take on the huge task at hand, it was the state enterprises that gradually undertook all the nation-building tasks. In addition to their historical function of rebuilding the country, they have been playing an important role in providing for the livelihood of many people. SOEs provide not just employment, but also a range of social services, education, medical care and healthcare and retirement protection.

Since economic reform and opening-up policies began in 1978, China's SOEs have undergone a long process of gradual and progressive transformation. To reduce their claim on budgets and/or bank loans, many inefficient and smaller SOEs have been closed down, merged or sold. The resulting unemployment and restructuring problems were painful. The transitional difficulties were made less disruptive because China maintained rapid economic growth and established basic social security, medical services, education, housing and other safety-net arrangements. Concurrently, and more positively, many large SOEs in key and strategic sectors have been successfully transformed, from inefficient production units operating under the state's economic plan, into profitable, incorporated business entities, for which appropriate corporate governance structures are being gradually implemented.

The relative economic weight of the state sector has declined substantially as successive reforms have increasingly opened up more industrial sectors to competition from non-state enterprises. The share of SOEs in the country's gross industrial output, for example, fell from one half in 1998 to one quarter in 2011. The number of SOEs owned by the central government has fallen from 196 in 2003 to 115 in March 2013. But many smaller SOEs are still owned by different levels of sub-national (local) government, many of which adopt policies that still discriminate in favor of local companies.

Despite the dramatic restructuring of Chinese enterprises, the subsequent successes of the large Chinese SOEs have become a source of friction between China and some of its trading partners, as these companies have become increasingly formidable competitors in both the Chinese and global markets. The U.S. business community has complained about the unfair competition arising from government policies that favor SOEs in the China market. In addition, the Chinese government's encouragement of overseas ventures by large SOEs is also seen to disadvantage other companies competing in the global market.

Some complaints are justified. For example, SOEs do enjoy some preferential treatment, including in licensing and in winning government procurement contracts in the China market, particularly at the local government level. However, some complaints – such as the argument that China's SOEs benefit from access to preferential financing – are subject to debate. Furthermore, many SOEs compete against each other very aggressively, and they should not be seen simply as government-controlled monopolies.

China's central government has reaffirmed its determination to accord national treatment for all foreign-invested companies. At the fourth meeting of the U.S.-China Strategic and Economic Dialogue held in May 2012, China committed to developing a market environment of fair competition and treating all enterprises without discrimination. In line with the longstanding strategy of implementing reforms in a gradual manner, China issued a set of directives in mid-2012 to encourage the development and growth of China's non-state enterprises. China also introduced further measures in late-2012 to allow more market competition in vital industries, including financial services, healthcare and telecommunications. China now needs to demonstrate that its actions validate its statements of intent.

Given the long history of SOEs and the enormous social responsibilities imposed on them, China's gradual approach to SOE reform is understandable. Today, deficiencies in China's market infrastructure continue to prevent the government from fully allowing free market forces to run the economy. The government will continue, therefore, to have an important role to play in resolving these transition problems in China's development. Our study proposes that the Chinese governments at all levels should focus on providing public goods; developing and maintaining an efficient market infrastructure; and ensuring fair competition, including national treatment for all enterprises, regardless of the nature and background of ownership.

China's main SOEs will continue to play a major role in both the domestic and global markets, particularly in strategic industries and sectors. But China's SOE and market reform should continue, as the government has pledged. Our study suggests that the government's shareholding in SOEs could fall below 50% without compromising the need for the state to remain a major and controlling shareholder. In the longer term, state ownership of SOEs could be confined to non-contestable sectors only. Meanwhile, reform of the governance of the SOEs should continue. Recent initiatives – such as the requirement for SOEs to increase their dividend payouts, the introduction of proper recruitment and appointment systems for top-level executives and external directors, and efforts to address interconnected party transactions – are steps in the right direction. Above all, greater transparency is needed in the decision-making processes of the SOEs, along with assurances that they are operating independently and at arm's length from the government.

The Role of State-Owned Enterprises in the Chinese Economy

Introduction

In recent years, issues surrounding SOEs have become growing sources of friction between China and some of its trading partners, including the U.S. The disputes reflect the rising clout of some of China's SOEs at home and abroad, and have come to the fore due to some high-profile cases involving acquisitions and mergers. The main complaint from the U.S. business community is the perceived unfair advantages given to China's SOEs by the government, with the playing field tilted against foreign companies in the Chinese market. The global advance of China's large SOEs, with support from the government, is also seen to be putting pressure on foreign competitors or even placing them at a disadvantage in the global market.

Concerns about the rising importance of China's SOEs were also heightened by the debates in China in recent years about a perceived phenomenon described as 'the state advances, the private (sector) retreats' (国进民退). This debate was triggered by various developments, including:

China's deployment of a RMB4tr fiscal stimulus package to counter the economic downturn triggered by the global financial crisis in 2008. Most of these funds and the RMB10tr bank loans that supported this fiscal measure, at the end, were allocated to SOEs. This happened at a time when many non-SOEs were seriously affected by weak markets and rising costs.

The large-scale restructuring and consolidation of the coal mining industry in Shanxi province – after many coal mine accidents with high death tolls – led to the closing down of a lot of small and mid-size private mining firms or their mergers with SOEs in 2009 and 2010.

There have been many subsidiaries of SOEs involved in real estate businesses that have bid aggressively for land in public auctions in recent years, benefitting from the abundant low-cost capital and bank loans they could get. These actions are seen by the public to have fuelled housing prices that were already too high.

In its annual report to the U.S. Congress in 2012, the U.S.-China Economic and Security Review Commission (USCC) argued that the past five years have witnessed a reversal of the trend towards less government control of the economy and greater market openness[1]. Whether this assessment is true or not, both the U.S. and China could benefit from measures that would alter perceptions about how Chinese SOEs compete in domestic and foreign markets.

Historical Overview and the Evolution of China's SOEs

State ownership of enterprises is not a China-specific phenomenon. According to a study by the Organization for Economic Co-operation and Development (OECD), in the 27 reporting member countries in 2009, there were 2,057 SOEs, with an estimated value exceeding US$1.3tr and employing close to 4.3 million people[2].

1 "Report to Congress", U.S.-China Economic and Security Review Commission, November 2012.
2 "The Size and Composition of the SOE Sector in OECD Countries", OECD, 2011. Some respondents only reported SOEs that are under the supervision of the segments of general government. Data are missing or partially missing for Japan, Turkey and the U.S., which have substantial SOE sectors.

History and origin of China's state enterprises

When the People's Republic of China was established on 1 October 1949, the country was on the verge of bankruptcy. No infrastructure to speak of existed, industrial capability was minimal, education and healthcare were scarce and social security was nonexistent. China was a country with 20% of the world's population and 7% of the world's arable land, but its agriculture and energy resources were underdeveloped. At that time, Western aid was nonexistent, while aid from the Soviet Union ceased when economic ties ended in 1960. Although aid from the World Bank and other donors was gradually and gratefully received subsequently, the enormous task of nation building was left to the Chinese people.

In the beginning, as there was hardly any private wealth to speak of, nor any other organized structure to take on the huge tasks at hand, the government essentially undertook all nation-building tasks. Gradually, state enterprises began to take over the work of the government in the rebuilding of the nation.

In China, the term 'state enterprises' used to mean enterprises that were owned fully by the state and run as government units under the direct control of line ministries. Following rules set by the government, state enterprises fulfilled the output targets assigned by state planners and sold their products at predetermined prices. At a time when China was poor and devastated by a long period of war and underdevelopment, state enterprises were the main form of economic organization that built China's economy and they met the cradle-to-grave needs of a large proportion of the urban population.

Progressive reform in the past few decades

Reforming the state enterprises has been an important component of China's transformation into a socialist market economy since 1978. As competition emerged in the Chinese economy and prices increasingly became market determined, many SOEs found their profitability eroding. By the mid 1990s, in aggregate, China's industrial SOEs no longer provided net revenues for the government, but absorbed fiscal and quasi-fiscal resources that were estimated to be as large as 5% of gross domestic product (GDP). Moreover, meeting their obligations to past and current workers put the SOEs at a competitive disadvantage compared with new entrants with no such welfare constraints. It was plain to China that state enterprises needed to be revitalized by giving them increased autonomy and different incentives, as many of them had become inefficient production units functioning like government departments. The term 'state-owned enterprise'[3] came to be used after China decided to reform state enterprises by separating ownership and management. While the state retains ownership or majority control, it gives increasingly more autonomy to SOEs' managers to run the business.

SOEs are owned by central, provincial or municipal governments. After being registered under the Company Law that was introduced in 1994, SOEs began to transform themselves into limited liability companies or shareholding companies. The pace of reform gathered momentum in the late 1990s. Guided by the principle of 'grasping the big, letting go of the small' (抓大放小), the central government maintained control over the largest and most important SOEs, and granted local governments the authority to restructure smaller SOEs through employee buyouts, open sales, leasing, joint ventures, mergers or bankruptcy. Many small SOEs were closed and millions of workers were laid off at that time. On the other hand, the government spent a lot of effort to turn around the inefficient, loss-making, large SOEs, particularly in the strategic and key sectors of the economy.

3 Corporatization reform in China has produced many different ownership structures for SOEs. The term 'state-owned and state-holding enterprises' is sometimes used in the *China Statistical Yearbook* to include a broad range of enterprises where the state has ownership stakes. Also see footnote 9.

Reform of the institutional arrangements governing the state's ownership of the SOEs owned by the central government took an important step forward in 2003 when the State-owned Assets Supervision and Administration Commission (SASAC) of the State Council and Central Huijin Ltd. were set up as investors on behalf of the state. Ownership of many SOEs was transferred away from line ministries to SASAC and Central Huijin. This has helped to foster the transformation of the line ministries into policy-making bodies and the government into regulators, and to avoid the conflict of interest government units had when they owned and ran enterprises. Under this framework, most major industrial SOEs are now owned on behalf of the state by SASAC, while state-owned financial institutions are owned by Central Huijin. This reform is incomplete as some SOEs remain under the control of central government ministries such as the Ministry of Industry and Information Technology, the Ministry of Agriculture and the Ministry of Education[4]. SASAC and Central Huijin have broad oversight over the protection of SOEs' state assets and the further reform of the SOEs, but they are not involved in the day-to-day business operations. There are sub-national SASACs at provincial, municipal and county levels, with their roles running parallel to those of the central SASAC.

Improvement of corporate governance through corporatization and Initial Public Offerings

Corporatization and improving corporate governance of SOEs

Corporatization is designed to separate ownership from management so that the company can be run on a commercial basis while ownership of the company could be diversified or otherwise changed by trading shares in the company. More than 80% of central SOEs, including their subsidiaries, have implemented shareholding reform through corporatization[5].

In 2005, a pilot program to establish standard boards of directors was launched by several wholly state-owned enterprises. By introducing external directors, delegating the nomination rights of top executives to the board[6], and setting up board committees for nomination, remuneration and audit, this reform helped to strengthen the system of checks and balances between the board of directors and management of the SOEs. By the beginning of 2012, 42 central SOEs had standard boards of directors, with external directors occupying more than half of all seats. SASAC has also improved managerial incentives by introducing monitoring systems and contracts that link compensation of senior management to performance.

Initial public offerings

According to the "Trade Policy Review" published by the World Trade Organization, by the end of September 2011, there were 1,047 SOEs listed on the Shanghai and Shenzhen stock markets, accounting for 44.7% of companies listed in China[7]. Many SOEs have also been listed in the Hong Kong stock market and other overseas stock markets such as New York, London and Singapore.

Large SOEs are often organized in a pyramid.

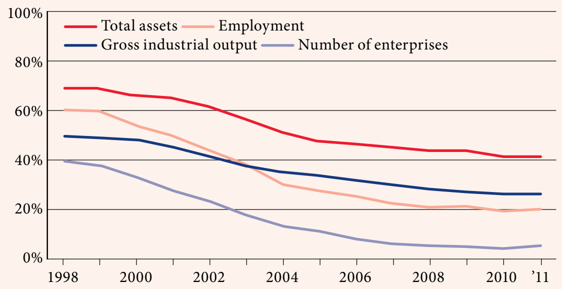
4 The railway business was controlled by the Ministry of Railway until the government reforms of March 2013. A wholly state-owned China Railway Corporation, funded by the Ministry of Finance, has been set up to manage all the enterprises in the railway system, while the Ministry of Transportation has taken over the supervision and administration of the railway business from the Ministry of Railway which has since been dissolved.

5 "Trade Policy Review: Report by China", World Trade Organization, 2012.

6 In 2008, a trial program was launched to allow boards of directors to recruit and nominate top executives. Nevertheless, SASAC and the Central Organization Department (COD) of the Chinese Communist Party still appoint the majority of senior managers in central level SOEs.

7 A speech delivered by SASAC's Chairman Wang Yong at the National State-owned Assets Supervision and Administration Working Conference revealed that, by the end of 2012, there were 953 SOEs listed on the Shanghai and Shenzhen stock markets, accounting for 38.5% of companies listed in China's 'A' share market. Their market capitalization was worth RMB13.71tr in 2012, 51.4% of market capitalization of all listed companies in the 'A' share market (http://www.sasac.gov.cn/n1180/n1566/n259760/n264785/15106589.html). These numbers differ from those reported by the WTO.

Figure 1: The Share of SOEs in All Industrial Enterprises



Source: China Statistical Yearbook 2012

At the top are a number of holding companies controlled by SASAC and Central Huijin. In a typical initial public offering (IPO), the holding company carves out its most valuable assets and most profitable businesses to form a financially strong company that meets listing requirements. A certain percentage of this company's shares are sold to the public in an IPO, while the holding company retains a controlling stake in the listed company. Ownership structure and transparency of the listed SOEs have improved as they are required to disclose operational, financial and other relevant information in a timely manner. Governance of the listed SOEs has also improved as they have to satisfy various requirements of the stock exchanges and the regulators[8].

Diminishing role of the state sector in China's economy

Declining weight of the state sector

According to the *China Statistical Yearbook*, the number of state-owned and state-holding enterprises[9] decreased from 39.2% of all industrial companies in 1998 to 5.2% in 2011. During the same period, their proportion of gross industrial output dropped from 49.6% to 26.2%, their share of total industrial assets fell from 68.8% to 41.7%, while their share of employment declined from 60.5% to 19.8% (see Figure 1).

The "China 2030" study of the World Bank and the Development Research Center of the State Council envisages a continuation of this trend with the share of SOEs in industrial output dropping further – to around 10% by 2030[10]. The 2030 study views this continuing structural change as a desirable consequence of eliminating most barriers to entry in virtually all sectors (except for a few viewed as 'natural monopolies') and of fostering competition for SOEs from domestic and foreign private firms[11].

Expanding role of the private sector

In contrast to the declining weight of the state sector, the private sector has become a vibrant force that powers economic growth and generates employment, and is also the most dynamic source of innovation. Private firms accounted for around 60% of fixed asset investment in 2011, while their proportion of total employment exceeded 75%. In addition, more than 60% of research-and-development (R&D) spending and 65% of patent applications came from private enterprises[12]. For example, private enterprises are dominant in the highly competitive IT sector, with prominent successes demonstrated by private companies such as Alibaba, Tencent, Huawei, Sina and Baidu. Similarly, many private companies are now dominant in the real estate sector, including

8 According to a survey on the corporate governance standards of companies listed in Hong Kong – conducted by the Hong Kong Institute of Directors and Hong Kong Baptist University in 2012 – more than half of the top-10 firms with the best corporate governance practices are state-owned or backed with funding from China (for more information on the survey, go to http://www.hkiod.com/scorecard.html).

9 The term 'state-holding enterprises' includes state-owned enterprises, state-funded corporations and state-owned joint-operation enterprises, and enterprises in which the percentage of state assets (or shares held by the state) is larger than any other single shareholder of the same enterprise.

10 "China 2030", World Bank, 2012.

11 "China 2030" also asserts that "to sustain rapid GDP growth, China will need to extract more productivity from its currently protected services and utilities sectors" (op. cit. Page 110), essentially by the same strategy of facilitating private entry and deregulating to encourage international competition.

12 'China Statistical Yearbook 2012'. The term 'private enterprises' in the Yearbook is used to describe enterprises that are funded only by natural persons. A broader definition of private enterprises is applied in this chapter, which are domestic enterprises exclude those state-owned (and state-holding), collective-owned, cooperatives, joint ownership and self-employed.

Figure 2: **SOEs in Selected Industries (%)**

	Number of firms		Gross industrial output		Total assets	
	1998	2011	1998	2011	1998	2011
Mining and washing of coal	49.5	11.5	81.9	53.6	92.7	72.0
Extraction of petroleum and natural gas	81.7	40.2	94.5	92.1	98.9	94.7
Manufacture of food	44.1	4.1	29.7	5.8	41.1	9.9
Manufacture of tobacco	87.2	79.1	98.3	99.3	98.2	99.3
Manufacture of textiles	24.0	1.2	32.2	2.4	46.2	5.0
Printing, reproduction of recording media	58.0	8.0	37.9	11.5	51.2	18.2
Processing of petroleum, coking and nuclear fuel	28.3	10.9	91.0	68.6	90.3	58.8
Manufacture of chemical products	32.3	5.0	50.4	18.7	69.5	29.1
Manufacture of medicines	45.3	7.1	49.6	11.8	60.8	20.3
Manufacture of rubber	21.0	3.1	34.3	12.1	50.7	16.2
Manufacture of general machinery	29.6	3.2	38.4	12.5	60.7	22.3
Manufacture of special machinery	40.9	5.2	41.2	20.5	63.3	32.2
Manufacture of transport equipment	40.1	7.6	67.0	44.0	78.2	53.2
Manufacture of communication equipment	29.8	5.2	37.7	8.3	51.0	19.6
Production and supply of electric power and heat power	85.6	66.4	85.4	93.0	89.1	90.7
Production and supply of water	92.6	61.4	87.8	69.4	90.3	79.6
Production and supply of gas	84.0	29.9	71.6	44.4	93.7	54.3

Source: China Statistical Yearbook 1999 and 2012

Dalian Wanda Commercial Properties, Vanke, Evergrande Group and Country Garden. Even in the energy sector, some private enterprises such as ENN Energy and China Gas – are now providing domestic gas supply to hundreds of cities in China. There are now also indigenous private automakers in China, including Geely and BYD[13].

SOEs retreating from contestable industries

After three decades of reform and market liberalization, SOEs no longer play dominant roles in many labor-intensive and contestable industries such as the manufacture of textiles, rubber, medicines, general machinery and printing (see Figure 2).

The number of central SOEs directly controlled by SASAC decreased from 196 in 2003 to 115 in March 2013[14]. Central SOEs are encouraged to focus on their core business and improve their business structure. For example, in March 2010, SASAC announced that 78 central SOEs whose core business is not real estate should gradually retreat from the real estate sector[15]. Generally, most of the remaining central SOEs are in strategic industries that are perceived to be of vital importance to national security and/or people's livelihoods, such as defense, petroleum and petrochemicals, electricity generation and distribution, telecommunications, shipping, and civil aviation.

Compared to central SOEs, the results of local SOE reform are more mixed. On average, local SOEs, which are under the direct control of local (sub-national) SASACs, tend to be much smaller than central SOEs. Their presence varies significantly across regions. They tend to be less prevalent and less important in regions that have a more de-

13 "China Top 500 Private Enterprises 2012", http://www.acfic.org.cn/zt/12/sgm/161213002302.htm

14 See the Appendix to this chapter for the list of central SOEs controlled by SASAC.

15 Refer to http://www.sasac.gov.cn/n1180/n1566/n259730/n264168/11674985.html

Figure 3: Top 10 Retail Operators in China, 2011

Rank	Company	Sales volume (RMB billions)
1	Bailian Group Co., Ltd	118.2
2	Suning Appliance Co., Ltd.	110.0
3	Gome Electrical Appliance Group	110.0
4	China Resources Vanguard Co., Ltd.	82.7
5	RT-Mart Shanghai	61.6
6	Chongqing Commerce (Group) Ltd.	47.8
7	Carrefour China Inc.	45.2
8	Yum! Brands Inc., China Division	43.4
9	Wal-Mart (China) Investment Co., Ltd.	43.0
10	Wumart Group	41.1

Source: China Chain Store & Franchise Association

Figure 4: Top 10 Steel-Producing Companies in China, 2004 vs. 2011
(Million tons crude steel production)

Company	2004	Share	Rank	Company	2011	Share
Baosteel Group	21.4	21.9%	1	Hebei Group*	44.4	15.4%
Anshan	11.3	11.6%	2	Baosteel Group	43.3	15.0%
China Steel	10.9	11.1%	3	Wuhan Group	37.7	13.1%
Wuhan	9.3	9.5%	4	Shagang Group	31.9	11.1%
Shougang	8.5	8.7%	5	Shougang Group	30.0	10.4%
Maanshan	8.0	8.2%	6	Ansteel Group	29.8	10.3%
Shagang	7.6	7.8%	7	Shandong Group	24.0	8.3%
Tangshan	7.1	7.3%	8	Maanshan	16.7	5.8%
Jinan	6.9	7.1%	9	Benxi	16.5	5.7%
Handan	6.8	7.0%	10	China Steel	14.0	4.9%
Total	97.8	100.0%		Total	288.3	100.0%

Source: World Steel Association
** Hebei Group was created as Handan Steel consolidated with Tangshan Steel in 2010.*

veloped private sector or have more foreign investments, such as Zhejiang and Guangdong provinces.

SOEs in many industrial sectors face severe competition

Competition between SOEs and private firms

As the market-oriented reforms proceed, SOEs have been facing increasingly stiff competition in the domestic market from private firms and foreign-invested enterprises, particularly in highly contestable sectors. For instance, among the top 10 retail-chain operators, subsidiaries of SOEs – such as Bailian Group and China Resources Vanguard – are facing intense competition from private companies such as Suning and Wumart, as well as foreign competitors such as Carrefour and Wal-Mart (see Figure 3). Even in the steel-making industry, numerous privately owned steel producers such as Shagang Group have emerged among the top producers in China, posing challenges to SOEs. Shagang's share in total crude steel production climbed from 7.8% in 2004 to 11.1% in 2011 (see Figure 4). The rapidly changing competitive landscape reflects how competition is increasing across many sectors in China. The competitive advantages SOEs once enjoyed – by being close to or part of the government – have been eroded rapidly in most sectors.

Inter-SOE competition

Even in sectors where central SOEs remain dominant – such as telecom services, petroleum and petrochemicals and financial services – inter-SOE competition is intense. As illustrated by the distribution of 3G licenses in 2009, there was fierce competition among three central SOEs in the telecommunications industry. Eventually, China Mobile was required to deploy the Chinese 3G standard – TD-SCDMA – which was less mature than the CDMA license awarded to China Telecom and the WCDMA standard awarded to China Unicom. The state-owned banks are widely known to be competing aggressively with each other in most lines of banking business. These examples highlight the fact that, while SOEs are majority owned by the government, they operate as independent commercial entities. This fact is insufficiently appreciated by SOEs' foreign competitors and critics, partly because the government still intervenes appreciably and the companies' accounts lack the transparency necessary to convince competitors and their governments that Chinese SOEs are competing fairly.

Prospects for China's further SOE reforms

The reform of SOEs is inevitably a gradual process, given their long history and the many people who would be affected. SOEs are saddled with enormous economic and social obligations. Even for the listed SOEs, their parent companies have taken on the legacy responsibilities such as healthcare and retirement benefits for their hundreds of thousands of retirees. By the end of 2011, there were still more than 8,000 social institutions, including workplace hospitals and schools, run by central SOEs, which incur billions in costs each year. Apart from being relied upon as a stabilizing force during difficult times or economic downturns, and a provider of public goods and services, SOEs are also dependable partners of the government in promoting industrial transformation and upgrading, and in the construction of the country's infrastructure. They also help to bridge the development gap across regions and industries by taking up projects that are unprofitable in the short term, but necessary for the development of the country in the long term.

Nevertheless, the Chinese government has expressed its determination to continue market-oriented reforms. For example, in the 12th Five Year Plan, the Chinese government stated that:

"We will … create an institutional environment in which economic entities under all ownership forms use factors of production as equals in accordance with the law, compete as equals in the market and are equally protected by law."[16]

In the fourth meeting of the U.S.-China Strategic and Economic Dialogue (S&ED) in May 2012, China committed to "developing a market environment of fair competition for enterprises of all kinds of ownership and to providing non-discriminatory treatment for enterprises of all kinds of ownership in terms of credit provision, taxation incentives, and regulatory policies". China also made a commitment to steadily raise the dividend payout ratio of SOEs and increase the number of both central and provincial SOEs that distribute part of their profits as dividends[17]. Foreign competitors will be watching closely to see how effectively the government makes good on these assurances.

According to the October 2012 "Report of the State Council on State-Owned Enterprises Reform

16 "Adhere to and Improve the Basic Economic System", 12th Five-Year Plan for National Economic and Social Development of the People's Republic of China, State Council of China.

17 "Joint U.S.-China Economic Track Fact Sheet – Fourth Meeting of the U.S. China Strategic and Economic Dialogue (S&ED)", U.S. Department of the Treasury, May 2012.

Figure 5: **Breakdown of China's Bank Loans**

	Bank loans to (RMB trillion)				Total Bank assets (RMB trillions)	SOE loans as Percentage of		Household loans as Percentage of	
	Non-SOEs	Households	SOEs	Total		Total bank loans	Total bank assets	Total bank loans	Total bank assets
2000	5.08	0.00	4.86	9.94	13.74	48.89	35.35	0.00	0.00
2001	5.95	0.00	5.29	11.23	15.94	47.06	33.15	0.00	0.00
2002	7.11	0.00	6.02	13.13	20.44	45.83	29.44	0.00	0.00
2003	9.13	2.33	6.77	15.90	24.40	42.55	27.73	14.65	9.54
2004	10.59	2.92	7.15	17.74	27.98	40.32	25.56	16.47	10.44
2005	12.00	3.25	7.46	19.47	32.40	38.34	23.04	16.71	10.04
2006	13.99	3.87	8.54	22.53	44.13	37.90	19.35	17.16	8.76
2007	16.45	5.07	9.72	26.17	54.12	37.13	17.96	19.36	9.36
2008	19.57	5.71	10.77	30.34	64.15	35.51	16.80	18.81	8.89
2009	22.30	8.18	17.67	39.97	80.98	44.21	21.82	20.46	10.10
2010	29.07	11.25	18.85	47.92	96.16	39.33	19.60	23.49	11.70

Source: The People's Bank of China

and Development"[18], market access will be eased further in sectors such as electricity, telecommunications, and petroleum and petrochemicals, and the government's administrative function would be separated from enterprises' management in the railway, postal service and salt industries.

An Analysis of the Complaints about China's SOEs

To what extent do SOEs get preferential treatment?

One common complaint about China's SOEs is that they enjoy preferential treatment from the government, for example, in securing licensing approvals, government contracts and low-cost bank financing, thus giving them an unfair competitive edge. In making this case, a report of the U.S.-China Economic and Security Review Commission stated that SOEs still tend to benefit from lower cost of and better access to funds from state-owned banks[19]. This was especially the case with the government's economic stimulus package in 2008-09, when a large proportion of the bank loans used to support the fiscal stimulation package were allocated to SOEs to jump start state-approved projects. Figure 5 shows that SOEs still receive a share in bank loans that is disproportionate to, albeit declining in, their diminishing share in the economy. The sharp jump in SOEs' loan share in 2009 testifies to the impact of the stimulus and its transmission primarily through the SOEs[20].

Furthermore, credit practices in China's immature banking market make it viable and legitimate for SOEs to re-lend the low-cost funds from bank loans to their subsidiaries or to private companies through commercial banks via the so-called 'entrusted loan' arrangements. Thus, some SOEs may generate another source of revenue by profiting from the interest margin, while many private firms complain that their development is stifled due to the shortage and high cost of funding.

According to the "Economic Survey of China" released in 2010 by the OECD, the Chinese government has substantially reduced subsidies to state enterprises in recent years. But the survey also argues

18 Report delivered by Chairman of SASAC, Wang Yong, to the Standing Committee of the National People's Congress on October 2012.

19 "Report to Congress", U.S.-China Economic and Security Review Commission, 2011.

20 Figure 5 also shows the rising share in lending to households, mainly as mortgages, from zero in 2002 to 23.5% in 2010, which is a positive development for the banking system and the economy.

that China's SOEs are much more capital intensive than their private counterparts, which is "indicative of a lingering lending bias towards SOEs in the predominately state-owned banking sector".[21] The clear inference is that the Chinese economy would benefit if more formal finance found its way to the higher productivity activities of private firms.

However, what is unclear is whether China's SOEs do have privileged access to bank loans and whether they have been granted bank loans at preferential interest rates. Loans made to SOEs are commercial decisions made by the banks. Except for the government-backed nature of SOEs, large-scale asset holdings and having a long track record are two key factors on which banks base their credit decisions. In this regard, as SOEs are relatively less risky than private firms and therefore are more creditworthy, banks tend to lend more to them and at lower interest rates. Such lending considerations and decisions are common, not only among the state-owned banks in China, but also the foreign banks that operate in China. Syndicated loans made to Chinese enterprises in overseas markets with participation by many foreign banks also reflect the credit pricing pattern in the domestic market. The fact that many private firms fail to obtain loans or have to pay for funds at high interest rates is due more to the inadequacies of China's banking system and the associated business, legal and financial infrastructure. Such inadequacies raise the risks for banks that lend to small and medium-size firms and private enterprises. A priority for the government is to remove the disincentives to lend to non-SOEs by comprehensively improving the infrastructure that supports the financial system.

The financial market backdrop in recent years should also be borne in mind when analyzing complaints by U.S. firms that Chinese SOEs derive an unfair advantage through the low interest-rate loans they borrow from state-owned banks. In the past few years, U.S. firms are operating in an environment of exceptionally low interest rates with the federal funds rate[22] close to zero, whereas in China the benchmark one-year lending rate is around 6%.[23] The probability is high that SOEs and major companies in the U.S. both are benefitting from a cost of capital too low to be sustained over the long run.

Another aspect to consider in evaluating the preferential treatment SOEs receive from the government is the preferential treatment foreign-invested enterprises (FIEs) in China enjoyed in the past. For many years, to attract foreign investors China extended a host of preferential treatment to foreign investors; many local governments still compete for foreign investors through offering different kinds of incentives. For example, profit tax rates for foreign firms were lower than those for local enterprises, and there were various tax exemption arrangements given to foreign enterprises, such as the exemption from duties on imports of machinery and equipment. Such 'super-national treatment' given to foreign firms, however, was gradually phased out in recent years as China has adopted a national treatment approach for all kinds of enterprises. On 1 January 2008, the government eliminated the preferential income tax rate for FIEs. They are now subject to a 25% tax rate, the same as domestic enterprises. Since 1 December 2010, FIEs have been required to pay urban maintenance and construction taxes and education levies at the same rates as domestic enterprises. These commendable measures to ensure firms are treated equally irrespective of ownership need to be extended to eliminate remaining concessions that favor domestic SOEs.

Market access by foreign companies

From the perspective of U.S. businesses, many SOEs

21 "Product Market Regulation and Competition", OECD Economic Survey of China (2010), pp. 109-110.

22 The Federal funds rate is the overnight interbank offered rate for depository institutions to trade balances held at the Federal Reserve. It is an important benchmark in the financial markets. The bank prime loan rate – one of several base rates used by banks to price short-term business loans – has remained at the 3.25% level since January 2009. See http://www.federalreserve.gov/releases/h15/data.htm

23 Refer to the People's Bank of China, http://www.pbc.gov.cn/publish/zhengcehuobisi/631/2012/20120706181352694274852/20120706181352694274852_.html

in China are market incumbents that continue to benefit from a legal or natural monopoly in their industrial sector, with various regulatory privileges and preferential treatment. China's industrial policies, they believe, create state monopolies and national champions in industries that are strategic and important.

In 2006, SASAC identified seven 'strategic industries' in which the state would keep absolute control and five 'pillar industries' where the state would retain strong influence. Strategic industries include defense, electricity generation and distribution, petroleum and petrochemicals, telecommunications, coal, civil aviation and waterway transport. Pillar industries include machinery, automobiles, information technology, construction, steel, base metals and chemicals.

But the strategic industries or pillar industries as stated above are too broadly defined. Foreign investment in many sub-sectors of these industries is indeed encouraged, according to the recently revised "Catalogue for the Guidance of Foreign Investment Industries".[24] However, in some industries, investment in the form of a joint venture is still required, and in some sectors, the foreign partner(s) are not allowed to be the controlling shareholder(s). The Chinese economy could benefit if the government considered how to ease foreign entry requirements further.

Market access by foreign investors is also subject to changes in China's industrial policies as economic circumstances and development strategies change. For example, foreign investment in car-making used to be encouraged, but this has been changed from 'encouraged' to 'permitted' due to potential overcapacity and excessive investment in the sector in recent years. However, foreign investment in alternative-energy automobiles is favored. Similarly, given China's immense need for energy, the construction and operation of hydroelectric stations and combined heat and power stations by foreign investors are encouraged and entail no foreign equity ceilings, while foreign investments in new energy sources – including shale oil – are also welcomed[25].

U.S. businesses complain that foreign companies are excluded from the markets reserved for strategic industries and are heavily regulated in those designated for the pillar industries[26]. The "OECD Economic Survey" also argued that, although some of these sectors are technically open to foreign investors, discriminatory treatment or red tape discourages them from participating[27]. Such complaints highlight the need for China to continue improving the procedures and processes in vetting and approving foreign investments.

But from a macro perspective, compared to other transitional economies and developing countries, China is relatively open to foreign investment, as reflected by the high level of inward FDI China has attracted over the years (see Chapter II-13 for a more in-depth analysis of foreign direct investment in China).

A related issue about market access to foreign investors is the need for China to improve its market infrastructure and regulatory capacities further before allowing more market competition. The Chinese government's recent reform initiatives have indicated a greater willingness to create a more level playing field for all competitors. The Anti-Monopoly Law, which took effect in August 2008, is a significant step towards better regulation of market competition. Private investment will be supported in sectors that are currently dominated by SOEs, such as financial services, railroads and health-

24 The latest catalogue was issued in December 2011 and effective since 30 January 2012.

25 See, for instance, "China Shifts Foreign-Investment Focus", http://online.wsj.com/article/SB10001424052970204720204577130011797163488.html

26 "Report to Congress", U.S.-China Economic and Security Review Commission, 2011.

27 "Product Market Regulation and Competition", OECD Economic Survey of China, 2010, pp. 120-21.

care[28]. For instance, in March 2012, the government approved a broad package of financial reform measures, which include allowing private lending in Wenzhou, a city known for entrepreneurship and underground lending. This is an experimental step towards liberalizing further the country's financial system[29]. In May 2010, the announcement of "Certain Opinions on Encouraging and Guiding the Sound Development of Private Investment"[30], known as the "new 36 clauses", signals that future reform will focus on encouraging market competition, even in some strategic industries.

Unfair competition arising from local protectionism

Complaints about unfair competition and the existence of barriers to market access do arise from time to time with regard to local governments protecting or favoring local enterprises, including local SOEs. Such complaints come not only from foreign companies, but also from local Chinese companies. Local governments generally welcome FDI, which adds to local GDP growth, fiscal revenue and employment. When it comes to government procurement and market regulations, however, there are instances when local governments tend to favor local enterprises and locally made products, especially during an economic downturn. Some municipal governments, for instance, may provide consumption subsidies for indigenous automobiles or household appliances. Some may support local enterprises with lower land costs, preferential licensing and approvals, as well as better access to government contracts and bank loans. Such behavior impedes competition not just from foreign competitors, but all non-local companies. However, given the size of China and the wide disparities in the level of development of different regions, in addition to the inadequacies of China's institutions and capabilities, such problems are complex and difficult to resolve. They do need to be tackled in the interests of both creating efficiency in an integrated Chinese economy and assuring foreign firms that government assurances are genuine.

Over the past two years, the central government has reaffirmed that national treatment would be provided to FIEs. In the document "Several Opinions on Better Utilization of Foreign Investment"[31], the government acknowledges that FIEs are an important part of China's economy and play a positive role in promoting innovation, upgrading industries and bridging the development gap among regions. The government has also clarified some of its contentious policies. For instance, the industrial restructuring and revitalization plan as well as identification standards of indigenous innovative products are now applicable to FIEs. The government procurement policy favoring indigenous innovative products has also been removed to avoid allegations of unfair treatment. Still, full implementation of national treatment for all foreign companies largely rests on the effectiveness of enforcement by local governments.

Concerns about China's 'go global' strategy

Chinese enterprises are rapidly expanding their footprint around the globe in an effort to purchase natural resources, develop overseas markets and acquire much-needed technologies. A significant proportion of overseas investment made by Chinese companies has come from large central SOEs[32]. Benefitting from the rapid growth of China's economy and restructuring efforts in recent

28 "Factbox: Private Investment in China", Reuters, 28 May 2012, http://www.reuters.com/article/2012/05/28/us-china-energy-fact-idUSBRE84R01U20120528

29 "China Tests Financial Relaxation in Wenzhou", *Wall Street Journal*, 28 March 2012, at http://online.wsj.com/article/SB10001424052702303404704577309051957346004.html

30 This was issued by State Council of China in May 2010 (see http://www.gov.cn/zwgk/2010-05/13/content_1605218.htm). Corresponding measures were released by early July 2012 (see http://finance.people.com.cn/n/2012/0728/c70846-18617776.html).

31 In 2010, the State Council of China issued the document "Several Opinions on Better Utilization of Foreign Investment", in which 20 specific policy measures were put forward.

32 In terms of number of investing enterprises, however, SOEs represent only a small proportion, which reflects the large number of individual private investment.

years, increasingly more Chinese SOEs have gained a place among the largest companies in the world. In 2011, three of them were in the top 10 Fortune Global 500 list of companies, with more than 40 others included in the top 500[33]. The rising profile of China's SOEs has raised worries among some U.S. and other businesses about the unfair advantage these government-supported SOEs enjoy in global competition. There are also allegations that some investments made by SOEs in the U.S. were driven by strategic rather than commercial objectives.

China has long been a prominent recipient of FDI, but its level of outbound investments was insignificant in the past and has only started to increase rapidly in recent years. China and its SOEs have entered the stage of development when expanding their footprints in the global market is inevitable. So long as such investments and the operations of China's enterprises abide by the laws and regulations of the countries involved, the rise in Chinese outward investments could be dealt with on normal legal and commercial considerations. Politicizing this development is counter to the long-term interests of the countries involved as well as China.

Just like investments from elsewhere, FDI from China to the U.S. generates employment and growth in the U.S. economy. China Ocean Shipping (Group) Company (COSCO), for example, has been recognized in Massachusetts for its contribution to the American economy and job market. This appreciation comes a decade after COSCO opened a direct link between China and Boston in 2002 after the Danish shipping giant Maersk Line closed its service. According to David Mackey, the interim CEO of the Massachusetts Port Authority, COSCO's decision to invest saved more than 34,000 jobs over the last decade[34]. (A more detailed discussion of the economic impact of Chinese FDI on the U.S. is given in Chapter 13 on FDI.)

33 Refer to Fortune Global 500, 2012.
34 Refer to *China Daily*, 6 March 2012.

Recommendations

SOEs play an important role in many economies. But a large state sector typically harbors inefficiencies, stifles market competition, frustrates innovation and hinders the growth of the private sector[35]. As China becomes a more developed and more diversified economy, a vibrant private sector that liberates entrepreneurial energies and mobilizes the innovation, initiatives and ingenuity of millions of people is crucial to enhancing China's innovative capacity and productivity growth. The Chinese government needs to focus more on its role in providing a wider range of public goods and services such as education, healthcare and social security, as well as providing the proper institutions and regulations for competitive markets to function efficiently. As China integrates more with the world, the need to reform the government and restructure the SOE sector becomes more imperative so as to avoid unnecessary conflicts with other economies.

Refine government's role and improve transparency

The dividing line between government and enterprises should continue to be delineated more clearly. In the long term, the government would do well to focus on providing public goods and services and ensuring a level playing field for all types of enterprises. The state could pursue its macroeconomic strategies and achieve its goals through industrial policies, effective regulations and law enforcement, without having to be involved in the management of enterprises. State control of SOEs could also be gradually reduced to a desired minimum.

To ensure that market competition works properly, China's regulatory and supervisory capabilities, the system of laws and regulations, and hardware

35 According to the World Bank's report "China 2030", the average return on equity of non-state firms was 9.9 percentage points above that of SOEs. If the artificially high rate of return from a few monopolies is excluded, the gap between the profitability of private firms and that of SOEs would be even larger.

and software institutions need to be improved. The Anti-Monopoly Law should be applied to and enforced equally among SOEs, domestic private firms and foreign companies. The development of China's financial, accounting, taxation, legal and other governance institutions should create a rules-based system that fosters healthy market competition.

Enterprise performance could be improved further by complementary reforms of these institutions that support mature market economies. In particular, despite some extraordinary progress in the financial and capital markets since the mid 1990s, the government clearly still lacks trust in the ability of the banks and securities markets to allocate financial resources in their best interests. As recent events in the U.S. have demonstrated, all governments reserve the right to intervene to rescue systemically important enterprises that find themselves in – presumably temporary – financial distress. In less extreme situations, however, the financial system ensures that firms that use resources poorly are compelled to enter bankruptcy or otherwise exit their markets. China experiences recurring examples of excess capacity in diverse industries due, in part, to the enthusiasm of sub-national governments for investment in centrally identified priority sectors. In a more mature financial system – less subject to influence from bureaucratic direction – analysts would conclude that many projects which are in a position currently to find finance would be unlikely prospects for funding. An important contributor to efficiency in enterprise investment would be the development of greater expertise in credit analysis within the banks and the financial system in general.

Doubts about China's intentions and policies often arise because of the opacity of its decision-making processes and the inadequacies of its consultative procedures. A priority for the government should be making these processes and procedures transparent, by creating, in particular, a process that disseminates government policy intentions, laws and regulations, and how administrative measures should be implemented. The practice of soliciting comments from all stakeholders before draft regulations and rules are finalized should be improved and formalized, particularly at the local government level. Government procedures that affect businesses, such as those in licensing and government procurement, should also be improved and made transparent.

Deepen SOE reform gradually

The current range of industries and sectors where state ownership exists is too broad. As recommended by the World Bank[36], to tackle 'administrative monopolies', Chinese authorities could review the lists of strategic and pillar industries, and cancel the explicit or implicit barriers to competition in sectors or sub-sectors where the rationale for state ownership is weak. To enable private entities to flourish, state ownership's focus should be on the provision of public goods in strategic industries and in non-contestable sectors, such as national defense and key infrastructure. In contestable and competitive sectors such as real estate and construction, the state should gradually retreat[37]. A reduction in the scope of state ownership would help reduce the incentives for governments at all levels to intervene in businesses and help boost investor confidence.

To reduce unnecessary conflicts with other countries that could impede the efforts of China's SOEs to go global, the Chinese government should consider reducing gradually the share of state ownership to below 50%. The state could still remain a major shareholder or could exercise its influence through other less direct ways. Given the large size of these SOEs, selling shares could be a challenge as this could depress stock market sentiments. But these shares could be transferred to the country's social security fund so as to enable it to better cope

36 Refer to "China 2030", World Bank, 2012.

37 In the interests of transparency, where 'gradual' might involve some years and an explicit timetable for government withdrawal from the sector could be agreed and publicized.

with China's aging population in coming decades. At the same time, the government's efforts should continue to improve disclosure standards for listed enterprises, irrespective of ownership structure.

The dividends paid by SOEs to the Chinese government from their profits after tax have increased since 2011 to 15% of profits for energy, telecom and tobacco companies, and 10% for transportation and metal-producing companies, with the remaining holding companies paying 5%. The level of dividends paid by China's SOEs is low compared with listed companies in other countries. In a fully functioning market economy, how much to pay as dividends is a matter for the enterprises to decide[38]. But as agreed in the fourth S&ED, China will steadily increase the coverage and amount of dividends payable by SOEs to the government. This would help reduce the low-cost capital available to the SOEs that tends to encourage inefficient investment and overexpansion. This should also help to lower entry barriers for private competitors and increase fiscal revenue.

National treatment for all

While some U.S. companies lodge complaints about the discriminatory treatment they have experienced in China, a number of Chinese investors are confronted with barriers and political pressure in their investments and businesses in the U.S. There would be benefits for both the U.S. and Chinese governments in maintaining a level playing field for all enterprises, regardless of nationality and types of ownership.

Apart from exceptions arising from sensitive issues such as national security concerns, both the U.S. and Chinese governments should ensure that all policies, including market access and incentives, are implemented in a fair manner without discrimination against foreign companies. In government procurement, both the U.S. and Chinese governments should ensure that goods and services provided by all legal entities in their respective countries are treated equally, unless there are clear grounds for exceptional treatment. In all of these areas, for China to aspire to gain international recognition as a 'market economy' it would do well to review its approach in this respect.

38 Of course, governments influence the decision to the extent that they tax dividends differently to capital gains.

Appendix

List of Central SOEs Controlled by SASAC

Name	
1	China National Nuclear Corporation (CNNC) 中国核工业集团公司
2	China Nuclear Engineering Group Corporation (CNEC) 中国核工业建设集团公司
3	China Aerospace Science and Technology Corporation (CASC) 中国航天科技集团公司
4	China Aerospace Science & Industry Corporation (CASIC) 中国航天科工集团公司
5	Aviation Industry Corporation of China (AVIC) 中国航空工业集团公司
6	China State Shipbuilding Corporation (CSSC) 中国船舶工业集团公司
7	China Shipbuilding Industry Corporation (CSIC) 中国船舶重工集团公司
8	China North Industries Group Corporation(NORINCO GROUP) 中国兵器工业集团公司
9	China South Industries Group Corporation (CSGC) 中国兵器装备集团公司
10	China Electronics Technology Group Corporation (CETC) 中国电子科技集团公司
11	China National Petroleum Corporation (CNPC) 中国石油天然气集团公司
12	China Petrochemical Corporation (Sinopec Group) 中国石油化工集团公司
13	China National Offshore Oil Corp (CNOOC) 中国海洋石油总公司
14	State Grid Corporation of China (SGCC) 国家电网公司

15	China Southern Power Grid Corporation (CSG) 中国南方电网有限责任公司
16	China Huaneng Group (CNHG) 中国华能集团公司
17	China Datang Corporation(CDT) 中国大唐集团公司
18	China Huadian Corporation (CHD) 中国华电集团公司
19	China Guodian Group 中国国电集团公司
20	China Power Investment Corporation (CPI) 中国电力投资集团公司
21	China Three Gorges Corporation (CTG) 中国长江三峡集团公司
22	Shenhua Group Corporation Limited 神华集团有限责任公司
23	China Telecommunications Corporation (China Telecom) 中国电信集团公司
24	China United Network Communications Group Co., Ltd. (China Unicom) 中国联合网络通信集团有限公司
25	China Mobile Communication Group Co. (China Mobile) 中国移动通信集团公司
26	China Electronics Corporation (CEC) 中国电子信息产业集团有限公司
27	China FAW Group Corporation (FAW) 中国第一汽车集团公司
28	Dongfeng Motor Corporation (DFM) 东风汽车公司
29	China First Heavy Industries Group (CFHI) 中国第一重型机械集团公司
30	China National Erzhong Group Co. (China Erzhong) 中国第二重型机械集团公司
31	Harbin Electric Corporation (HE) 哈尔滨电气集团公司
32	Dongfang Electric Corporation (DEC) 中国东方电气集团有限公司
33	Anshan Iron and Steel Group Corporation (Ansteel) 鞍钢集团公司
34	Baosteel Group Corporation (Baosteel) 宝钢集团有限公司

35	Wuhan Iron and Steel (Group) Corporation (WISCO) 武汉钢铁（集团）公司
36	Aluminum Corporation of China (CHINALCO) 中国铝业公司
37	China Ocean Shipping (Group) Company (COSCO) 中国远洋运输（集团）总公司
38	China Shipping (Group) Company (China Shipping) 中国海运（集团）总公司
39	China National Aviation Holding Group (CNAH) 中国航空集团公司
40	China Eastern Air Holding Company (CEAH) 中国东方航空集团公司
41	China Southern Air Holding Company (CSAH) 中国南方航空集团公司
42	Sinochem Group Corporation (Sinochem) 中国中化集团公司
43	China National Cereals, Oils & Foodstuffs Corp. (COFCO) 中粮集团有限公司
44	China Minmetals Corporation 中国五矿集团公司
45	China General Technology (Group) Holding, Limited (Genertec) 中国通用技术（集团）控股有限责任公司
46	China State Construction Engineering Corporation (CSCEC) 中国建筑工程总公司
47	China Grain Reserves Corporation (Sinograin) 中国储备粮管理总公司
48	State Development & Investment Corporation (SDIC) 国家开发投资公司
49	China Merchants Group 招商局集团有限公司
50	China Resources (Holdings) Company, Ltd. 华润（集团）有限公司
51	China Travel Service (HK) Group Corporation (HKCTS) 中国港中旅集团公司[香港中旅（集团）有限公司]
52	State Nuclear Power Technology Corporation Ltd. (SNPTC) 国家核电技术有限公司
53	Commercial Aircraft Corporation of China, Ltd. (COMAC) 中国商用飞机有限责任公司

54	China Energy Conservation and Environmental Protection Group (CECEP)	中国节能环保集团公司
55	China International Engineering Consulting Corporation (CIECC)	中国国际工程咨询公司
56	China Huafu Trade & Development Group Corp.	中国华孚贸易发展集团公司
57	China Chengtong Holdings Group Ltd.	中国诚通控股集团有限公司
58	China National Coal Group Corp. (ChinaCoal)	中国中煤能源集团公司
59	China Coal Technology & Engineering Group Corp. (CCTEG)	中国煤炭科工集团有限公司
60	China National Machinery Industry Corporation (SINOMACH)	中国机械工业集团有限公司
61	China Academy of Machinery Science & Technology	机械科学研究总院
62	Sinosteel Corporation (Sinosteel)	中国中钢集团公司
63	China Metallurgical Group Corporation (MCC)	中国冶金科工集团有限公司
64	China Iron and Steel Research Institute Group (CISRI)	中国钢研科技集团公司
65	China National Chemical Corporation (ChemChina)	中国化工集团公司
66	China National Chemical Engineering Group Corporation (CNCEC)	中国化学工程集团公司
67	Sinolight Corporation (Sinolight)	中国轻工集团公司
68	China National Arts & Crafts (Group) Corporation (CNACGC)	中国工艺（集团）公司
69	China National Salt Industry Corporation (CNSIC)	中国盐业总公司
70	Huacheng Investment & Management Co., Ltd.	华诚投资管理有限公司
71	China Hi-Tech Group Corporation Ltd.	中国恒天集团公司
72	China National Materials Group Corporation Ltd. (SINOMA)	中国中材集团公司

73	China National Building Materials Group Corporation (CNBM)	中国建筑材料集团有限公司
74	China Nonferrous Metal Mining (Group) Co. Ltd. (CNMC)	中国有色矿业集团有限公司
75	General Research Institute for Nonferrous Metals (GRINM)	北京有色金属研究总院
76	Beijing General Research Institute of Mining & Metallurgy (BGRIMM)	北京矿冶研究总院
77	China International Intellectech Corporation (CIIC)	中国国际技术智力合作公司
78	China Academy of Building Research (CABR)	中国建筑科学研究院
79	China CNR Corporation Ltd. (CNR)	中国北方机车车辆工业集团公司
80	CSR Corporation (CSR)	中国南车集团公司
81	China Railway Signal & Communication Corporation (CRSC)	中国铁路通信信号集团公司
82	China Railway Engineering Corporation Group (CRECG)	中国铁路工程总公司
83	China Railway Construction Corporation Group (CRCCG)	中国铁道建筑总公司
84	China Communications Construction Company Ltd. (CCCC)	中国交通建设集团有限公司
85	Potevio Company Ltd. (Potevio)	中国普天信息产业集团公司
86	Datang Telecom Technology & Industry Group	电信科学技术研究院
87	China National Agricultural Development Group Corporation (CNADC)	中国农业发展集团总公司
88	Chinatex Corporation Limited	中国中纺集团公司
89	Sinotrans & CSC Holdings, Co., Ltd. (SINOTRANS Group)	中国外运长航集团有限公司
90	China Silk Corporation	中国中丝集团公司
91	China Forestry Group Corporation	中国林业集团公司

92	China National Pharmaceutical Group Corporation (SINOPHARM)	中国医药集团总公司
93	CITS Group Corporation	中国国旅集团有限公司
94	China Poly Group Corporation	中国保利集团公司
95	Zhuhai Zhen Rong Company	珠海振戎公司
96	China Architecture Design & Research Group (CAG)	中国建筑设计研究院
97	China Metallurgical Geology Bureau (CMGB)	中国冶金地质总局
98	China National Administration of Coal Geology (CNACG)	中国煤炭地质总局
99	Xinxing Cathay International Group Co., Ltd.	新兴际华集团有限公司
100	China TravelSky Holding Company (TravelSky)	中国民航信息集团公司
101	China National Aviation Fuel Group Corporation (CNAF)	中国航空油料集团公司
102	China Aviation Supplies Holding Company (CAS)	中国航空器材集团公司
103	Power Construction Corporation of China	中国电力建设集团有限公司
104	China Energy Engineering Group Co., Ltd.	中国能源建设集团有限公司
105	China National Gold Group Corporation	中国黄金集团公司
106	China National Cotton Reserves Corporation	中国储备棉管理总公司
107	China Guangdong Nuclear Power Holding Co., Ltd. (CGNPC)	中国广东核电集团有限公司
108	China Hualu Group Co., Ltd	中国华录集团有限公司
109	Alcatel-Lucent Corporation Limited	上海贝尔股份有限公司
110	FiberHome Technologies Group	武汉邮电科学研究院
111	OCT Group	华侨城集团公司
112	Nam Kwong (Group) Company Limited	南光（集团）有限公司
113	China XD Group	中国西电集团公司
114	China Railway Materials Commercial Corporation (CRMCC)	中国铁路物资总公司
115	China Reform Holdings Corporation Limited	中国国新控股有限责任公司

Source: SASAC website, March 2013

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CHAPTER 17

TURNING POINT: TOWARDS A U.S.-CHINA PARTNERSHIP FOR THE GLOBAL TRADING SYSTEM

James BACCHUS
Chair, Global Practice Group, Greenberg Traurig

Victor K. FUNG
Chairman, The Fung Group and The Fung Global Institute, and Vice-Chairman, China-United States Exchange Foundation

Executive Summary

The relationship between China and the U.S. has reached a turning point. More than three decades of trade expansion between the two countries under the multilateral trade system has created deep commercial and investment ties. Despite this, today, China and the U.S. increasingly find themselves on opposite sides of a range of contentious trade issues.

At the same time, the basis of past and present commercial ties – in which China served as a production base for American consumer and industrial goods – is changing rapidly as both countries face new sets of economic challenges. In particular, China is shifting from being a global center of production, to a global consumer market. In short, the time is ripe, and perhaps urgent, for China and the U.S. to take their trading relationship to a new level.

A new framework for their trade could help both countries address imminent issues in their respective growth paths. There are discussions – both officially and unofficially – on the best framework for the U.S. and China to evolve their trading relationship. Perhaps the most prominent of these include bilateral frameworks, such as a U.S.-China free trade agreement (FTA) and regional/preferential trade agreements (PTA) such as the Trans-Pacific Trade Partnership currently being negotiated.

While both the bilateral FTA and regional PTA appear to have many merits as trading frameworks, a conclusive case cannot be built. An FTA may sound great in theory, but putting it into practice will require concessions that both sides may be unable to make, regarding disputed issues such as intellectual property protection, market access and technology. As for PTAs, these frameworks may help expand trade between their members, but only when backed by a strong dispute resolution function, and open, fair trade principles, such as those commonly found in the multilateral system under the World Trade Organization (WTO).

Indeed, the case for PTAs strongly resembles the case for the multilateral system, with one missing element: the former has a closed members list, whereas the multilateral system is built on principles of inclusiveness. It is commonly acknowledged that the entrance of new players expands the trade pie for the benefit of all. Therefore, there is good reason to encourage a number of PTAs to widen their membership. In fact, this plurilateral approach already exists and is practiced under the WTO.

Today, plurilateral frameworks – which allow trade liberalization to take place at a faster pace – are a notable benefit of the multilateral trade system, but not the only one. In the harsh light of the stalled Doha Round, it may be easy to overlook the benefits of the multilateral system, but the U.S. and China would do well not to fall into the same trap. Both countries have benefitted immensely from the multilateral system, and its principles of transparency, openness, and adherence to rules and dispute settlement, first under the General Agreement on Tariffs and Trade and then under the WTO. Both countries have every reason to anchor the next phase of their trading relationship along these same principles.

To do so would be the right way to evolve their partnership, but it would not be sufficient. Many criticisms of the WTO point to legitimate issues that need to be addressed, if only to bring the system up to date with present day realities regarding technology, global value chains, the rise of services and other areas.

Pushing ahead with these reforms would be very much in the interests of both China and the U.S. Both countries would gain from the exports boost and jobs created, as well as more generally from the WTO having its systems and processes updated to meet the demands of the 21st century. In short, if the U.S. and China – as the world's two largest trading economies – put their force of intent behind the WTO's reform agenda, this might well provide the boost that the agenda needs to move ahead.

Finally, the U.S. and China could build on their partnership to initiate discussions towards an international agreement on investment. This would provide much needed coherence to a global foreign direct investment environment which is in dire need of multilateral principles of transparency, fairness and adherence to common rules. Here again, a convergence of interests is clear.

In short, there are a multitude of reasons for China and the U.S. to recognize that the only way to address the many challenges facing the global community is through multilateralism and collective responsibility. In partnership, China and the U.S. can enhance multilateralism, make it a more effective force for solving the world's problems, and in doing so, create an enormous global public good which will be recognized for generations to come.

Turning Point: Towards a U.S.-China Partnership for the Global Trading System

Taking Stock

Some 40 years after President Richard Nixon's seminal visit to China, the relationship between the U.S. and China is at a turning point. Since 1972, and especially since the normalization of ties in 1979, the relationship between the U.S. and China has become one of the world's most important economic partnerships. Two-way trade has grown from a mere US$95.9m in 1972, to US$7bn in 1985 and US$460bn in 2011. American companies are among the leading investors in China, with investments in China worth over US$50bn as of 2010. Today, China is a leading source of revenue for U.S. companies such as General Motors and Yum brands.

Economic ties have created the basis for a number of social, cultural, educational and scientific ties as well. In 2011, there were nearly 200,000 students from China in the U.S., accounting for nearly one quarter of all foreign students in the U.S. Interest in China is also growing on the U.S. side, with the number of American students studying Mandarin estimated to have tripled in the past five years alone, up to 60,000.

Suffice to say, the U.S. and China are trading more with each other, investing more in each other and learning more about each other. This should be the basis for a long and fruitful partnership, and one that would not only produce many mutual benefits, but also yield many co-benefits for the global community. Indeed, we hope that will be the case. But there are worrying signs.

Despite – or maybe even because of – the depth of commercial ties, the two countries seem to be on divergent paths in international trade. Both have launched cases against one another through the World Trade Organization (WTO) settlement system; some rivalries have seeped into geopolitical spheres, with the U.S. pushing forward with its 'pivot' to Asia and a Trans-Pacific Partnership that excludes China. There are also accusations of commercial spying and hacking on both sides.

Small misunderstandings can easily grow into much larger ones, especially in a digitally connected age. These needlessly complicate a bilateral relationship that, due to the sheer size and significance of the two countries, is destined to involve at least some measure of competition.

Commercial competition between two countries can be helpful to both. Free and open trade between two countries can also be mutually beneficial, when carried out on fair terms and according to agreed rules. It can enhance the productivity and the overall prosperity of both. And this can be the case for China and the U.S. Ongoing commercial competition between two countries of such size and diversity will inevitably lead to trade disputes, but this is to be expected.

But, as Singapore's former Prime Minister Lee Kuan Yew has noted, "Competition between the United States and China is inevitable, but conflict is not." Yet, all too often the bilateral relations between the two countries seem to veer towards confrontation.

The task before us, then, is to create conditions for the U.S. and China to direct their relationship on the path to stability, harmony and shared prosperity. Clearly, rebuilding mutual trust is essential. We also know that mutual trust can only come from cooperation and shared experience. In other words, we need to find ways for the U.S. and China to understand each other, working side by side, towards shared goals, particularly in the trade arena which has been the bedrock of the relationship in the last 30 years.

The Sources of Past Ties

Hence, at the heart of the U.S.-China relationship are trade and economic ties. Trade and economics were the foundation of past ties, and they will continue to be the key building blocks for the future. The challenge is that the specific conditions that initially brought China and the U.S. together as trading partners have changed. Each is facing demands which are not easily fulfilled if it is primarily within a relationship built on American companies outsourcing manufacturing to China, and China exporting goods back to the U.S. or around the world.

For the U.S., which faces fiscal adjustment and a protracted period of deleveraging, consumer spending will likely be flat in the years to come. American companies need to look abroad for their major sources of growth, and the emerging markets led by China are obvious candidates. Indeed, China is already an important buyer of U.S. products, and as it grows wealthier, imports from the U.S. will likely increase.

China is already becoming an important global consumer market. China also needs to rebalance its economy away from secondary industries, such as manufacturing, towards tertiary industries, such as services and retail. This is a major opportunity for the U.S., which leads the world in services exports. For Chinese companies looking to globalize and find markets abroad, close ties with the U.S. could offer many benefits.

In short, both countries face economic transitions where successful adjustment can be facilitated through positive engagement with the other. The key question is, what is the best framework for mutually beneficial engagement between the U.S. and China, given their respective needs and priorities?

In the past, a complementarity of needs defined and drove the U.S.-China relationship forward for more than three decades. However, it is important to note that this commercial relationship would have been almost impossible to achieve without the supporting framework of the multilateral trade system, and specifically, the WTO.

This may not be evident at first glance. But surely no two countries have benefited more from participation in the multilateral trade system under the WTO, than the U.S. and China. The multilateral system offered China the best of both worlds – flexibility to pursue development and economic expansion backed by the security of common codes of practice, rules-based norms, a level playing field and the fail-safe option of impartial, effective and enforceable dispute resolution through the WTO.

The number of claims lodged by both China and the U.S. under the WTO system may seem alarming. However, two large countries with as much two-way trade as China and the U.S. are bound to have disagreements. The WTO dispute settlement system resolves such disputes peacefully and in accordance with agreed rules for trade. Far better for countries to engage in tedious legal proceedings before the WTO, than to settle their disputes through confrontation or other means.

Perhaps the greatest benefit of WTO membership for both countries is to enable them to trade with all members every day in every part of the world, within a commonly held set of trading rules.

In particular, the basic WTO rules prohibit discrimination in commerce that affects international trade. Without the legal protection against trade discrimination to which it is entitled under the most-favored-nation (MFN) rule as a WTO member, for example, China would surely have met many more obstacles during its rise and return in recent years to global economic pre-eminence.

As it is, China has grown at an average annual rate per capita of nearly 8% since entering the WTO in 2001. Chinese exports have increased six-fold since joining the WTO. Internal reforms required by WTO rules have spurred economic growth in China and helped to lift millions of Chinese out of poverty. This is all true despite the fact that China has had barely a dozen years to benefit from participation in the multilateral trading system.

On the other hand, the U.S. has benefited since the establishment of the system, with the creation of the General Agreement on Tariffs and Trade (GATT) in 1947. According to the Peterson Institute for International Economics, the benefits to the U.S. alone from freer trade and from other forms of economic integration since World War II total US$1tr in added income for the American people annually. This represents an increase of 10% in the overall U.S. gross domestic product (GDP), and amounts to an annual income gain of US$10,000 for every American household.

The Peterson Institute estimates that the American people could gain another US$500bn annually in national income by eliminating all the remaining barriers to trade and investment worldwide. That would provide an additional US$5,000 in annual income for every American household.

So, it cannot be denied that China and the U.S. – individually and in partnership – have benefitted immensely from the multilateral trade system.

Taking U.S.-China Trade Relations Forward: Bilateral, Regional or Multilateral?

While both China and the U.S. continue to regard multilateralism as the centerpiece, both countries appear to be drifting away from multilateralism. For sure, the system is not perfect, and especially in view of the stalled Doha Round, there are many questions about its effectiveness. Many of these questions are rightly addressed at the WTO, which seems at times to be paralyzed to act, even when it knows that the times demand change.

It is perhaps understandable that many countries, including both the U.S. and China, have in recent years explored trading partnerships that are bilateral or regional in nature. Globally there seems to be an acknowledgement that, if the 150 plus members of the WTO cannot come to an agreement on trade liberalization – especially when under the single undertaking principle that "nothing is agreed until everything is agreed" – it may be easier for two countries or a small group of countries to achieve liberalization on the side.

As a result, bilateral and preferential trade agreements have proliferated. According to the WTO, as of January 2013, over 350 regional or preferential trade agreements came into force.

These alternatives – bilateral and regional trade arrangements – have been proposed as frameworks for the U.S. and China to consolidate their relationship and move it to the next stage. Both alternatives are worth considering for their benefits and costs.

To many, it would seem natural for the U.S. and China – based on their bilateral interests – to press ahead for something such as a U.S.-China free trade agreement (FTA). The logic appears simple: the U.S. and China are the world's two largest trading nations and their economies are very complementary, so a U.S.-China FTA could provide total sufficiency for both economies.

A U.S.-China FTA would be very strong and could dominate global markets to the advantage of both, especially if the U.S. and China could agree upon contentious issues such as intellectual property protection, market access, technology development, military and industrial equipment, and the liberalization of agriculture markets. The list of issues to be resolved by a U.S.-China FTA is long, and each one represents a major conundrum. And if these issues can be managed through an FTA, they could boost bilateral trade significantly and open up new grounds for partnership.

The big question is 'if' it will happen. There is an assumption that it would be possible or even easier to resolve these issues in an FTA, no matter that the U.S. and China's interests on many of these issues oppose one another. The U.S. and China have been at loggerheads over many of these issues for years now, and framing them in an FTA will not necessarily make the solutions appear more palatable to each side. It may take many months or years to even agree on which issues should be addressed in an FTA. We might well end up with an intractable negotiation between the two countries.

It is true that exploring the possibility of an FTA could have its own rewards. In fact, they will likely give China and the U.S. a better understanding of each other's perspective, needs and challenges, which is invaluable if they are to work together. But this alone will not make vested interests and 'deal breakers' on each side go away.

The other issue with a U.S.-China FTA is that for all the size and might of the world's two largest economies, they cannot proceed alone. They need the stability, predictability and governance mechanisms of the WTO framework.

Moreover, a U.S.-China FTA in isolation would likely leave the rest of the world much worse off. Other countries might feel compelled to form their own coalition to protect themselves from the detrimental effects of a U.S.-China trade bloc. Of course, both blocs would be exclusionary and undermine basic principles of global community and shared responsibility.

The Case for Multilateralism

If, on balance, a U.S.-China FTA does not appear to be an obvious pursuit at the present juncture, can we consider a slightly wider arrangement, in the form of a regional or preferential trade agreement among several countries, including both the U.S. and China?

Let us take for example the much discussed Trans-Pacific Partnership (TPP) which is heavily promoted by the U.S. as the commercial centerpiece of its pivot to Asia. The TPP's benefits are widely touted by its members, who in joining, agree to harmonize tariffs, rules and practices to promote trade within the group.

Many have wondered why the TPP does not encompass China. Surely, the co-benefits will be felt by all members. This is true for China joining, or indeed any other country in the region. So why not widen the group? Let any country that agrees to adhere to the rules of the group join in to form a coalition of the willing. The concept for this is open regionalism, which was discussed under the Eminent Persons Group of the Asia-Pacific Economic Cooperation (APEC) in the early 1980s.

Its present day form is plurilateralism, which we promote as a way for trade liberalization to take place without the prerequisite of an overall global consensus under the WTO's single undertaking mentioned above.

As it is, negotiating outside the WTO and with a defined, seemingly exclusionary list of participants, the countries negotiating the TPP, or any other preferential trade agreement, will at some point have to understand how they will enforce the agreement, even after all the terms are agreed. They will need a dispute settlement system for just that one agreement.

It may even resemble the WTO's dispute settlement system. But why create another system when an effective one already exists within the WTO? Why proceed outside the WTO when it makes so much more sense to proceed within the WTO?

Practical matters aside, when such agreements are pursued outside of the WTO, the further risk is that they will have needless geopolitical implications. Is the U.S. trying to isolate China with the proposed TPP? Are the U.S. and the E.U. trying to create a common economic bulwark against China and other emerging economies with the so-called Trans-Atlantic Trade and Investment Partnership?

Neither of these questions would arise if these negotiations were conducted within the WTO. The TPP and even the Trans-Atlantic Partnership could, with the consent of the WTO membership, be incorporated into the WTO, though no one involved in the negotiations has suggested this. As it is, suspicions arise and the negotiations add to the drift of the U.S., China and so much of the rest of the world away from multilateralism.

If the plurilateral idea works regionally , the nations of the world should consider expanding this within the existing multilateral framework. And China and the U.S. share a mutual interest in leading the way within the framework of the WTO.

Today, we need global solutions more than ever. The great advances in information and communications technology have made the world more connected and interdependent than ever before. Problems in one corner of the planet may have global repercussions. There are a host of contemporary global issues, such as climate change, security, natural resource scarcity and demographic change, which must be addressed by the global community acting in concert.

Unresolved, these problems will affect China and the U.S. as they will affect every nation. So multilateralism must be the overarching architecture of how the world works, and, together, China and the U.S. must lead the way in making it work, simply because it is in their own interests for the world to work well.

The truth is, despite their differences, China and the U.S. share a single economic fate. Neither can succeed economically without the success of the other. And the best way for both to succeed is by working together openly, transparently, under commonly held norms about fairness and shared goals. In other words, much like the multilateral trade system works today.

A China-U.S. Partnership: Remaking the Trading System for the 21st Century

If neither bilateral nor regional preferential trading arrangements provide a workable framework for future trade relations, why have they attracted so much attention? Or in other words, when we know that the multilateral system provides so many benefits to all parties, why is it perceived as ineffective and stalled?

Alas, it is true that the problems of multilateralism, and especially of the WTO, are widely known and are a source of much criticism. It has been said that the single greatest element blocking progress in multilateralism is political will. Consider that against the backdrop of China and the U.S., having recognized the benefits offered by the multilateral system, agreeing to invest themselves in the improvement of the system. Surely that constitutes sufficient will to break through on any number of issues facing impasse?

In fact, U.S. and China have every reason to invest in resolving the issues facing the WTO, even considering only their own respective interests. There is even a fair amount of convergence between American, Chinese and global interests with regard to the reform of the WTO.

Many of these changes have been discussed within the WTO, by its members and the public. A few priorities stand out:

- The WTO needs to bring its systems and processes up to date with the ever-changing realities of global production and supply chains.
- The WTO's rules and procedures need modernizing to keep pace with the fact that today, the WTO has 158 members whereas the trading system had only 23 members at the founding of the GATT; plurilateral arrangements are one such alternative, but there are others that should be explored.
- The WTO needs to step up the pace of liberalization on IT and new areas such as global services and environmental goods and services.
- And even the WTO's key strengths, such as dispute resolution, need updating so that they can still be effective today.

Clearly, this is a long-term, ambitious agenda, but one that both the U.S. and China have every interest in supporting.

Consider the task of updating the WTO's systems to track global supply chains and production systems. When the WTO was formed, many consumer goods were made in one country and shipped to another country where they were consumed. Today, global supply chains have fragmented and globalized. Even a very simple product may cross multiple borders during the production process. As a result, trade in intermediate goods accounts for more than half of regional trade in East Asia. It is increasingly difficult to determine where a product undergoes 'substantive transformation' along its way to production. In our world of global supply chains, products are no longer 'from' anywhere. They are 'from' everywhere.

Moreover, what matters most in profiting from production is not the site of a substantive transformation; it is the value added. When tallied according to value added, the shape and structure of world trade – and of various bilateral trade balances – looks very different from when it is calculated under current 'rules of origin' according to where traded products are supposedly 'from'. However, the standard trade flows tracked by the WTO, and many countries, still rely on outdated concepts of production. They attribute 100% of the value of a product as from its country of origin, which is often its last point of assembly.

This is more than just another trade statistic. When politicians in the U.S. are told that the U.S.-China trade deficit is more than US$300bn, they may form incorrect assumptions about their own economy and that of China, and the interconnections between the two. These misunderstandings may have geopolitical consequences.

This is but one example of how current trade rules are no longer attuned to 21st century realities. At a minimum, we need to update the WTO's information systems, so that they accurately reflect the two countries' true trading relationship.

Other agenda items that we have laid out above would yield great benefits for both China and the U.S. as well. One is trade in services. An international services agreement could potentially accelerate U.S.-China partnership to expand and diversify the delivery of services in China and thereby support China's economic rebalancing.

The Peterson Institute recently studied a potential global services agreement within the WTO and found that such an agreement would boost global exports by US$1.129tr, create 8.6 million new jobs and boost global GDP by US$1.04tr.

Similarly, extending the WTO Information Technology Agreement (ITA) to cover more products would result in a GDP boost of US$147bn, accounting for US$178bn in exports and 3.7 million new jobs. More countries should be encouraged to sign the ITA and efforts should be made to address non-tariff as well as tariff barriers to IT trade.

At a time when global attention is rightly turning to issues of sustainable development, the WTO can do much to ensure that environmental goods and services are available where they are most needed. The recent APEC initiative listing eligible goods and services can be helpful. For example, China and the U.S. could begin by working together on a sustainable energy trade agreement as a plurilateral agreement within the WTO. Freeing trade in environmental goods and services can be an important part of such an agreement.

In addition, a sustainable energy trade agreement could also include other issues that affect green growth. It could limit import and export restrictions on energy products. It could carve out a limited exception from WTO subsidies rules for certain carefully defined green subsidies. It could begin to fulfill some of the promises that China, the U.S. and other G-20 countries have made about reducing the trillions of dollars worldwide in climate-damaging fossil fuel subsidies.

Why should China and the U.S. take the lead in such an initiative? A better question is: why shouldn't they? Both need new technologies, both need new markets and both understand that the whole world must find new ways of growing economically, while surviving environmentally.

Expanding Multilateralism to Address Global Challenges

There is one additional new initiative that is critical to the advancement of a harmonious U.S.-China relationship for the future, and whose accomplishment would represent great progress for the cause of multilateralism: that of an international agreement on investment.

The story of U.S. investment abroad is well known. U.S. foreign direct investment (FDI) has for many years spurred worldwide growth. China has been one of the beneficiaries of American FDI and continues to be one of the world's most attractive FDI destinations, and this may well continue.

But today, a new and exciting story is developing about Chinese investment abroad, which has grown from just under US$1bn at the turn of the century, to over US$60bn annually today. Chinese investment abroad is globally very diversified and covers all industries. But from time to time, it is thwarted by misconceptions about its nature and provenance. The U.S. needs investment to create jobs and kick-start growth. How can we unlock Chinese investment for the benefit of U.S. workers, businesses and the overall economy?

Negotiation of a bilateral investment treaty between China and the U.S. would be a good start. But it will not be enough. More than 3,000 such international investment agreements already exist. These outline rights and responsibilities for investors and investments, but when taken together, the network is large, complex and, in some cases, contradictory. Moreover, these 3,000 treaties protect only two thirds of the existing stock of global FDI, and cover only one fifth of possible bilateral investment relationships. The United Nations Conference on Trade and Development calculates that an additional 14,000 bilateral treaties would be needed to provide full coverage of international investment.

Trade and investment are two sides of the same coin in global commerce. We need global rules on investment akin to the global rules we have long had on trade. In short, we need a multilateral agreement on investment, which would provide a transparent, rules-based framework for making investments worldwide.

Conceivably, a multilateral investment agreement could be negotiated by the members of the WTO, and could become part of the WTO system and subject to WTO dispute settlement. This is by far the best way to support the continued growth of global FDI.

There were discussions towards a multilateral agreement on investment almost two decades ago. However, the idea proved too contentious, with the investor and investee countries lined up on opposite sides. But the world has changed since then. Today, each investee country is also a potential investor. Is China an investor or an investee? It is both. The same is true of the U.S.

Worldwide, an increasing convergence of investment concerns has replaced old notions and allegiances as far as investment rights and protections are concerned. This helps make the time right for the global community to move forward on an international agreement on investment.

Conclusions: From a Trust Deficit to a Trusting Partnership

Cooperation can be habit-forming. Successful cooperation by China and the U.S. in strengthening the WTO and restoring the global commitment to multilateralism in trade can help build the confidence and the impetus the two countries will need to tackle together other tasks of multilateralism.

China and the U.S. can cooperate, and through their cooperation, help construct a multilateral trade system that meets their own needs, while providing an enormous global public good. In doing so they will recognize the value of multilateralism, and give credence to the notion that all nations should work towards its improvement.

In a time of acknowledged complexity, global interconnectedness, and many rising risks to our growth and prosperity, this contribution may be the greatest legacy of the U.S.-China partnership, at the beginning of the 21st century.

Chapter 18

Pursuing Sustainable Planetary Prosperity

Peter A. SELIGMANN
Co-Founder, Chairman and CEO, Conservation International

Michael TOTTEN
Founder and Principal, AssetsforLife.net

Executive Summary

China and the U.S. are the two largest consuming nations, their combined gross domestic products (GDPs) comprising one-third of global GDP. The two nations consume one-quarter of world natural gas and one-third of world oil production, and produce nearly two-thirds of world coal. The two nations are also the planet's largest CO_2 emitters, jointly releasing nearly half of the world total.

Business-as-usual scenarios are insufficient to address the acute sustainability challenges that both nations – as well as the community of nations – are facing. However, collaboration in pursuing solutions through unprecedented statesmanship, leadership and technological advances will simultaneously provide national and global sustainability solutions.

Joint initiatives are in both of our nations' enlightened self interest – from immediate and sustained economic and environmental gains to long-term well being and prosperity of our peoples – and will make a major, essential contribution to finding global solutions to the devastating risks facing humanity and the biosphere.

Pursuing Sustainable Planetary Prosperity

The Challenge

The family of nations faces two inextricably interwoven biophysical threats of unprecedented historical and global magnitude: catastrophic dangers from climate destabilization and deterioration and destruction of the planet's biosphere productivity, resilience and stability, which are the sources of and services for sustaining humanity's health, well being and inter-generational prosperity.

These destructive threats and outcomes are being accelerated by three primary drivers:

Combustion: Producing goods and services through the combustion of fossil and biological resources annually, emitting more than 40 billion tons of CO_2.

Consumption: Consuming a gigantic and expanding amount of the world's renewable and non-renewable natural resources, with the massive waste streams contaminating and degrading the planet's natural capital assets.

Population: An enormous, expanding population that has grown 500% between1950 and 2050. It is important to note that population growth is a central sustainability concern, but not relevant to the actions that must be taken within the next 10 years to rapidly slow down climate destabilization.

Combustion

Humanity's unceasing ingenuity is generating vast economic gain for billions of people, with goods unavailable even to the wealthy throughout most of history. Fossil fuels have admirably served humanity in this capacity, fueling the engine of economic activity, especially through access to cheap oil over the past century. Indeed, virtually every facet of the US$70tr global economy is dependent upon these historically cheap and abundant fossil resources.

However, in deriving and consuming these fossil energy resources, they have unwittingly – but now knowingly with a vast accumulation of empirical evidence and scientific findings – become a primary driver of most of the global risks and threats confronting humanity[i]. Worldwide, governmental programs pay a staggering US$700bn to US$1tr per year in subsidies to produce and consume fossil fuels. In addition to these market-distorting subsidies, recent assessments by environmental consultants TruCost indicate fossil fuel externalities cause human health and environmental impacts globally exceeding US$4tr per year.

For example, according to a comprehensive analysis by Harvard Medical School, the externality costs just from coal production and combustion in the U.S. amounts to upwards of US$500bn per year – more than 10 times the total revenues of the U.S. coal industry.

Unfortunately, failure to include these externalities in the price of each kiloWatt hour (kWh) means citizens are forced to incur the costs through sickness, chronic illness and premature mortality, and serious declines in the health of terrestrial ecosystems, watersheds and marine life. If these externality costs were factored into the delivered price of electricity, consumers would be paying US$0.37 per kWh. That is 12 to 40 times more expensive than end-use efficiency improvements, six times more costly than wind power, and two to three times the price of solar photovoltaic (PV) delivered electricity.

The costs and consequences are now undeniably immense and clearly indicate business-as-usual is driving the economy, society, humanity and the biosphere towards accelerating (premature) morbidity and mortality. We are exceeding planetary boundaries and collapsing the safe operating space for humanity.

An assessment commissioned by 20 governments in 2012, the "Climate Vulnerability Monitor", calculated that five million deaths occur each year from air pollution, hunger and disease as a result of climate change and carbon-intensive economies. That toll would likely rise to six million a year by 2030 if current patterns of fossil fuel use continue.

The report noted that the effects of climate change have lowered global output by 1.6% of world GDP, or by about US$1.2tr a year, and losses could double to 3.2% of global GDP by 2030 if global temperatures are allowed to rise.

Humanity's health and well-being hang in the balance. To keep the global temperature from rising more than 2 degrees Celsius and sparking dangerous consequences, leading scientists calculate that less than 900 gigatons (Gt) of cumulative CO_2 emissions can be released into the atmosphere in the first half of this century.

By 2012, collective emissions reached 360 Gt CO_2, or 40% of the 50-year budget. Unchecked, the rising level of CO_2 emissions will result in the global average temperature increasing by 2°C in the next two decades, 3.5°C by 2040 and 4°C by 2050[ii].

Consequences are already being seen in the agriculture heartlands of both the U.S. and China, gripped by multi-year droughts. An article published in *Science*[1] summed up China's agriculture predicament from climate destabilization in its title, "Losing Arable Land, China Faces Stark Choice: Adapt or Go Hungry". China has one-fifth of the world's population, but just 7% of arable land, that is shrinking further from urbanization converting nearly nine million hectares of farmland per decade[iii].

China's agriculture and livestock growth trends are at high risk of reversal due to rising tempera-

1 *Science* 8 February 2013:
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tures (0.8°C over the past half century) and declining rainfall, causing shorter growing seasons in China's farm belt. The Chinese Academy of Sciences reported in 2009 that warming caused a 4.5% decline in growth of wheat yields across China from 1979 to 2000, resulting in the annual loss of hundreds of thousands of tons of grain.

Resource patterns collapsing biosphere resilience, stability and ecosystem services

Biologists and ecologists have been sounding alarms over the last quarter century of an unfolding extinction spasm of planetary dimensions, due to humanity's liquidation of intact ecosystems and assemblages of flora and fauna. The loss of these natural capital assets and services are occurring in the wake of converting nation-size landscapes for food, feed, fiber, forestry, fuel and other commodities[iv].

As detailed in the multi-volume "Millennium Ecosystem Assessment" and the more recent studies "The Economics of Ecosystems and Biodiversity" (TEEB) and "Principles for Responsible Investment", the wholesale destruction of worldwide ecosystem services – the planet's natural capital – is destroying some US$6tr per year of assets and economic value[2].

Ecosystem services' irreversible losses

With the world's population expanding by the population size of the U.K. every year, the projected figure of 10 billion by 2050 will require a 70% increase in food production. Along with the increased energy and materials feeding humanity's rising economic 'metabolism', the continued loss of ecosystem services and natural capital is estimated to cost nearly 20% of annual gross world product by 2050. This is a conservative estimate because it is not based on the 4°C global temperature rise that will occur by then from business-as-usual emissions.

Global fisheries are being exploited into extinction. One-third of all fish stocks globally have collapsed, and at current fishing rates, they will have collapsed completely by the middle of the century. A full three-quarters of the world's fisheries are now either collapsed, over-exploited or significantly depleted.

Species extinction rates have accelerated due to habitat destruction. Humans are implicated directly or indirectly in the 100 to 10,000-fold increase in the 'natural' or 'background' extinction rate that normally occurs as a consequence of gradual environmental change. Harvard Biology Professor Edward O. Wilson estimates some 40,000 species go extinct each year. The continuation of current habitat destruction trends will drive more than half the planet's species to extinction by the middle of the century.

Ironically, ecosystem destruction is fueling business-as-usual CO_2 emissions. In recent decades the yearly burning and clearing of 14 million hectares of tropical forests has released several billion tons of CO_2 emissions – an amount greater than the emissions released by the global transport sector (including all vehicles, trucks, trains, planes and ships). It is roughly the same level as the CO_2 emissions released by the U.S. or China every year.

TEEB estimates the cost of forest ecosystems currently lost in just one year amounts to US$2tr to US$4.4tr, far exceeding the profits made from the deforested land. In the wake of the 14 million hectares of tropical forests burned down each year, it is estimated that some 16 million species populations go extinct[v].

Ocean acidification threat to the collapse of fisheries

The oceans face multiple extreme risks. Recent marine evidence has found that over the past half-century, phytoplankton – the base of the ocean

2 Millennium Ecosystem Assessment. Millennium Ecosystem Assessment Synthesis Reports, 3 Volumes, Island Press. Washington, DC, 2006, http://maweb.org/en/Synthesis.aspx; TEEB - The Economics of Ecosystems and Biodiversity, 4 volumes, Routledge Press, Boston, MA, 2012; Trucost, *Universal Ownership* Why externalities matter to institutional investors, 2011, UNEP Finance Initiative and Principles for Responsible Investment, London, UK.

food web – has declined by 40%, corresponding to a 0.5°C global temperature increase over the past century. In addition, humanity's annual 35+ gigaton pulse of CO_2 emissions is accelerating the rate of ocean acidification faster than at any time during the last 300 million years.

Marine scientists warn that the failure to peak global CO_2 emissions by 2015 and then steadily reduce these emissions by at least 5% per annum could, by the end of the century, cause acidification levels that essentially unravel the ocean ecosystem and collapse major fisheries and marine species. Only 1% of marine fishery catch revenues are not influenced by changes in ocean pH levels. Marine acidification and global warming risks are compounding humanity's already massive overfishing, depletion and collapse of major fisheries[vi].

One-third of all coral species are already at risk of extinction as a result of bleaching and disease caused by ocean warming in recent years. Catastrophic risk increases greatly when acidification interacts with the temperature stress on coral reefs: with 1.7°C warming, all coral reefs will be bleached, and by 2.5°C – within several decades – they will be extinct. Recent research has shown that agri-chemical and industrial run-off into coral rich coastal areas accelerates coral die-off at even smaller temperature increases.

Energy-driven materials and resource consumption

The past century's access to low-cost fossil fuels, combined with faster technological progress and preferential government policies and subsidies, played instrumental roles in the dramatic growth in resource consumption. During the 20th century, the price of key resources fell by almost half in real terms, despite global population quadrupling, economic output increasing 20-fold, and a jump in demand for different resources by six to 20-fold.

Resources are increasingly linked. Many nations liquidate and sell their natural capital resources to secure financing to pay for imported fuels and to build power plants. Over the past decade the price and volatility of diverse resources have become tightly linked. Price changes and shortages in one resource can suddenly impact other resources[vii].

The throwaway habits of historic consumption further aggravates price and volatility issues. A multi-nation study led by the World Resources Institute, "The Weight of Nations", discovered the astounding fact that half to three-quarters of the materials and resources consumed by society became waste within 12 to 24 months[3].

This linear pattern of expanding extraction-consumption-waste will pose a formidable, if not impenetrable barrier to achieving the 2% to 3% average annual global economic growth rates assumed by most economists; such growth rates imply a nearly 10 to 20-fold expansion of the world economy within this century.

Going Forward

A growing number of statesmen, corporate and civic leaders, and scientific experts have been exclaiming loud and clear, humanity has the next 10 years, starting immediately, to take and make transformational changes that will put the economy on a path consistent in keeping the global temperature rise below 2°C[viii].

Give the scale of the catastrophes looming on the horizon, which could be amplified by a dozen identified 'negative tipping points' – for example, the gargantuan release of methane emissions from melting permafrost, massive emissions from the dieback of the Amazon rainforest – it is incumbent upon leaders and citizens to support the rapid pursuit of bold, ambitious, transformational changes to our global economic development practices.

This section highlights several key transfor-

3 Emily Matthews et al., Weight of Nations: Material Outflows From Industrial Economies, 2000, World Resources Institute, Washington, DC.

mational opportunities available for ensuring economic and environmental sustainability for current and future generations of people and nature. The past half century has been witness to an explosion of knowledge generation, scientific breakthrough, technical advances, engineering progress and accumulated evidence from applied innovations in markets and governance that offer promising prospects for addressing the seemingly intractable perils confronting humanity and the planet.

Empirical evidence accumulated over the past four decades clearly and unequivocally point to improving the efficiency in the way utilities (electricity, natural gas, water), mobility and industrial services are delivered to the point of use as the largest pool of least-cost-and-risk (LCR) opportunities for achieving immediate, ongoing, deep reductions in global CO_2 emissions.

This amounts to a paradigm shift from the industrial smokestack era of economic growth which achieved economies of scale by constructing larger factories powered by bigger centralized power plants. The scientific revolution in solid-state electronics and space-age materials have led to new economies of scale through the delivery of distributed services at the point of use.

Services are delivered while dramatically reducing the amount of upstream natural resources and downstream waste and pollution, as well as lifecycle costs, as detailed extensively with respect to utility services in "Small is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size"[xi].

For example, the U.S., according to Amory Lovins in "Reinventing Fire: Bold Business Solutions for the New Energy Era", could reduce consumption by 25 million barrels of oil per day through efficiency, at an average cost below US$20 per barrel. By comparison, the average price of world crude oil since 2006 has ranged between US$60 and US$120 per barrel.

China has even larger savings opportunities at significantly lower cost, given all of the new construction, manufacturing expansion and consumer purchasing[x].

Least-cost-and-risk delivered utility services

Both the U.S. and China have tapped into this immense, and still expanding, pool of efficiency gains in the way the services of energy, water and resources are delivered to the point of use[xi].

Among a dozen states leading the U.S. in efficiency gains, California has been the exemplary model. Since the 1980s, California has been a world leader in developing a utility regulatory process that aligns the financial interests of the utility with those of their customers to capture end-use efficiency opportunities. This holds true for private-owned and public-operated utilities. California achieved this alignment by decoupling utility earnings from revenues to eliminate the perverse incentive of expanding supplies that are five times more costly than end-use efficiency gains.

This is combined with a comprehensive Integrated Resource Planning (IRP) methodology that calculates the levelized lifecycle cost-and-risk of delivering utility services from all supply and all end-use efficiency options. All options are priority ranked in order of LCR. End-use efficiency options have consistently and persistently ranked as the LCR. Ongoing assessments by McKinsey Global indicate LCR end-use options could provide half to three-quarters of all new utility services worldwide, based on utilities' 10% to 12% fixed earnings on capital[xii].

One among many 30% + solutions:
High-performance electric motor drive systems

A clear example of how important comprehensive IRP utility regulatory reform is needed to capture end-use efficiency services, involves the persistence and ubiquity of obsolete and inefficient electric motor drive systems around the world. Half of the world's electricity is consumed by industrial electric drive systems – electric motors, pumps, compressors and fans (60% in China).

New motor systems could achieve 50% in savings if users implement high-efficiency electric motor industrial drive system components. However, the conventional practice is to procure technologies that require the lowest capital cost, while ignoring how inefficiently they perform in terms of energy consumption, lifecycle costs and emissions. In some instances, these inefficient devices will consume up to 20 times more in electricity costs when compared to the motor's purchase price.

IRP-based utility efficiency incentive programs have been instrumental for decades in overcoming this distortion; utility financed efficiency upgrades to existing systems can achieve 30% in savings at five to 10 times less cost per kWh when compared to building new generation facilities to power the inefficient devices that dominate the current market[xiii].

China end-use efficiency initiatives

China has been a world leader in pursuing ambitious energy efficiency targets. From 1980 to 2002, China experienced a 5% average annual reduction in energy consumption per unit GDP.

There was a dramatic reversal of this historic relationship between 2002 and 2005, when efficiency options were largely ignored and energy intensity increased by 5% per year. However, China's 11th Five-Year Plan (FYP) set a target of reducing energy intensity by 20% by 2010, followed by the 12th FYP target for a 16% reduction in energy intensity between 2011 and 2015[xiv].

Feed-In Tariffs – fit policy for driving zero emission options

Feed-In Tariff (FIT) performance payments are proving essential for spurring zero and near-zero emission power options – such as solar, wind, geothermal, biowaste and small-scale hydro. Depending on how effectively a FIT is designed and implemented, this can make a significant difference to the amount of clean power generated. Given the urgency in reducing CO_2 emissions, the adoption of advanced FITs has become an imperative for aligning good governance and flourishing markets. As of 2011, FIT policies have been enacted in China, seven U.S. states and more than 50 other countries[4].

Utility investments in regulated states typically receive a guaranteed 10% to 12% return on investment. FITs are often set to provide an 8% to 10% internal rate of return (IRR). A FIT guarantees a long-term performance payment for electricity to help investors recover their investment. Solar, wind and end-use efficiency projects have no fuel, water or waste storage and disposal costs, so their entire investment is up front. Long-term payment contracts – which generally cover 20 years – ensure that energy providers recover their costs and help them secure financing[xv].

Zeroing in on zero-emission supply options

• Wind power

In less than a decade, China has rapidly become the world's biggest manufacturer of wind turbines and solar PV panels. The country established a FIT for wind in 2009 and for solar PV in 2011[xvi].

In recent years, China's ambitious renewable power targets and support for wind energy manufacturers have fueled rapid growth. In 2006, China had only 3,000 megawatts (MW) of installed capacity, and was a small global player. By late 2012, China surpassed 70,000 MW, reaching nearly one-third of installed global capacity – a 25-fold increase in six years, while the rest of the world only expanded by a factor of 2.6.

A 2009 joint assessment by Harvard's School of Engineering and Applied Science and Tsinghua University's Department of Environmental Science and Engineering concluded that China's favorable

4 Tariff Watch, http://www.pv-tech.org/tariff_watch/list

onshore wind resources could provide nearly 25 trillion kWh of electricity annually, more than five times its national consumption in 2012. The team also made a key point: that assuming a 10-year FIT payment per kWh comparable to what is currently being offered, "wind could accommodate all the demand for electricity projected for 2030, about twice current consumption."

The Harvard team estimates wind power can supply 40 times world consumption of electricity, and more than five times total global use of all energy[xvii]. Available wind resources on the U.S. Great Plains were estimated to be as much as 16 times total current U.S. power consumption[xviii].

Wind power is an established LCR power supply. Both the U.S. and China could steadily displace all their current and proposed coal power plants and most natural gas power with their wind resources[xix].

• Solar power

Solar power systems have experienced dramatic declines in production costs, achieving grid parity (cost-competitive) in a wide range of locations worldwide. More than 100,000 MW were installed worldwide as of 2012, with annual growth rates of 25% (i.e. doubling every three years).

Solar power is now less expensive than nuclear power. U.S. Secretary of Energy Stephen Chu said in early 2013 that large-scale solar would also soon eclipse coal and natural gas in cost. In 2012 for example, First Solar signed a power purchase agreement to deliver energy from a 50 MW solar PV plant in New Mexico to the local utility for US$0.06 per kWh – half the cost of a new coal plant[xx].

According to assessments by the U.S. National Renewable Energy Laboratory (NREL), it would require roughly 15% of existing urban land area sited with solar PV panels to deliver all of U.S. current power and energy consumption. This could be done on roofs, parking lots, along the sides of highways, bridges and railways, and on the sides of buildings. Over three-quarters of America's current electricity could be supplied with PV systems built on the 'brownfields'– the estimated more than 2 million hectares of abandoned industrial sites that exist in cities across the U.S.[xxi].

In 20 years, China's cities will have over 350 million inhabitants, more than the entire population of the U.S. today. By 2025, China will have 221 cities with one million–plus inhabitants – compared with 35 cities of this size in Europe today. Designing and constructing new cities, and expanding and retrofitting existing cities, should take maximum advantage of the proven ways to deliver lower cost utility and mobility services with zero and ultra-low emissions, and reduced waste materials.

China declared an eight-fold increase in its solar power target for 2015 to 40,000 MW[xxii]. This will put China far ahead of any other nation. For comparison, the U.S. had 6,400 MW installed at the end of 2012, with solar tax incentives set to expire in 2015[xxiii].

Mobility access power with zero emissions

A key opportunity for displacing oil-fueled vehicles is the shift to ultra-lightweight battery-electric vehicles (BEV), while also largely avoiding biomass-fueled vehicles[xxiv].

Converting crops to fuels is very inefficient, while requiring enormous land area, chemical inputs, and water consumption. For example, just shifting from diesel to biodiesel to fuel the world's maritime fleet would require a 40-fold expansion of current global production of oil palm plantations. Oil palm plantations have been one of the primary causes of widespread deforestation – and CO_2 emissions – of biodiversity-rich rainforest in recent decades.

Both Chinese and U.S. officials have raised security concerns that more than 50% of their oil use is dependent on vulnerable foreign oil imports, and China's oil imports are projected to double by 2020. The U.S. spent roughly US$430bn on foreign oil in 2012 – a direct wealth transfer out of the country. Billions more are spent to keep oil shipping lanes open and oil geo-politics add considerable additional burdens[xxv].

In his 2011 State of the Union speech, President Barack Obama announced a goal of having one million BEVs and plug-in hybrid electric vehicles (PHEVs) on the road by 2015 – compared to 500,000 on the road in 2012. This coincided with China's 12th FYP targets for ownership of five million BEVs and PHEVs by 2020[xxvi].

The combination of solar and wind powering ultra-lightweight BEVs accrue multiple economic and environmental benefits: dramatic improvements in urban and rural air quality and tremendous health gains for those experiencing record-breaking air contamination; the elimination of vulnerable and volatile-priced foreign oil imports; savings from replacing the cost of gasoline with solar or wind power; the elimination of vehicle combustion and emissions; and significant reductions in CO_2 emissions.

Consumption

The definitions of 'consumption' and 'consumer' refer to two elements: buying a good, and using, exhausting and wasting a resource. Humans perform both, however, the latter poses a threat to the long-term economic and ecological status.

The world is sitting on a consumption time bomb – more consumers lead to higher consumption and more material intensity. The Organisation for Economic Co-operation and Development projects the global middle class will increase by 250% to five billion people by 2030, with almost 90% of the growth coming from the Asia-Pacific region. Consumption in emerging markets is expected to rise from US$12tr in 2010 to US$30tr by 2025. These new consumers will move from bulk, unbranded products to highly processed and packaged goods.

According to the 2012 report "Towards the Circular Economy"[5] some 65 billion tons of raw materials entered the economic system in 2010, and this figure is expected to grow to about 82 billion tons in 2020. In the conventional linear economy of extract-consume-waste, society currently recovers only 20% of this material – well short of the 50% that could be recovered in the near term.

Supply chain practices – shifting from a linear to circular economy[xxvii]

Unilever CEO Paul Polman summed up the critical importance for business to move to a circular economy:

> "It is evident that an economy that extracts resources at increasing rates without consideration for the environment in which it operates, without consideration for our natural planetary boundaries, cannot continue indefinitely. In a world of soon to be nine billion consumers who are actively buying manufactured goods, this approach will hamper companies and undermine economies. We need a new way of doing business. The concept of a circular economy promises a way out. Here products do not quickly become waste, but are reused to extract their maximum value before safely and productively returning to the biosphere."[xxvii]

China and the U.S. have enormous global standing in the span of their supply chain networks, and are highly dependent upon natural resources from many other nations for food, feed, fiber, forests, fish, fuel, minerals, etc. Together they have an opportunity – as well as a global responsibility – to promote and encourage radical innovation in sustainable resource development from supplying nations.

Great progress could be made if both nations collaborated on encouraging and supporting other nations to manage their resources sustainably, including comprehensive energy, water and resource efficiency improvements and minimizing their land and water-use footprint. A step forward would be to

5 Towards the Circular Economy, 2012, The Ellen MacArthur Foundation, Isle of Wright, UK, www.circulareconomy100.org/

align U.S. and Chinese resource extraction policies when working in developing nations to meet global best-practice standards – and strengthen them over time.

China-U.S. statesmanship in governance and leadership in markets

China and the U.S. are categorized as 'megadiversity' nations, which means that their ecological assets are enormous – literally worth tens of trillions of dollars in social and economic value. Most people are unaware of these free services delivered through the rich diversity of ecosystem structures and functions. Many of the natural capital assets would be ridiculously expensive to replace, and some are irreplaceable once destroyed and irreversibly lost[xxix].

The fundamental sustainability challenge for both nations is to sustain growth while maintaining, not diminishing or depleting, natural capital productivity and resilience. The science is clear on major steps to ensure this happens: transitioning to reliance on zero-emission renewable energy resources; radically increasing energy and resource efficiency throughout the lifecycle of economic activity; and rigorously maintaining safe global limits – so-called planetary boundaries – in climate, resource stocks and flows, freshwater systems, etc.

The U.S. and China, although at different stages in their respective economic and environmental challenges, are each increasingly vulnerable to resource scarcity (from minerals, water, food and biodiversity) and climate destabilization (through drought, floods, wildfires and extreme weather). Both nations also have extensive supply chains operating in, and drawing significant resources from, other megadiversity countries. These nations face similar threats of natural resource exhaustion and collapse, but also can tap into the large pool of best practices in markets and governance to sustain their irreplaceable natural capital assets.

There are many areas where the U.S. and China could work together to help achieve large-scale sustainability gains for themselves and for their trading partners. Two primary areas include:

• Tech-knowledge

The U.S. and China jointly account for 50% to 60% of global research and development (R&D), and tremendous mutual gains in radical innovation are achievable through such valuable mechanisms as collaborative innovation networks. 'Tech-knowledge' is a broad term encompassing advances in science, technology, engineering, economics, finance and myriad ancillary fields involving capacity building, skills development, continuous learning, communication, etc.

• Policy

Tech-knowledge flourishes when good governance sets policies and incentives in alignment with market opportunities capturing highly desirable social and public goods. The next decade is critical to establish effective policies that help drive markets to capture the zero-emission LCR utility and mobility services highlighted in this chapter.

Being the two largest economies in the world, the U.S. and China should take the lead in fostering global agreements, such as on climate change and on governance policies that promote radical innovation solutions for sustainable global development. This requires adopting proven best-in-play options that supersede outdated and suboptimal subsidies/incentives, non-LCR utility regulations, lax environmental standards and enforcement mechanisms, and weak or modest efficiency standards for building, motors, appliances, vehicles, etc.

Regarding natural capital conservation, both China and the U.S. should strive to attain the Convention on Biodiversity (CBD) targets for both terrestrial and marine conservation[xxx].

UN Global Compact and International Union on the Conservation of Nature framework for corporate action on biodiversity and ecosystem services

The failure to manage impacts and dependencies on biodiversity and ecosystem services (BES) raise the likelihood of a myriad of risks that can directly impact on a company's competitiveness and profitability. It poses the increased potential of liabilities, placing the firm's long-term viability at risk. These risks encompass all facets of business engagement: operational, regulatory, legal, market, financial and reputational.

When biodiversity and ecosystem services are degraded or lost a company's operations may face reductions in productivity, disruption to business activities and interrupted or limited access to resources, all of which affect the bottom line operating costs. Corporations can find it difficult to secure a legal, regulatory or social license to operate for their failure to use ecosystem management[xxxi].

Businesses need to frame biodiversity and ecosystem targets in ways that are 'specific, measurable, achievable, relevant and time-bound' (SMART). They should begin by identifying what to avoid; for extractive industries this starts with 'no go' areas for exploration or clearing and includes identifying prohibited technologies. Expressed more positively, BES targets can promote 'reduce, reuse, recycle and restore', and adopt net balance approaches.

Integrating the mitigation hierarchy into corporate practices is the best practice approach to managing biodiversity risk. The efforts should result in preventing or avoiding biodiversity and the impact on the ecosystem. Consequently, successive efforts focus on restoring adverse effects, then addressing any residual negative effects. This is done with a 'biodiversity offset' in order to achieve 'no net loss' of biodiversity, or 'net positive impact' on biodiversity.

Offsets are "measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate prevention and mitigation measures have been implemented," as defined in the Business Biodiversity Offsets Program (BBOP) Standard on Biodiversity Offsets hierarchy of "Criteria and Indicators and Principles", established in 2009. The standard enables project developers to manage biodiversity related risks by providing an audit-able approach to no net loss, as well as enabling auditors and assessors to determine whether an offset has been designed and subsequently implemented in accordance with the BBOP principles.

Net positive impact

Many companies are exploring how to manage the adverse impacts of their activities on BES[xxxii]. A few companies have made public commitments to 'no net loss', 'ecological neutrality' or even 'net positive impact' (NPI) on biodiversity, or on specific ecosystem services such as water resources. Managing biodiversity risk involves looking beyond sites and products to the wider land and seascapes. Several examples of these efforts include:

The Consumer Goods Forum – an independent global network of retail and manufacturing companies, showcasing its ability to develop standard approaches with members through its intention to mobilize its collective resources to help achieve zero net deforestation by 2020.

Walmart – by recognizing that 90% of its CO_2 emissions originate in its supply chain, it has a joint initiative with Earthster to create an open database for product designers, manufacturers, suppliers and sustainability experts looking for current information on materials, energy, water, social and climate impacts throughout the product lifecycle. Since 2005, Walmart has developed and used a Sustainable Product Index to assess the environmental impact of its products and relays this information to customers using a labeling system. The Sustainable Product Index measures such facets of production as energy usage, material efficiency and human conditions.

Rio Tinto – is committed to achieving an NPI on biodiversity, a strategy launched at the 2004 International Union on the Conservation of Nature World Conservation Congress. Biodiversity losses and gains were measured and forecast for the period 2004-65, in order to determine whether the current and proposed mitigation activities of Rio Tinto QMM [QIT Madagascar Minerals] (QMM) operations are sufficient to achieve NPI by closure[xxxiii].

E.U. – in the policy arena, the E.U. has established an E.U. No Net Loss initiative to begin in 2015, as part of the E.U. Biodiversity Strategy to 2020.

TEEB – The "TEEB Business Report" documents sustainability-related global business opportunities in natural resources (e.g. energy, forestry, food and agriculture, water and metals) that may be worth up to US$6tr by 2050 (at 2008 prices). Biodiversity or ecosystem services would be the basis for these new businesses.

However, the TEEB assessment emphasizes that "effective responses to biodiversity loss and the decline in ecosystem services require changes in economic incentives and markets." The global carbon market, which expanded from nearly zero in 2004 to over US$140bn in 2009, was largely due to new climate-related regulations. The carbon market potential is immense, with the possibility of generating sufficient funds to prevent most global deforestation and ecosystem destruction[xxxiv].

There are also business initiatives to address poverty and biodiversity together. Coffee retailer Starbucks supports the investment portfolio of Verde Ventures, an initiative of Conservation International. Verde Ventures provides loans to local non-governmental organizations and coffee farmers to help implement projects that maintain forest ecosystems and services. One example is a loan to a coffee-growing cooperative near the Sierra Madre, which helped finance the coffee harvest while also allowing farmers to undertake reforestation activities adjacent to their lands. The funding also supported training programs focused on environmentally friendly coffee cultivation practices, with an emphasis on female education[xxxv].

Using option value to protect natural capital assets

Conventional development models pose significant threats to the economic and environmental sustainability framework highlighted in this article. It is in the enlightened self interest of the U.S. and China to collaborate on promoting and supporting these positive climate and biodiversity solutions in other nations. This entails pursuing zero-emission technology, innovative financing methods for LCR and FIT energy services, zero waste and closed-loop manufacturing processes, and conservation of ecosystems. A risk and cost-minimizing strategy for corporations and governments confronting the increasingly uncertain future filled with unwanted, disruptive surprises, is to implement a robust portfolio of market practices and aligned governance policies that foster a sustained path towards resource efficiency, zero emissions and waste, and sourcing emission offsets[xxxvi].

An exemplary opportunity regarding the third component is sourcing land-based CO_2 emission offsets. Why? The combination of energy efficiency improvements and ramping up zero-emission solar and wind power systems is a long-term process. Plus there are non-energy greenhouse gas (GHG) emissions from agriculture and chemicals that cannot be reduced to zero and will continue for the unforeseeable future. Sourcing offsets provide an immediately available, highly cost-effective way to help sustain the deep annual emission reductions needed now and for decades to come[xxxvii].

Sourcing standards-based, multiple-benefit conservation carbon offsets

It is an astonishingly under-reported fact that 15% to 20% of total global CO_2 emissions over much of the past two decades were due to the burning of 14 million hectares of tropical forests each year. This is an amount greater than the emissions released by the global transport sector, and roughly the same level as the annual CO_2 emissions of the U.S. or China.

Nearly a decade ago, the Climate, Community & Biodiversity (CCB) standards were launched as a multiple-benefits approach to sourcing land-based emission offsets; technically referred to as REDD+, reducing emissions from deforestation, degradation plus protection, or commonly called ecological carbon storage (ECS). The voluntary standards help design and identify land management activities that simultaneously minimize climate change, support local sustainable development and conserve biodiversity[xxxviii].

CCB has become the most used land-based standard worldwide, and is widely recognized as a high-quality, triple benefits standard used for addressing three pressing social and environmental problems. In a world still without global agreement on capping and major reductions in GHG emissions, such voluntary leadership actions remain essential for sustaining momentum toward phasing out GHG emissions, while demonstrating that it can be achieved simultaneously with development and sustaining healthy ecosystem services.

Sourcing standards-based ECS/REDD+ offsets provides an important option value for the recipient countries. Tropical forests in developing countries are richly endowed with biologically diverse plants and animals, most of which are indigenous and unique to that area. Avoiding burning or clearing these carbon-rich forests offer immediate climate mitigation value.

In addition, the indigenous species and ecosystem services offer multiple values beyond their carbon storage value. Many of these still remain to be estimated. Most are not reflected in market transactions, even when estimated. A proportion may become increasingly valuable over time as science, technology and engineering advances create new product and service opportunities for the medical, pharmaceutical and agribusiness (food, feed, fiber, fuel and forestry) sectors. As Nobel economist Kenneth Arrow described decades ago, faced with such uncertainty of future value, it becomes economically advantageous to exercise the option value, postponing an irreversible investment decision until new information occurs.

Oceans Health Index

Humanity depends on oceans – the world's largest bank account – which are estimated to be worth US$30tr to US$50tr (at 2012 values) per year in ecosystem services to people. Earth's healthy oceans provide us with ecosystem services such as seafood, carbon storage, biodiversity, natural products, clean water, shoreline protection, artisanal fishing, sense of place, tourism and recreation, and livelihoods.

With unsustainable fishing, climate change, habitat destruction, pollution and invasive species already degrading ocean ecosystems, nothing less than our future and our children's futures are at stake. Already 87% of the world's fisheries are fully exploited or depleted. Wildcatch fisheries peaked in 2000 and have been on a decline since then.

A major step to sustain and restore the earth's healthy oceans is to incorporate the Ocean Health Index (OHI) as a metric tool for international and national policy decisions, sustainable business practices prioritization and multi-lateral program assessments. OHI – launched in 2012 – is a composite index developed by a global team of scientists. It measures how well the oceans provide benefits to people now and in the future[xxxix].

The OHI helps nations recognize ocean values, by adopting methodologies of valuing and accounting coastal and marine ecosystem services in decision-making processes. Integral to the valuation process is recognizing the value of marine flagship species, and in creating new marine protected areas through a flagship species approach.

Research, for example, decisively shows that "a live shark is worth more than a dead shark".

In the 518,000 square km area of the Bahamas that bans shark hunting, it is estimated that for its tourism industry, every shark is worth US$245,000, and annually worth US$80m to Bahamas' shark diving tourism. Meanwhile, the fine for shark fishing in the Bahamas is US$5,000, up from US$3,000.

The OHI is also important for creating understanding about the value-creation and restoration benefits of a seascapes approach. Through the Convention on Biological Diversity, countries have agreed to include 10% of the ocean in marine-protected areas to conserve biodiversity and ecosystem services. Although marine-protected areas are expanding, global efforts are still falling far short of the goal with less than 1.5% of the ocean currently covered by marine-protected areas[xl].

The OHI is instrumental in addressing the economic and environmental sustainability of Coastal Fisheries Management, including rights-based fisheries management and sustainable aquaculture development. This involves developing and sharing new methods and recommendations for determining ecological, social and economic outcomes of aquaculture in island and coastal nations.

Done properly, farmed seafood converts more feed to nutritional protein than farmed land animals. Of global seafood consumed, 20% to 50% is from aquaculture and is increasing each year[xli]. The weight of grain needed to produce 1 kg of protein range from a low of 13 kg fed to fish, compared to 38 kg fed to pigs and 61 kg fed to cows.

China and the U.S. are both highly dependent upon the ecosystem services of healthy oceans. The two nations should lead a 'Global Partnership for Oceans', helping to accelerate and scale the use of the OHI and recommended sustainable practices.

Blue carbon natural capital

Ocean ecosystems play a vital role in controlling CO_2 levels[xlii]. Seagrasses, tidal marshes and mangroves sequester large quantities of blue carbon in both the plants and in the sediment below them. Total carbon stored per square kilometer in these coastal systems can be up to five times that stored in tropical forests. However, these ecosystems are being destroyed at a rapid pace, four times faster than tropical forests, resulting in significant emissions of CO_2 into the ocean and atmosphere and accelerating climate change. Of the world's mangrove forests, 35% have been destroyed in the last 30 years[xliii].

'Blue carbon' is defined as the carbon stored, sequestered or released from coastal ecosystems of tidal marshes, mangroves and seagrass meadows. Blue carbon activities refer to a suite of sustainable policy, management and planning activities in coastal ecosystems to reduce emissions from conversion and degradation and to conserve and sustainably manage coastal carbon sinks.

Conserving and restoring terrestrial forests, and more recently peatlands, has been recognized as an important component of climate change mitigation[xliv]. These approaches should now be further broadened to manage other natural systems that contain rich carbon reservoirs and to reduce the potentially significant emissions from the conversion and degradation of these systems[xlv].

Performing natural capital accounting

The accounting profession and financial reporting bodies should accelerate efforts to provide standards and metrics for disclosure and audit/assurance of biodiversity and ecosystem service impacts.

Most existing initiatives are weak, however, at quantifying biodiversity impacts (the so-called 'externalities' of business) in terms of human welfare. Methodologies for sector and business-level quantification of biodiversity and ecosystem services values are needed, accompanied by appropriate reporting requirements. Credible audit and assurance mechanisms are also needed to validate business performance and the quality of disclosure[xlvi].

Natural capital and the services it provides are fundamental to the well being of our businesses and society. Unfortunately, they are not yet fully represented within society's economic accounting system, despite facing rapid depletion and posing an increasing threat. Like other forms of capital, natural capital requires investment, maintenance and good management if it is to contribute fully to increasing prosperity and well being.

Natural capital accounting is a tool that can help measure and manage the full extent of a country's natural assets and now there is an internationally agreed methodology for natural capital accounting at the national level – the System of Environmental-Economic Accounting (SEEA).

Implementing wealth accounting and the valuation of ecosystem services

At the Rio+20 United Nations Conference on Sustainable Development in 2012, the World Bank Group launched the '50:50' campaign, an initiative for the public and private sectors to join forces, demonstrating on a global stage the importance of taking collective action in support of natural capital in economic decisions or business operations. It combines the support of governments, private sector leaders and other stakeholders for working towards integrating natural capital into decision-making. So called the '50:50' to represent the 50 governments and 50 corporations that have made their commitment to working towards natural capital accounting[xlvii].

A cornerstone of the effort is the Wealth Accounting and the Valuation of Ecosystem Services (WAVES). This initiative aims to integrate natural capital values into national accounting systems, and thereby encourage better, more efficient decision-making and planning. WAVES is a Global Partnership currently being implemented in five partner pilot countries. Developing countries such as Botswana, Colombia, Costa Rica, Madagascar and the Philippines are working to establish environmental accounts in practice[xlviii].

Recommended Opportunities for China-U.S. Joint Actions and Activities

Being the two largest economies in the world, the U.S. and China should take the lead in fostering global agreements, notably, on climate change and on governance policies that promote market deployment of innovative solutions for ecologically sustainable global development.

Ecosystem conservation and restoration should be regarded as a viable investment option in support of climate change mitigation and adaptation. Within the climate agreement process, Reducing Emissions from Deforestation and Forest Degradation plus prevention of deforestation should be prioritized for accelerated implementation, beginning with pilot projects and efforts to strengthen capacity in developing countries to help establish credible systems of monitoring and verification that will allow for the full deployment of the instrument.

Zero net deforestation by 2020 is an achievable, economically attractive opportunity that both nations should exemplify through leadership in attaining this goal, given their enormous global standing in the span of their supply chain networks, and their high dependence upon natural resources from many forest-rich nations for food, feed, fiber, forest products, fish, fuel, minerals, etc. Together they have an opportunity as well as a global responsibility, to promote and encourage radical innovation in sustainable resource development from supplying nations.

The principles of 'no net loss' or 'net positive impact' should be considered as normal business practice, using robust biodiversity performance benchmarks and assurance processes to avoid and mitigate damage, together with pro-biodiversity investment to compensate for adverse impacts that cannot be avoided.

China and the U.S. are both highly dependent upon the ecosystem services of healthy oceans. The two nations should lead a Global Partnership for Oceans, helping to accelerate and scale the use of the OHI and recommended sustainable practices.

Given the U.S. and China are both immensely rich in the three near-zero emission energy resource options – end-use efficiency gains, wind and solar power – all capable of delivering utility, mobility and industrial services at least lifecycle cost and risk compared to fossil fuels that include their associated externality costs, the two nations should recognize this enormous opportunity by adopting proven best-in-play options that supersede outdated subsidies/incentives, suboptimal utility regulations, lax environmental standards and enforcement mechanisms, and weak or modest efficiency standards for buildings, motors, appliances, vehicles, etc.

The principles of 'polluter pays' and 'full-cost-recovery' are powerful guidelines for the realignment of incentive structures and fiscal reform. In some contexts, the principle of 'beneficiary pays' can be invoked to support new positive incentives such as payments for ecosystem services, tax breaks and other fiscal transfers that aim to encourage private and public sector actors to provide ecosystem services.

Governments should aim for full disclosure of subsidies in the areas of energy, water and natural resources, measuring and reporting them annually so that their perverse economic and environmental consequences may be recognized, tracked and eventually phased out.

The annual reports and accounts of business and other organizations should disclose all major externalities, including environmental damage affecting society and changes in natural assets not currently disclosed in the statutory accounts.

Regarding natural capital conservation, both China and the U.S. should strive to attain the Convention on Biodiversity (CBD) targets for both terrestrial and marine conservation.

Great progress could be made if both nations collaborated on encouraging and supporting other nations to manage their resources sustainably, including comprehensive energy, water and resource efficiency improvements and minimizing the footprint from land and water-use practices. A step forward would be to align U.S. and China's resource extraction policies when working in developing nations to meet global best-practice standards that strengthen over time.

The U.S. and China can lead the innovation process by shifting from the conventional linear economy of extract-consume-waste, where only 20% of this material is recovered, to adopting a circular economy model where all waste becomes the nutrient inputs to more economic activity.

The present system of national accounts should be upgraded to include the value of changes in natural capital stocks and ecosystem service flows.

An urgent priority is to draw up consistent physical accounts for forest stocks and ecosystem services, both of which are required, for example, for the development of new forest carbon mechanisms and incentives.

The establishment of comprehensive, representative, effective and equitably managed systems of national and regional protected areas – especially in the high seas – in order to conserve biodiversity and maintain a wide range of ecosystem services. Ecosystem valuation can help to justify protected areas policy, identify funding and investment opportunities, and inform conservation priorities.

Human dependence on ecosystem services and particularly their role as a lifeline for many poor households needs to be more fully integrated into policy. This applies both to targeting development interventions as well as to evaluating the social impacts of policies that affect the environment.

Pursuing sustainable planetary prosperity

As this chapter has highlighted, the challenging news confronting humanity of damaging human practices shows they are in desperate and rapid need of transformation, matched by the abundance of wealth-generating opportunities waiting to be realized going forward.

Adopting a 'climate positive, earnings positive' and natural capital-preserving strategic portfolio made sense before we knew about life-threatening climate threats; now, it is the only sensible hope we have of avoiding the misery that inaction will bring upon us. As scientist Jared Diamond vividly recounts in his book, *Collapse: How Societies Choose to Fail or Succeed*[6], many past civilizations collapsed simply because they could not choose to cooperate and break out of their 'prisoner's dilemma'.

Joint collaborations and cooperative partnerships between China and the U.S. – demonstrating leadership in markets and statesmanship in governance – offer our respective countries, the global community of nations and the planet's biosphere a very hopeful, positive way forward. Let's make the most of it, so that future generations can praise our determination to sustain the health of the only planet we know of in the universe.

6 Jared Diamond, Collapse: How Societies Choose to Fail or Succeed, Penguin Books, 2011.

Endnotes

i. Combustion of fossil fuels and biomass are the primary drivers of: climate destabilization; ocean acidification; acid rain, smog, particulates, and air pollution; freshwater, land and marine contamination; deforestation, ecosystem destruction and biodiversity loss (in the case of biomass combustion); international wars and conflicts, including ethnocidal and genocidal acts. They are also responsible for large releases of mercury, toxic metals and hazardous chemicals; major contributors to chronic illness, premature morbidity and mortality; and major extractors of freshwater throughout their lifecycle.

ii. Humanity's current emissions trajectory is driving the planet into 5 to 7°C increases this century - a radically sudden global temperature change never experienced in the history of world civilization. CO_2 levels in 2100 will hit levels last seen when the Earth was 16°C (29°F) hotter – an ice-free planet with sea levels increasing more than 200 feet higher than today, and at a rate of sea level rise that taxes comprehension.

Consequences include desertification of roughly a quarter of global agricultural lands (as much as half of Africa's crop lands), the death of virtually all coral reefs and poisoning of most marine life from ocean acidification, as well as triggering largely irreversible changes in global ecosystems for 1,000 years after emissions stop.

According to an assessment by the International Institute for Environment and Development and the Grantham Institute for Climate Change, cost estimates from climate change impacts this century are projected to exceed US$1,200 trillion.

iii. At the same time, China's middle class has been shifting to more land- and water-intensive meat, rising from 8 to 71 million tons over the past three decades. By 2012, one-third of China's total grain harvest was being converted to feed for livestock and aquaculture, while 120 billion cubic meters of water have been pumped from Yellow River and northern aquifers than have been replaced by rainfall over the past four decades.

iv. Extinction of species inevitably occurs over geological time spans, with some 99.9% of all life having gone extinct since life first formed 3.85 billion years ago. What is different about the current human-triggered planetary mass extinction is the phenomenal rate, estimated to be three to four orders of magnitude higher than the average natural background rate.

v. There are about five billion hectares of land in agricultural production worldwide, and roughly 40% of the world's agricultural land is seriously degraded. Nearly one-third of the world's cropland has been abandoned in the past 40 years because erosion has made it unproductive, and each year 12 million hectares are lost due to drought and desertification, where 20 million tons of grain could have been grown.

vi. Worldwide, approximately 1 billion people are dependent on fish as the principal source of animal protein and half a billion people depend on fisheries and aquaculture for their livelihoods; the vast majority of them live in developing countries.

Coral reef-related fisheries constitute approximately one-tenth of the world's total fisheries, and in some parts of the Indo-Pacific region up to 25% of the total fish catch, while also representing the breeding, nursing, and feeding grounds for one-quarter of economically important marine fisheries.

vii. As McKinsey Global Institute emphasizes in their study, Resource Revolution: Meeting the world's energy, materials, food, and water needs, "The correlation between resource prices is now higher than at any point over the past century, and a number of factors are driving a further increase."

The energy-water nexus looms large. The energy intensity of water has been rising with declining groundwater tables, the expansion of desalination plants, and the development of mega-projects for the surface transfer of water (such as China's South-North Water Transfer project and interstate water transfers in the western U.S.).

viii. President Obama articulated in his 2013 inaugural address that our obligations "are not just to ourselves, but to all posterity," and he spoke of our duty to "preserve our planet, commanded to our care by God."

ix. Without faster, smarter, more efficient ways of delivering energy services, energy consumption in the U.S. would have risen 225 percent from 1973 to 2005. Instead, energy consumption in 2005 increased only 30 percent. The difference (75 exajoules, EJ) also avoided $700 billion per year in higher energy bills.

How much is 75 EJ? Envision a freight train annually hauling nearly 18,000,000 railcars of coal, which would wrap around the world seven times. As world energy expert Amory Lovins calculated, the nearly 40% drop in energy required per unit of GDP from 1975 to 2000 represented, by 2000, "an effective energy 'source' 1.7 times as big as U.S. oil consumption, [and] five times domestic oil output."

x. How large of economic and environmental opportunities are energy efficiency gains for the world? According to a recent Ecofys analysis, one among a series of recent assessments coming to similar conclusions, energy-saving gains could accrue all the following benefits through 2050 worldwide:

ELECTRICITY: delivering the equivalent of 12,800 TeraWatt-hours per year (12.8 trillion kWh), compared to 20,000 TWh consumed in 2009 worldwide; and,
HEAT: delivering the equivalent of 46 ExaJoules

(EJ) per year, compared to 160 EJ consumed in 2009 worldwide; and,

TRANSPORT: delivering the equivalent of 80 EJ of liquid fuels per year, compared to 80 EJ consumed in 2009.

To put such massive figures into understandable context, these delivered energy efficiency services would displace the need for ALL THE FOLLOWING SUPPLY (illustrative purposes only, not in these exact quantities):

COAL: 28 million rail cars per year carrying 2.8 billion tons of coal; for comparison, China shipped 2 billion tons in 20 million rail cars, and the U.S. shipped 810 million tons in 8.1 million U.S. rail cars in 2011, with the two nations consuming nearly two-thirds of global production; and

LNG: 355 million cubic meters of LNG delivered by 1,775 supertanker shipments (200,000 m^3 per shipment); for comparison, 355 million m^3 of LNG were delivered worldwide in 2011; and

PETROLEUM: 17 million barrels per day of offshore oil; for comparison, 30 million barrels per day produced from 150 offshore oil platforms worldwide in 2011; and

OIL PALM: 15 million hectares of oil palm plantations for diesel fuel; for comparison, 15 million hectares was the total global oil palm production in 2011; and

SUGAR CANE: 10.3 million hectares of sugar cane for ethanol; for comparison, 24 million hectares was the total global sugar cane production in 2010; and

CORN: 32.4 million hectares of corn for ethanol, for comparison, 162 million hectares was the total global corn production in 2011; and

NUCLEAR: 372,000 MW of nuclear power plants; for comparison, 372,000 MW was the total global installed nuclear capacity in 2012; and

HYDRO: 750,000 MW of hydrodams (equivalent to 41 mega-sized Three Gorges dams); for comparison, there were 1 million MW of global installed hydroelectric capacity in 2010.

Tremendous financial benefits also accrue from these efficiency gains. Given the several-fold lower cost of efficiency improvements compared to supply expansion, the direct cumulative monetary savings amount to tens of trillions of dollars. The indirect cumulative savings include preventing hundreds of billions of tons of CO_2 emissions at essentially zero cost.

xi. A stellar example is how to cool down urban heat islands. A staggering sum of between 25 and 150 billion tons of CO_2 emissions could be prevented through this urban retrofit process, while accruing multi-trillion dollar savings through avoided power plants and air condition equipment. It involves painting flat roofs white, and replacing low-albedo roof shingles with high-reflecting ones, so the sun's heat is not absorbed. It also involves resurfacing black asphalt pavements with white cementitious finishes which also reflect away the sun's heat. The rooftop efficiency measure is so cost-effective it has now been integrated into California's world-leading Title 24 building standards.

xii. California's highly innovative regulatory framework is so effective because it is based on allowing utility companies to recoup lost earnings from reduced sales in return for assisting customers to reduce their utility bills through capture of cost-effective end-use and locally distributed efficiency gains in buildings, factories, appliances and devices. The result is delivery of more services with less energy or water resources.

The powerful paradigm shift refocuses the utility's attention and motivation, because their earnings remain robust even when revenues decline, while customers enjoy lower utility bills through smarter use even though the underlying rate increases (to recoup the utility's lost earnings). Most importantly, the utility's capital investment, previously limited to large power plants operating over 30 to 50 year time horizons, is diversified by focusing on a larger pool of lower cost end-use efficiency services.

When combined with California's world leadership in setting continuously stronger appliance and building efficiency standards, these efforts have allowed the state to save customers an average of $165 per capita per year on electric and water utility bills, and the utility sector has CO_2 emissions 50 percent below the national average. If all U.S. states had followed California's end-use efficiency model, the U.S. national energy bill would be several hundred billion dollars less per year. The country also would have surpassed the CO_2 reduction targets of the Kyoto Protocol at essentially zero cost to ratepayers and taxpayers.

xiii. Worldwide, an initiative for transforming the efficiency of electric motor systems would deliver the services equivalent of 2 trillion kWh per year, equal in services to one-fourth of all power plants planned for construction through 2030. A successful market transformation would reduce global energy bills by ~$1.6 trillion per decade.

The ancillary benefits for a world confronting droughts and water shortages would be significant, as the following illustrates. If motor efficiency gains were used to displace thermal power plants, the savings in water use would range between two and 200 billion m^3 per year – equivalent to the water use of one to 10 Colorado Rivers.

In China, the potential energy savings from efficiency gains from electric motor drive systems are worth several hundred billion dollars per decade, displacing the need for 63,000 MW of planned power plants. Jiangsu province is leading the effort, identifying 10,000 MW of motor efficiency gains that can be delivered at a cost of US$ 0.01 per kWh. By comparison, the Jiangsu electricity price delivered to the industrial sector in 2012 was US$0.14 per kWh (0.87 Yuan).

Hypothetically, applied comprehensively to all power-consuming uses throughout China's residential, commercial, institutional, industrial and agricultural sectors, end-use efficiency and decoupling methodologies could help in avoiding half of an estimated US$10 trillion in utility expenditures incurred from the power plants to be built by 2030.

xiv. According to a recent assessment by LBNL, selected policies and programs that China has instituted to fulfill the national goal have made substantial progress. Many of the energy-efficiency programs appear to be on track to meet – or in some cases exceed – their energy-saving targets. Most of the Ten Key Industry Energy Saving Program, the Top-1000 Enterprise Energy Efficiency Program (1000 largest companies, consuming about one-third of the China's energy), and the Small Plant Closure Program (a total of 80,000 MW of inefficient thermal plants and industries were shut down) met or surpassed the 11th FYP savings goals. In the 12th FYP China extended the Top-1000 program to the Top-10,000 program.

According to China's National Development and Reform Commission (NDRC), between 2006-2010 the government's three major efficiency programs displaced 600 million tons of coal equivalent (Mtce). The Top-1000 Program yielded energy savings of 150 Mtce; the Ten Key Industry Program yielded 340 Mtce; and the Phasing-out Obsolete Capacity Program 110 Mtce.

With the deployment of more efficient technologies, overall energy consumption per ton of steel dropped by 12.1% in 2006-2010. At the same time, the deployment rates of all major new technologies went up. The medium and large steel companies achieved better performance than their Japanese peers who were considered world leaders in terms of many indicators.

xv. The benefits of a well-designed and implemented FIT outweigh the costs of the premium paid to renewables even without taking into account the economic development impacts. The German ministry overseeing their FIT estimates that the total benefits of the legislation have exceeded the costs by a factor of three.

xvi. China is developing different FIT rates depending on local resource conditions. The National Development and Reform Commission (NDRC) set four categories of onshore wind projects. Areas with better wind resources get lower FITs, while those with lower outputs will be able to access higher tariffs. The wind power tariffs per kWh are set between US$0.082 (0.51 RMB) and US$0.098 (0.61 RMB). For comparison, the average rate paid to coal-fired electricity generators is US$0.055 per kWh (0.34 RMB).

China is projected to shatter the government's 2015 target of 100,000 MW by 50 percent. China has been consistently exceeding its wind growth targets, so it is quite feasible their ambitious targets for 2020 (200,000 MW), 2030 (400,000 MW) and 2050 (1 million MW) will all occur much sooner. China now leads the world both in production and use of wind power.

The U.S., with 60,000 MW of installed wind capacity and ranked second with 25% of global total, may not renew the tax incentive for wind power after 2013. A tragic mistake if Congress takes this step. The U.S., like China, has immense wind resources, far larger and more economical than even their massive reserves of coal and oil shale.

xvii. Writing in the Proceedings of the National Academy of Sciences, Professor Michael McElroy et al conclude, "that a network of land-based 2.5 MW turbines restricted to non-forested, ice-free, non-urban areas operating at as little as 20% of their rated capacity could supply more than 40 times current worldwide consumption of electricity, [and] more than 5 times total global use of energy in all forms."

xviii. The land footprint of wind farms is remarkably small. Analysis indicate the several million wind turbines that could produce as much power as the U.S. currently consumes would take up less than three percent of the Great Plains region. The wind royalties paid to site the wind farms would generate twice as much revenue for the region than farming and ranching currently generate occupying 75 percent of the Great Plains!

xix. China has current plans to construct 558,000 MW of coal plants (the U.S. 17,000 MW), and the U.S. projects building 141,000 MW of natural gas plants. When wind (and solar) are phased in with utility bill-reducing efficiency opportunities, the system costs and risks of delivering electricity should be comparable to or less than continuing dependence on coal or natural gas plants powering inefficient devices. This transformational action would also position the two wind-giant nations to seize a substantial share of the multi-trillion dollar wind export market opportunity worldwide.

xx. The cost and cost-effectiveness of solar PV systems vary enormously due to a number of technical, financial, geographical, and institutional factors. A thorough discussion of these factors was published in 2012 by UNIDO and a consortia of other institutions, "Re-considering the Economics of Photovoltaic Power."

xxi. Silicon is the second most abundant element in the Earth's crust. The amorphous silicon cells manufactured from one ton of sand can produce as much electricity as burning 500,000 tons of coal. Solar cells currently in production (with 25 or more years of generating electricity) "pay back" the energy consumed in producing them within 6 months to 3.5 years. From the perspective of generating jobs, each million dollars spent on PV panels creates three times more jobs than coal mining, and nine times more jobs than oil and gas exploration.

xxii. FITs have been key in spurring solar PV (and wind power) growth. Beginning in 2011, China established a national FIT for solar projects, setting the FIT at US$0.15 per kWh. At the end of 2012, China had 5,000 MW of installed solar PV capacity;

its 2015 goal set a new high bar for other nations in committing to solar power.

xxiii. As in the case of U.S. wind production tax credits (PTC) set to expire in 2014, this is entirely in the wrong direction to be moving. Why?

First, because it undermines any semblance of a level playing field. Fossil fuels, as well as nuclear power, have received 20 times more government subsidies over the past half century than have solar and wind. Moreover, the tax incentives for solar and wind power represent a minute fraction of the massive costs due to fossil fuel externalities.

Second, unlike fossil fuel power plants (and nuclear and large-hydro), which use 40 percent of U.S. extracted water, solar PV and wind power require 95 percent less water. In a water-constrained world that is only worsening, the water frugality of solar PV and wind power make them low-risk assets over a lifetime of price volatility. They are also inherently low-risk assets in providing protection against any future price volatility as a result of being power generators with zero fuel requirements and zero emissions, pollution and wastes.

Third, given the imperative to expedite a global economy powered with zero emissions, the export market growth potential of solar and wind technology is immense. This is illustrated in the recent global renewable energy scenario by Stanford Professor Mark Jacobson and University of California Professor Mark Delucchi, A Plan for a Sustainable Future by 2030.

Beginning with the implementation of the robust energy efficiency improvements noted above – a gargantuan export market potential, in itself, in every energy-consuming end-use appliance, device, and equipment category – the authors show that solar and wind power could provide 90 percent of global total power and energy demand phased in over several decades. Geothermal and hydro power provide most of the other 10 percent, while also providing an important storage function to complement the intermittent solar and wind power.

One can debate the achievable annual growth rates, which appear to average 25 percent per year for wind and 40 percent for solar PV. There is historical precedence for such high growth rates. Between 1956 and 1980, before nuclear power fell out of favor, global installed nuclear generating capacity grew at an average rate of 40% per year. Like nuclear in its heyday, wind and solar will need strong, sustained supporting public policies to maintain such high growth rates.

xxiv. As car manufacturers replace heavy steel components with crash-impact resistant ultra-light carbon composites, a vehicle's reduced mass significantly reduces the amount of batteries required. Most of the running cost of a BEV is for the maintenance of the battery pack, and its eventual replacement. A BEV incurs low maintenance costs because it has only around five moving parts in its motor, compared to hundreds of parts in a gas-fueled internal combustion engine.

Electric drive systems are four to five times more efficient (80%) than diesel (20%) or gasoline engines (15%), respectively. According to the U.S. Environmental Protection Agency (EPA) fuel economy ratings for city driving, the 11 BEV models sold in 2012 averaged between 33 and 59 kilometers per liter-equivalent, km/l-e (77 to 138 mpg-e). By comparison, the EPA fuel economy rating for the average new (fuel combustion) car in 2012 was 9.4 km/l (22 mpg).

EPA estimated the total CO_2 emissions from a new gasoline car at 311 grams per kilometer (500 g/mile), which includes upstream gas production and tailpipe emissions. The grams of CO_2 per km for a BEV varies greatly, since it depends on how clean or dirty is the power grid. The Jacobson-Delucchi clean grid scenario would result in BEV CO_2 emissions near 10 g/km, whereas an all-coal grid would exceed 250 g/km.

xxv. This is the major impetus for both nations in promoting domestic oil shale reserves and biofuels, despite substantially increasing CO_2 emissions. China is the world's largest car producer, manufacturing 1 of every 4 cars, and the car markets in China and the U.S. jointly account for more than one-third of world sales. McKinsey Consulting noted in their recent report, Recharging China's Electric Vehicle Aspirations, that if China were to achieve U.S. levels of per-capita vehicle penetration, its demand for oil would increase 15-fold, exceeding total global production. BEVs are critical to China's economic, security, and environmental sustainable growth.

xxvi. Both governments have made multi-billion dollar commitments in developing advanced batteries, and providing consumers with incentives to purchase EVs. However, as the McKinsey EV report details, both nations are in need of substantially refined policies and incentives to ensure a steady acceleration and scaling of BEV production and sales.

BEV bicycles and scooters are an entirely different, and highly successful story. China has experienced an explosive growth of sales of BEV bicycles, scooters and motorcycles, with annual sales jumping from 56,000 units in 1998 to over 21 million in 2008. China is home to 150 million e-bikes as of 2012, with sales increasing 10% per annum. China is the global leader both in the production (22 million per year) and consumer use of e-bikes. Sales of more than 466 million e-bikes and scooters are projected by 2016, with China continuing to dominate the world market with more than 95% of sales.

Furthermore, with gas prices exceeding US$0.80 per liter ($3 per gallon) – equivalent to electricity at $0.32 per kWh – solar electric charging stations are cost-effective to power the world's e-bikes.

xxvii. What could be accomplished if the linear economy shifted to a circular one where the wastes became nutrient inputs to the consumption process, reducing the need for virgin resources? McKinsey was commissioned to assess the economic and business rationale for the circular economy as an innovation framework.

McKinsey analyzed the circular opportunities of the "fast-moving" consumer goods sector, comprised of products that have a lower unit cost, are bought more frequently, have a short service life compared to durable goods, with a total material value of US$ 3.2 trillion per year. These fast-moving consumer goods account for 35 percent of material inputs into the economy and 75 percent of municipal waste. Most notably, the consumer goods sector absorbs more than 90 percent of agricultural output.

The annual value of material savings of these circular opportunities is worth an estimated US$700 billion – or an annually recurring 1.1 percent of 2010 GDP. The consumer goods industry would save 20% of current materials input costs.

xxviii. Polman goes on to emphasize, "Most importantly for business leaders, such an economy can deliver growth. Innovative product designers and business leaders are already venturing into this space. I don't believe business can be a mere bystander in the system that gives it life. This is why decoupling economic growth from environmental impact and increasing positive social outcomes are two priority objectives that lie at the heart of my vision for corporate strategy. Businesses need to reinvent themselves, and the circular economy framework provides very promising perspectives."

xxix. As extensively detailed in the multi-volume global scientific report, Millennium Ecosystem Assessment, nature provides scores of essential services for societies such as climate stability, fresh water supplies, food security, health and medicines, protection from storms, floods and droughts, soil erosion, and a vital source for sustaining livelihoods for billions of people, etc.

xxx. The CBD's three main objectives are: 1) The conservation of biological diversity; 2) The sustainable use of its components, and 3) The fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

The CBD recently adopted a strategic 10-year plan, the Aichi Biodiversity Targets, that offers opportunities for better alignment between business strategies, the CBD's main objectives and new or improved public policies and regulatory frameworks. It has also launched a Global Platform on Business and Biodiversity to promote markets that support nature conservation and sustainable use.

Both nations also need to develop and enforce important policies on reducing the over exploitation and trade of biodiversity. China and the U.S. are signatory parties to CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

As affluence spreads and transport and trade links improve worldwide, the cases of illegal animal trafficking continue to rise. According to Global Financial Integrity, illegal trade in wildlife, timber and fish amount to US$25 billion a year, and ranks among the top five most valuable illicit markets globally, after counterfeiting and the illegal trafficking in drugs, humans and oil. Levels of exploitation of some animal and plant species are soaring and the trade in them, together with massive habitat loss, is depleting populations and driving some species close to extinction.

xxxi. A 2011 biodiversity survey by the Union for Ethical Biotrade indicated 80 percent of consumers desire to be better informed about companies' sourcing practices. An even higher proportion indicated they would cease purchasing goods if they knew the brand failed to respect ecological or ethical practices. Three-quarters of consumers surveyed scrutinize environmental and ethical labels when buying food and cosmetic products.

In a PwC survey of global CEOs in 2009, more than one-quarter expressed concern about the impacts of biodiversity loss on their business growth prospects. The Economics of Ecosystems and Biodiversity (TEEB) Report for Business, emphasizes that business commitment to manage biodiversity and ecosystems begins with corporate governance and involves integration into all aspects of management. This involves integration across the company of goals and targets for biodiversity and ecosystem services – into business risk and opportunity assessment, operations and supply chain management, financial accounting, audit and reporting, and communication.

xxxii. Puma is assessing the benefits of their business against ecological and social costs by developing an Environmental, Social and Economic profit & loss statement. The process should reveal what is required to achieve a net positive impact.

xxxiii. Four main types of conservation actions are being implemented by Rio Tinto to mitigate project impacts on key habitats and species. These are:

- Avoidance Zones have been established. They represent a cost to Rio Tinto of 8% of foregone ilmenite minerals, as well as the management cost of maintaining these areas, and protect 27% of the best quality remaining forest cover on the deposit;
- Minimization – reduction of the likelihood or magnitude of biodiversity impacts from mining activities that cannot be avoided;
- Rehabilitation and restoration – re-establishment of littoral forest on areas that have been completely cleared, by replacing topsoil (stored during the mining process) and planting with appropriate

native species propagated in Rio Tinto's nursery;

- Biodiversity offsets – Rio Tinto is investing in biodiversity offsets at several forest sites in the region, with the aim of reducing the high background rate of deforestation.

In addition, Rio Tinto QMM is carrying out a number of additional conservation actions (e.g. environmental education, capacity-building, livelihoods alternatives, etc.) with the aim of making a positive contribution to sustainable development in the region and reducing human pressure on biodiversity.

xxxiv. The full potential of conservation carbon offsets (REDD+) awaits an actionable commitment of all nations, hopefully led in a joint effort by the U.S. and China, to live within the carbon budget essential for staying below 2°C temperature rise. Such a commitment could tap into additional new markets for biodiversity 'credits', watershed protection, pollination services, providing new environmental assets with both local and international trading opportunities.

xxxv. Key Action points for Business to address biodiversity and ecosystem services:

1 Identify the impacts and dependencies of your business on biodiversity and ecosystem services (BES), both direct and indirect.
2 Assess the business risks and opportunities associated with these impacts and dependencies; economic valuation of BES impacts and dependencies can help to clarify risks and opportunities.
3 Develop BES information systems, set SMART targets, measure and value performance, and report your results; a key step for building trust with external stakeholders, while creating peer pressure within industry, is for business to measure and report their BES impacts, actions and outcomes
4 Take action to avoid, minimize and mitigate BES risks, including in-kind compensation ('offsets'); BES targets may build on the concepts of 'No Net Loss', 'Ecological Neutrality' or 'Net Positive Impact' and include support for biodiversity offsets where appropriate.
5 Grasp emerging BES business opportunities, such as cost-efficiencies, new products and new markets; such opportunities may be facilitated by engaging with public agencies, accountancy and financial standard setting bodies, conservation organizations and communities
6 Integrate business strategy and actions on BES with wider corporate social responsibility initiatives; there is potential to enhance both biodiversity status and human livelihoods, and help reduce global poverty, through the integration of BES in corporate sustainability and community engagement strategies.
7 Engage with business peers and stakeholders in government, NGOs and civil society to improve BES guidance and policy; business needs to participate more actively in public policy discussions to advocate appropriate regulatory reforms, as well as developing complementary voluntary guidelines.

xxxvi.

- RESOURCE EFFICIENCY – steadily reducing energy intensity through aggressive and continuous "deep dive" efficiency gains in the way we deliver utility services to the point of use, derive mobility access, perform industrial processes, design physical infrastructure, etc;
- ZERO EMISSIONS AND WASTES – encouraging deep reductions in carbon intensity through a wide variety of technological measures and shifts to zero emission energy options, notably solar and wind, and other ecologically sustainable renewable energy options; as well as shifting from an economy based on one-way, resource-intensive throughput to a prosperous economy based on knowledge-intensive throughput (infor-

mation bits displacing molecules of energy and materials), in a circular closed-loop resource and waste-as-nutrient system;

- SOURCING OFFSETS – Sourcing multiple-benefits, standards-based conservation carbon offsets protecting threatened intact ecosystems (e.g., rain forests, mangroves, peatlands, grasslands) to offset current emissions, essentially incorporating the cost of negative externalities of CO_2 emissions caused by carbon combustion.

xxxvii. One touted carbon mitigation technology, Carbon Capture and Storage (CCS) of fossil fuels, will not be available at any meaningful scale for decades to come. Even if, hypothetically, CCS was suddenly available overnight and applied to the 2.3 billion tons of CO_2 emissions from U.S. fossil-fired electricity generation in 2010, this would amount to a staggering US$115 billion, increasing electricity by 3 cents per kWh (assuming the future projected CCS cost of US$50 per ton of CO_2).

In sharp contrast, ecological carbon storage (ECS), or reducing emissions from deforestation and degradation plus protection (REDD+) as it is referred to in climate negotiations, is immediately available at an average cost of US$7.50 per ton of CO_2. This is nearly seven times lower than future CCS cost projections, adding just US$0.004 per kWh to utility costs (four-tenths of one cent). When mixed in with the end-use efficiency gains captured through a comprehensive IRP utility planning process, it would reduce utility bills well beyond this slight increase.

Hypothetically, how much could be raised for ECS/REDD+ financing if the U.S. offset the fossil emissions from both the utility sector and the highway transportation sector? U.S. highway fuel consumption in 2010 amounted to 170 billion gallons, emitting 1.5 billion tons of CO_2. Sourcing ECS/REDD+ offsets for this sum would amount to about US$11 billion, adding 6.5 cents per gallon (1.7 cents/liter). Sourcing offsets for the combined utility and highway vehicle emissions would generate US$28 billion per year. It is equivalent to the amount estimated necessary for incentive payments to prevent virtually all tropical deforestation worldwide. This is as politically likely to happen as ending slavery was at the time of adopting the U.S. Constitution in 1787. Yet, it remains a least-cost-and-risk benchmark for one of the fastest mitigation options for achieving deep CO_2 reductions while accruing multiple globally significant benefits.

xxxviii. CCB standards are analogous to green building standards such as LEED. LEED certification requires going beyond just making a building energy efficient. Similarly, CCB standards require offset projects to go beyond just doing carbon mitigation and encompassing community sustainability, improved local livelihoods, and protecting or restoring the health and integrity of ecosystem services and functions.

xxxix. Scientifically solid and globally respected, the OHI reveals variations and trends in ocean health and offers a new way of looking at both the interests of people and the needs of the oceans and marine life by: offering a working assessment of the oceans, reflected in scores at the global and country level for 10 public ocean goals based on approximately 100 indicators; emphasizing opportunities for improving ocean health, evaluating trade-offs and highlighting successful actions; and, undertaking annual updates that will keep the Index in the news and highlight progress toward improved ocean health.

xl. The Seascapes approach integrates and encompasses a network of Marine Protected Areas, recognizing that many marine species migrate over long distances between their breeding, nursing and feeding locations. The Seascapes approach addresses this need for connecting spatially separated distances over migrating species' life cycles.

xli. Two-thirds of the world's farmed seafood production – aquaculture and mariculture – occurs in China, and 90 percent in Asia. The upper estimate of 50% for aquaculture is FAO's nominal figure, whereas the lower estimate of 20% takes into account by-catch and discards, illegal, unregulated or unreported catches, and generally subsistence and recreational catches, which may be substantial in some places.

xlii. Over the past 200 years the oceans have absorbed 525 billion tons of CO_2 from the atmosphere, or nearly half of the fossil fuel emissions over this period. The ocean continues to capture one-third of CO_2 emitted to the atmosphere. This natural process of absorption has benefited humankind by significantly reducing the CO_2 levels in the atmosphere and thus minimizing some impacts of climate destabilization. However, the ocean's daily uptake of 22 million tons of CO_2 is starting to take its toll on the chemistry of seawater. At present, ocean chemistry is changing at least 100 times more rapidly than it has changed during the 650,000 years preceding our industrial era.

xliii. In the Sacramento-San Joaquin Delta, California, 1,800 km^2 of wetlands have been drained for agriculture over the last century, resulting in the release of massive amounts of CO_2 into the atmosphere. Each year, carbon equivalent to the emissions from more than one million cars continues to be released from the Delta.

xliv. Several countries are developing policies and programs in support of sustainable development through initiatives that reduce the carbon footprint associated with the growth of their economies, including actions to conserve and sustainably manage natural systems relevant to the United Nations Framework Convention on Climate Change (UNFCCC) and the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism.

xlv. The importance of coastal carbon management for climate change mitigation is not yet fully recognized by international and national climate change response strategies. Climate change financing opportunities are currently untapped for supporting mitigation actions for conservation, restoration and sustainable use of coastal ecosystems.

The Blue Carbon Policy Framework has five specific Policy Objectives:

1 Integrate Blue Carbon activities fully into the international policy and financing processes of the UNFCCC as part of mechanisms for climate change mitigation;
2 Integrate Blue Carbon activities fully into other carbon finance mechanisms such as the voluntary carbon market as a mechanism for climate change mitigation;
3 Develop a network of Blue Carbon demonstration projects;
4 Integrate Blue Carbon activities into other international, regional and national frameworks and policies, including coastal and marine frameworks and policies;
5 Facilitate the inclusion of the carbon value of coastal ecosystems in the accounting of ecosystem services.

xlvi. As the TEEB reports, the Millennium Ecosystem Assessment, and a large body of documentation by illustrious and highly respected commissions have strongly argued, governments have an essential role to play in providing an efficient enabling and fiscal environment. As highlighted in this article, such actions encompass removing biosphere-harmful and damaging subsidies; offering tax credits or financial incentives for conservation investment, establishing stronger environmental liability (e.g., performance bonds, offset requirements); developing new ecosystem property rights and trading schemes (e.g., water quality trading); encouraging increased public access to information through reporting and disclosure rules; and facilitating cross sector collaboration.

xlviii. One month prior to Rio+20, ten African Heads of State participating at the Summit for Sustainability in Africa held in Gaborone, Botswana, became the first formal signatories of the Communiqué on Natural Capital Accounting, which they nested in The Gaborone Declaration of the Summit for Sustainability in Africa.

Africa is a natural resource-rich, cash-poor continent that will face some of the most severe catastrophes inflicted by the unchecked rise in CO_2 emissions. Protecting and restoring their biodiversity and ecosystem services natural capital is critical for mitigating and adapting to climate destabilization. As such, Africa's leaders are at the forefront in raising the call for global leadership to help resolve these twin challenges of stabilizing the planet's climate and recognizing the immense value of nature's capital assets.

xlviii. Australia, Japan, Norway, the United Kingdom, and Canada are developed countries in which efforts towards environmental accounting is taking place and are, as a result, important WAVES partners. Other important partners include international organizations such as United Nations agencies (UNEP, UNDP, and the UN Statistical Commission), as well as many supporting research and non-governmental organizations. WAVES seeks to foster the implementation of natural capital accounting with the ultimate goal of incorporation in policy analysis and development planning, while supporting the development of internationally agreed-upon guidelines for ecosystem accounting.

The WAVES demonstration project in Madagascar, for example, conducted an in-depth assessment of the contribution of key ecosystem services from the Ankeniheny-Zahamena Forestry Corridor, the largest remaining contiguous patch of humid forest in eastern Madagascar. The project demonstrated the relevance of methodologies for the assessment of economic dimensions of ecosystem services and their benefits, as well as the detailed, spatially-explicit and dynamic methodology for ecosystem services – provided, for example, by the Artificial Intelligence for Ecosystem Services (ARIES) tool.

Chapter 19

Sustainable Development: Challenges, Opportunities and Implications for Sino-U.S. Cooperation

HE Jiankun
Professor and Director, Institute of Energy, Environment and Economy
Former Executive Vice President, Tsinghua University
Vice Chairman, National Expert Advisory Committees on Energy and on Climate Change

QI Ye
Cheung Kong Professor of Environmental Policy and Management, School of Public Policy and Management Director, Climate Policy Institute of Tsinghua University

WU Tong
Senior Policy Analyst, Climate Policy Institute of Tsinghua University

Executive Summary

Thirty years ago, 'development' was the key word in China's politics, economy and society. Deng Xiaoping – the chief architect behind China's economic modernization – emphasized that development was of overriding importance. Indeed, development – which can be understood to be the means to improving the lives of a population – has been the guiding principle of all major policies and actions of the Chinese government since the era of 'opening up'. But today, the watchword and the social ethos have changed to *sustainable* development. In a poignant signal of this shift, the Chinese Communist Party officially incorporated the "Scientific Outlook of Development" (Scientific Outlook) as one of the fundamental principles of the party's constitution in November 2012. The Scientific Outlook requires development to be comprehensive, balanced, and sustainable, and all policies must "put the people first".

In his address to the 18th Congress of the Chinese Communist Party, then President Hu Jintao added his key components by urging political reform and economic, social and cultural development to achieve modernization and the revival of the Chinese nation. He also put emphasis on the cultivation of a 'harmonious society'.

Now, more than ever, environmental protection, natural resource conservation and ecological progress have been highlighted as core principles of national development. Former Premier Wen Jiabo, in his address at the sixth National Conference on Environmental Protection in April 2006, stressed that "we must be fully aware of the severity and complexity of our country's environmental situation and the importance and urgency of increasing environmental protection. Protecting the environment is to protect the homes we live in and the foundations for the development of the Chinese nation. We should not use up resources left by our forefathers without leaving any to our offspring. China should be on high alert to fight against worsening environmental pollution and ecological deterioration in some regions, and environmental protection should be given a higher priority in the drive for national modernization."

The new administration of President Xi Jinping and Premier Li Keqiang have reaffirmed this commitment to sustainable development. Indeed, earlier this year, the concept of "ecological civilization" - meaning a society that balances socioeconomic and environmental wellbeing - was written into the ruling party constitution. This high-level endorsement signals China's seriousness in dealing with its own as well as global environmental challenges. There have also been productive developments in the practical, policy-making dimension. The ongoing 12th Five-Year Plan (FYP) extends and expands the energy-saving and ecological conservation goals of the successful 11th FYP. These positive developments form a strong foundation for realizing future national objectives, as well as for greater collaboration with the United States in sustainable development.

Sustainable Development: Challenges, Opportunities and Implications for Sino-U.S. Cooperation

China's Sustainability Challenge

China has achieved impressive economic growth, averaging a double-digit annual growth in the last three decades. However, the cost of natural resource depletion and environmental degradation has been equally significant. China's gross domestic product (GDP) was about one tenth of global GDP in 2011, but consumed nearly half of the world's annual production of coal, iron and steel, and more than half of its cement. Resource productivity is much lower than that of developed countries and even many other developing countries. Taken together, these represent serious obstacles to achieving anything that can be legitimately called 'sustainability'.

Resource exploitation, in particular, has caused severe environmental problems. China consumed 3.35 billion tons of coal in 2011. Coal burning alone emits 80% of CO_2 emissions in China, and causes myriad environmental problems at local and global scales – most notably, climate change. Coal mining directly results in thousands of deaths every year, and often results in severe land despoliation and the consequent displacement of communities. At the Huainan Coal Mine, for instance, thousands of hectares were flooded by water and the residents were forced to abandon their homes and farmland. Groundwater suffers from coal excavation, as mining damages important aquifers. In 2007, the external cost of coal mining and transport reached RMB1.7tr, or 7.1% of national GDP (Mao, et al. , 2008).

China now produces 610 million tons of steel annually, corresponding to 44.53% of the world total. Hebei Province, which surrounds the sprawling metropolises of Beijing and Tianjin, produces one third of that amount alone. A notable – and lamentable – consequence of the coal burning for the iron and steel industry in this area is a deleterious level of PM2.5 – a pollutant confirmed by the Chinese Academy of Sciences to be particularly harmful to the human respiratory system. In January, 2013, seven major cities in Hebei Province were listed among the 10 most polluted cities in China[1].

In January 2013, Beijing's air was saturated with heavy smog for a staggering 26 days. During the smoggy days, PM2.5 levels ranged from 200-700 mg per cubic meter, with select days afflicted by levels as high as 1,000 mg per cubic meter. The World Health Organization has warned that if a 24-hour average exceeds 25 mg per cubic meter, a hazardous threshold has been reached. Beijing is not the only place in China dealing with this toxic phenomenon, as it is not even the most polluted city in China. Although featured less prominently in the international media, Shijiazhuang, the capital city of Hebei, suffered even higher levels of the smog. In fact, as much as 1.4 million square kilometers of eastern China – where heavy and chemical industries are concentrated – were impacted by the pollution. Dr Zhong Nanshan, a well-respected medical scientist who played a critical role in addressing the SARS outbreak a decade ago, warned that the heavy smog is even more dangerous than that infamous epidemic.

Another topic of serious concern, but which may not receive significant attention in the global press, is the issue of soil pollution. In January 2013, *People's Daily* – a widely circulated periodical within China – cited an important finding by the Ministry of Environmental Protection about soil pollu-

1 http://www.cnemc.cn/, accessed March 9, 2013

tion. According to a recent survey, an astounding 10 million hectares of farmland have been polluted in China. Furthermore, an additional two million hectares are under irrigation with polluted water, and 130,000 hectares have been destroyed or are covered by solid waste. Thus, a total of more than 10% of the country's farmland is affected by environmental degradation. Each year, as much as 12 million tons of grain are wasted due to heavy metal pollution in the soil (State Environmental Protection Administration, 2006). In fact, a recent survey sampling 300,000 hectares of basic farmland reserves showed heavy metal pollution for every eight hectares on average.

Pollution has gone beyond the land surface and severely affected groundwater, especially in cities. A recent China Central Television (CCTV) program reported that 55% of urban groundwater is poor or extremely low in quality[2]. A Peking University study based on multi-year, continuous monitoring of water quality in 118 cities showed that nearly two-thirds had been severely polluted, and one-third lightly polluted, with only a small proportion rated as more-or-less clean[3]. Experts warn that groundwater pollution, caused by surface water pollution, poses a serious threat to human health, as it is considered a key factor in the rapid growth of cancer. A recent Google map rendering highlighted the geographical distribution of 247 so-called 'cancer villages'[4].

These resource and environmental problems are so severe that they jeopardize the sustainability of the national economy. These problems not only undermine the resource endowment of future generations, but are hurting the wellbeing of the present generation. These problems also pose a serious challenge to the legitimacy of the political leadership and the ruling party.

Policy Responses

Despite this spate of environmental challenges, many of which seem barely surmountable, China has maintained a vigilant stance and marshaled an earnest array of policy actions. Since the 1980s, the Chinese government and policy experts have reminded themselves of the lessons from the 'treatment-after-pollution' model that occurred in the early industrialized countries. Despite this, the level of pollution has become equally bad, if not worse. Unfortunately, China has not been able to escape the treatment-after-pollution model, and is now even replicating the experience from its economically advanced coastal region to the less industrialized western parts. The inability to adopt a more anticipatory approach has taken much of the country on a long struggle toward a sustainable balance between economic growth and environmental protection.

However, it would be a mistake to conclude that no serious action has been undertaken in recent decades. Indeed, policies in environmental protection and natural resource conservation have been adopted throughout China during the recent decades. China's policy action on environmental protection began at the 1972 United Nations (UN) Conference on Human Environment in Stockholm, Sweden. Shortly after the conference, China's State Council set up the influential Environmental Protection Committee. The first Environmental Protection Law was enacted in 1979, and since then about 30 laws have been adopted in environmental and natural resource protection.

China officially made sustainable development a major development strategy following the 1992 UN Conference on Environment and Development (UNCED). In response to the call of the UN conference, China was the first country in the world to complete its national Agenda 21, implementing

2 CCTV News 1+1, 21 February 2013
3 http://www.foodmate.net/special/anquan/90.html
4 (*Global Times* microblog, 22 February 2013)

sustainable development strategy[5]. The document highlighted various national programs, and outlined initiatives on environmental challenges going forward. Over the last three decades, China has made a handful of so-called basic national policies – which are at the core of the centralized decision-making process – and nearly all of them have been about environmental protection, population control and natural resource conservation. This wide-ranging strategy has also changed environmental governance in China. In the early 1990s, the State Council set up the China Council for International Cooperation on Environment and Development (CCICED), consisting of 32 Chinese members and 25 international members, led by the vice premier. This committee commissions task forces every year on major issues of sustainable development and submits policy recommendations to the Central Government for consideration. This organization is notable for being China's only sustained and substantial nexus for international policy cooperation.

Although it must be admitted that vigorous efforts at environmental control have not kept up with environmental degradation – a besetting issue that afflicts many other large economies – a number of salient achievements thus far offer optimism for China's potential to achieve sustainability. We review them in the following sections.

Achievements

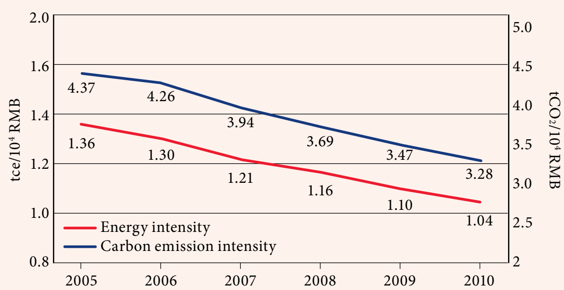
Increase in economic productivity and resource use efficiency

Since 2004, China's grain production has consistently exceeded 500 million tons, a 25% increase over yields prior to the 1992 UNCED. Grain yield per hectare has exceeded four tons, reaching a level considered to be highly productive. The enhanced grain production has been critical for the food security of the world's most populous nation, especially considering the land and water resource limitation. China's per capita arable land is only 40% of the world average, and per capita freshwater availability is only 28%. China's enhanced agricultural productivity has, in large part, been achieved through infrastructure construction and technological improvement. 'Green' and low-carbon farming has been on the rise. The coal equivalent of 37 million tons – accounting for about 1.14% of the total end-use energy consumption – was consumed by agriculture and forestry in 2010, while contributing to 9.4% of the national GDP. Among all of China's industries, agriculture is the only one that stabilized its energy consumption in the 11th Five Year Plan (FYP), about 35.0-37 Mtc per year. Energy intensity showed a sharp decrease of 17.4% from 2005 to 2010. It is notable, however, that the embedded carbon emissions associated with agricultural production has increased. In 2009, the embedded carbon emissions in agriculture production materials were 325 Mt CO_2-eq, or 2.6 times as much as the direct emissions in agriculture. Fertilizer was a major source of embedded carbon emissions, accounting for about 86% of all sources. Need-based fertilization was an effective measure to reduce the total fertilizer use and thus to reduce the embedded carbon emissions in agriculture. China's agriculture shows strong low carbon features compared to many other countries. Compared to the agricultural energy consumption in some Organization of Economic Cooperation and Development (OECD) countries in 2006 (measured by the purchasing power parity (PPP) method (IEA, 2009)), China's level was only 19.0% of the average level of the developed nations' group. More specifically, it was 24.4% of Australia's, 22.1% of the U.S.' and 36.5% of Japan's level.

In the two decades since the first UNCED, otherwise referred to as the Rio Conference, China transformed from an agriculture-dominated economy to the world's manufacturing hub. As a percentage

5 The UN developed Agenda 21, which was agreed upon by the participating parties at the Rio Conference in 1992. The Conference called for each country to develop its own Agenda 21 to implement the sustainable development strategy. China responded with the completion of the first national Agenda 21.

Figure 1: Energy Intensity and CO_2 Emission Intensity of the Manufacturing Industry, 2005-10



Source: Qi, 2011.

of GDP, China's exports rose from 11% in 1980 to as high as 39% in 2006 (World Bank). To enhance the sustainability of China's industry, the government has focused on restructuring initiatives that reduce the share of energy and resource-intensive sectors, closing down production facilities with low resource and energy efficiency, and adopting more sustainable technology.

Energy savings in the manufacturing industry are of particular importance. In 2010, energy consumption by the manufacturing industry was about 1.83 Gtce, accounting for 60% of end-use energy consumption, or 56% of total national energy consumption; CO_2 emissions were 4.30 Gt, accounting for 59% of national total energy-related emissions. During the 11th FYP, total energy consumption and CO_2 emissions increased in the manufacturing industry, but the energy intensity and carbon emissions intensity experienced a rapid decrease.

Energy efficiency in the manufacturing industry can be measured by two indicators – the energy consumption per unit of value-added, which reflects the overall energy intensity in one industry, and the energy consumption per unit of an industrial product. From 2005 to 2010, energy consumption per unit value-added in the manufacturing industry decreased by 23.2%, an annual decrease of 5.14% on average. This was 20% faster than the national average of 4.15%. This also translated into total energy savings of 329 Mtce, accounting for 52.5% of the national total. Carbon dioxide emissions per RMB10,000 value-added decreased from 4.37 tons in 2005 to 3.28 tons in 2010, a decrease of 25.1%, or an annual decrease of 5.6% on average (see Figure 1). Cumulative CO_2 emission reductions were 1.16 Gt, accounting for 74.8% of total national reductions.

Energy consumption per unit of product decreased for all 16 major products in six energy-intensive industries. The manufacturing industry achieved total energy savings of 311 Mtce through unit product energy efficiency improvement, accounting for 94.6% of total savings by the manufacturing industry, or 49.6% of total national energy savings.

This major success was largely due to technological improvement and structural optimization. Technological improvement included innovation, phasing out inefficient technologies and scaling up the deployment of advanced technologies, adopting energy efficient equipment and increasing investment in research and development. From 2006 to 2010, the so-called "Top-1000 Enterprises Energy Efficiency Program"[6] yielded energy savings of 150 Mtce (NDRC, 2011a), the "Ten Key Industry Energy Saving Program"[7] yielded 340 Mtce (NDRC, 2011b), and the "Phasing-out Obsolete Capacity Program" yielded over 110 Mtce (Qi, 2011). These three programs successfully met, and even surpassed, energy savings targets. With the deployment of more efficient technologies, overall energy consumption per ton of steel dropped by 12.1% from 2006 to 2010 (NBS, 2011c). At the same time, the deployment rates for all major new technologies went up. The medium and large steel companies achieved better performance than their Japanese peers, who

6 Approximately 1,000 of the largest energy-consuming enterprises were selected as primary focus of the industrial energy-saving program. This program was called the "Top 1000 Enterprises Program", a key program in the 11th Five-Year Plan. This program has been scaled up in the 12th Five-Year Plan to the "Top 10 Thousand Program", to cover a much wider range of enterprises.

7 "The Ten Key Industry Energy Saving Program" identified ten major areas of industry for national support for energy saving.

were rated as world leaders according to numerous industry indicators. Comprehensive energy consumption intensity in the cement industry achieved a decrease of 28.6% through the large-scale deployment of new dry processes and residue heat-to-electricity technologies, and through increasing the bulk cement rate (NBS, 2011c). There was also energy efficiency success in the non-ferrous metal industry. By scaling up pre-baked cell production, AC electricity consumption in aluminum ingot production has dropped by 12% (NBS, 2011c). The overall electricity consumption intensity in copper smelting dropped by 35.9% (NBS, 2011c), the largest decrease achieved among all industries between 2006 and 2010.

In terms of structural changes, the heavy-industry-oriented industrialization trend in the first three years during 2006-10 continued, but the rate slowed down. Meanwhile, the structure of the manufacturing industry started a transition to a more energy efficient mode, with a decreasing share of high energy-intensive industries and an increasing share of less energy-intensive products. In addition, the share of the services industry increased from 39% to 43.2% in the first decade of the 21st century. This change alone helped create 65 million jobs and moved the economy down a significantly more energy and resource efficient path.

Poverty alleviation and balanced regional development

According to the previous poverty line set by the Chinese government, from 2000 to 2010, the number of people living in poverty shrank from 94.22 million to 16.88 million, or from 10.2% to 2.8% of the overall population. There are several reasons for this. One reason is the significant improvement in infrastructure in the most poverty-stricken regions. Hard-surfaced roads, electricity, telecommunications and television connections are now available in most places. These improvements have lowered transportation and transaction costs, provided information and communication networks, and therefore facilitated new income and employment opportunities, and boosted the 'social capital' of previously marginal communities. Additionally, due to growing outlays and the government focus on education, the illiteracy rate in impoverished regions has declined to about 10% of the population.

Poverty alleviation at the national scale has benefited from more balanced regional development. The current pattern of more advanced economic development in the eastern, coastal provinces and less in the western regions is being adjusted. Since 2007, the rate of economic growth in the west has broadly exceeded that of the east, and this change seems to be a long-term trend of the Chinese economy. Even with overall GDP expansion currently slowing down, western China is still maintaining double-digit growth.

The Chinese government has put forward a strategic vision of promoting the construction of development priority zones since 2006. In 2010, China released an official outline of the "National Planning for Development Priority Zones". Based on different regions' resources and environmental bearing capacities and their current development intensity and potential, the Chinese government is comprehensively planning corresponding population distributions, economic layout, and land use and urbanization patterns. Land space is divided into four categories: optimized development zones, key development zones, restricted development zones and prohibited development zones. The main functions of different regions have been determined, and accordingly, their development orientations have been specified, development policies improved, development intensity controlled and development order regulated. The strategy strives to facilitate new national land development patterns that accommodate population, economy, resources and the environment. This strategy is meant to achieve a national balance between natural conservation and socioeconomic enhancement.

Urbanization and infrastructure improvement

Urbanization is a major macro-trend of China's social and economic development. Each year more than 10 million rural residents move to cities and towns. In 2011, for the first time in Chinese history, more people lived in cities and towns than in rural villages. This change was driven by greater economic opportunities that are largely absent in rural areas, and has made it possible for many more people to enjoy the better living standards afforded by urban infrastructure and built environment. In 2010, urban fountain water coverage reached 96.7% of the population, and natural gas supply 92% – as compared to 2000, when these figures were only 63.9% and 50.1% respectively. District heating coverage has increased three-fold, buses 1.2-fold and urban green areas 1.55-fold. Processed urban waste water and garbage facilities increased to 82.3% and 77.9%, respectively. Urbanization has become a very important factor in development, improving the standard of living for hundreds of millions of people in China in recent decades.

Meanwhile, the energy efficiency of buildings and transportation in cities has advanced significantly. Energy consumption and CO_2 emissions in the building sector continuously increased in the 11th FYP as a result of urbanization and the growing standard of living, but the annual growth rate decreased notably compared to that of the 10th FYP. Almost one quarter of the buildings now meet the national energy-saving standards. From 2005 to 2010, energy consumption per unit area increased by 19.7%, or an annual rate of 3.7% on average. At the same time, CO_2 emissions per unit area increased by 17.9% overall, or 3.3% annually on average. At present, China's CO_2 emissions per unit of building area are far lower than developed countries levels and less than one-third that of the U.S. level. These achievements have made China, despite being a still relatively low-income economy, one of the world leaders in the field of sustainable built environment.

Four categories can be identified in building energy consumption. Centralized district heating system in northern cities achieved the greatest progress in energy efficiency. Energy consumption per unit area in central heating systems in northern cities continuously dropped from 17.78 kgce per square meter in 2005 to 16.28 kgce per square meter in 2010, a decrease of 8.41%. At the same time, the associated CO_2 emissions per unit area also decreased from 47.48 kg CO_2 per square meter in 2005 to 43.87 kg CO_2 per square meter in 2010, a decrease of 7.6%. As a result, the growth rate of total energy consumption and CO_2 emissions related to northern cities' central heating system has slowed down, which accounted for about 25% of total building energy consumption in the whole country in 2010.

Through the transformation of the envelope structure of buildings, the institutional reform of the centralized district heating system and the scaling up of energy-saving lighting and energy standards for home appliances, the building sector has achieved an energy-saving capability of 67.50 Mtce, equivalent to an accumulative emissions reduction capability of 185 Mt CO_2 from 2006 to 2010.

China's transportation sector has experienced rapid growth in roads, vehicles and traffic, all leading to growth in energy consumption. Energy consumption in the transportation sector amounted to 230 Mtce in 2005 and 300 Mtce in 2009, an increase of more than 30% over four years, higher than the average growth rate in other sectors, although it was lower than that of the previous FYP. Energy efficiency improved significantly in the sector. Energy consumption per ton-km in railway transportation decreased from 6.48 tce/Mton-km equivalent in 2005 to 4.94 tce/Mton-km equivalent in 2010, a decrease of 23.8% (MOR, 2011). Fuel oil consumption per unit ton-km in aviation transportation decreased from 0.336 kg/ton-km in 2005 to 0.298 kg/ton-km in 2010, a decrease of 11.3% (CAA, 2011).

Answering the growing demands of an increasingly mobile urban population, the Chinese government has encouraged the development of mass transportation. There has been a continued increase in the share of public transportation in resident trips. Take Beijing as an example: the share of public transportation reached 39.3% in the first half of 2010 (*Beijing Daily*, 2010), an increase of nearly 7% compared to 2005. In railway transportation, the government developed an overall plan and implemented an express railway network with priorities. It is expected that the express railway network will provide alternatives to carbon-intensive modes of transport such as airplanes and cars in the long run.

And in response to the proliferation of private vehicles, the government has increased fuel economy standards to encourage the production of more efficient cars and imposed a gas tax in 2008. It has also adopted a progressive tax schedule on cars with higher fuel consumption to incentivize the purchase of more efficient cars. In 2005, small-displacement cars of 1.6 liters or less accounted for two-thirds of the total ordinary passenger cars in China (CATRC, 2009). The ratio increased to 68.77% in 2010 (CAMA, 2011). The government has also provided a much-needed fillip to the alternative fuels automobile market. In 2009, the Ministry of Science and Technologies and the Ministry of Industries and Information Technology jointly launched a pilot program of 1,000 new energy cars in 10 cities to promote the mass production of these vehicles and reduce their cost to consumers. The two ministries developed the "New Energy Vehicle Development Plan", which drew a roadmap for technology development.

Reforestation, resource conservation and environmental protection

Shortly after the floods in the Yangtze River Basin in 1998, the Chinese government implemented a universal ban on the logging of primary forest. Since then, the government has funded six major afforestation and reforestation programs aimed at increasing forest coverage and ecosystem conservation. Over 43 million hectares of forest were planted in the last decade, almost a quarter increase over the previous 10 years time. The national forest coverage has increased to 20.36%, as compared to 16.55% a decade ago. Meanwhile, natural conservation efforts have also included ecosystem restoration of grasslands and wetlands. The government has sponsored and funded numerous programs. In the conservation of wetlands, 70,000 hectares of wetland have been restored and 550 wetland reserves have been established, including 41 international key wetlands and 213 wetland national parks. These have bolstered the extensive nature reserve system. By 2010, a total of 2,588 nature reserves were established, putting 149 million hectares under official conservation programs. The total area of nature reserves is now 25% greater than the total area for food production in China.

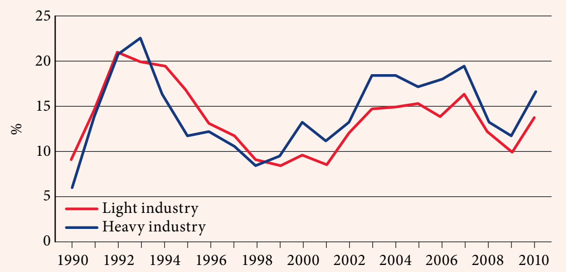
Water conservation is of particular importance and therefore has been given great attention over the last two decades. According to the "National Report on Sustainable Development" released before the Rio+20 Conference on Sustainable Development in 2012, China has, since 2001, established 300 pilot projects for building a water-saving society and raised the technological standards for water conservation in agriculture, industry and cities. As a result, water consumption for every thousand RMB of industrial value-added dropped from 28.5 cubic meters in 2000 to 124 cubic meters in 2010, and water consumption per thousand RMB of GDP fell from 554 cubic meters in 2000 to 225 cubic meters in 2010 (The People's Republic of China, 2012).

Climate change mitigation

China's climate change policies focus on mitigation rather than adaptation. The efforts at mitigation include both energy saving and renewable energy development.

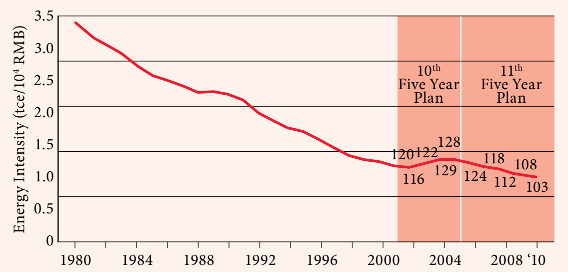
From 1980 to 2000, China's GDP increased by a factor of 6.15, but the energy consumption grew only by a factor of 2.14. The energy intensity was cut

Figure 2: **Growth Rate of Light Industry and Heavy Industry, 1990-2010**



Source: "The Statistics Bulletin of the National Economic and Social Development of the People's Republic of China", 1990-2010

Figure 3: **Change of Energy Intensity in China, 1980-2010**



Source: China Statistics Yearbook 2011 (NBS, 2011a); Energy intensity is calculated at 2005 prices

by 63.3%. As the nation entered the new century, accelerated industrialization posed new challenges to energy use, and the share of energy-intensive heavy industry increased quickly (see Figure 2). The overall energy intensity reversed from a decreasing trend to a sharp increase. Measured by energy consumption per unit GDP, intensity increased by 4.8% in 2003 and by 5.5% in 2004. In 2005 the energy intensity went back down to the 1999 level. The two consecutive years of increase canceled out the achievement in energy intensity reduction from 1999 to 2005. GDP in 2005 increased by 70% compared to that of 1999. With such a high growth rate continuing into the future, energy consumption and carbon emissions will increase dramatically if effective controls are not in place, posing a severe challenge to energy supply, environmental quality and climate change impacts for China as well as for the world.

The 11th FYP, covering the period from 2006-2010, set an explicit target of reducing the energy intensity by 20%. In addition, a few major industrial sectors were identified as priority areas under the energy saving policy. The 11th FYP defined the target as 'mandatory' and required all government departments and local governments to ensure the delivery of the target with maximum effort and the greatest measure of resources that could be allocated.

According to data from the National Development and Reform Commission, by the end of 2010, energy intensity in China had decreased by 19.1% compared to the 2005 level, virtually achieving the target set by the 11th FYP. On a year-to-year basis, the reduction was 2.72% in 2006, 5.01% in 2007, 5.23% in 2008, 3.62% in 2009 and 4.10% in 2010 (NDRC and NBS, 2011). By 2008 energy intensity had dropped to the 2002 level (see Figure 3). The rapidly increasing trend of energy intensity during the 10th FYP period (2000-2005) was replaced with a sharp decrease of an annual rate of 4.3%. As a comparison, energy intensity in the U.S. decreased by 1.2% annually on average (BEA, 2011; EIA, 2010). In 2011, the first year of the 12th FYP, the energy intensity of the Chinese economy was further cut by 2.01%, contributing to the overall five-year target of 16%.

The key to low-carbon development is the decarbonization of the economy. This is achieved by decreasing fossil fuel consumption per unit of production and consumption. During the 11th FYP, China successfully curbed its increasing energy intensity, moving towards a low-carbon development path. This helped to alleviate the pressure on the energy supply, where shortages were once rampant across the country, and slowed down the increase in greenhouse gas emissions, despite maintaining high economic growth.

Large-scale reforestation in China has contributed to ecological carbon sequestration. In 2009 forest coverage reached 20.4%, achieving the 11th

FYP target. A nationwide general survey of forest stock from 2004 to 2009 showed that China's forestry carbon sink amounted to 22,290 $MtCO_2$, a total increase of 10.4% compared to the previous survey period (1998-2003), an annual increase of 420 $MtCO_2$ on average. The IFO Institute – Center for Economic Studies – a German government think-tank – reported that China had developed 73% of total new forest land (Xinhua News Agency, 2010), despite a massive global deforestation rate of 20,000 hectares per day. China's continuing efforts in reforestation will ensure a steady increase of forestland, greatly contributing to China's low-carbon development and global CO_2 emissions reduction efforts.

Obstacles to China's Sustainable Development

Vulnerabilities of the physical environment and limitations of the resource endowment

China's vast, beautiful and diverse territory shows the complexity of the nation's geography, geology and geomorphology. Although China may be a naturalist's dream, it may not be the beau ideal for the farmer or factory owner. Most of the country's land area is considered unsuitable for agricultural and industrial production as well as for human habitation: more than 20% of the land is located atop the frigid Qinghai-Tibetan Plateau, with the highest altitude in the world; another 10% in the mountainous karst area of southern China, which has exceptionally poor soil quality; and more than half of the land is under arid and semi-arid climate. Per capita freshwater availability is only 28% of the world average and arable land is 40% of the world average. Per capita mineral resource is also limited. The natural capital endowment is a tight constraint for China's sustainable development, given the rising demand of a broadening consumer class. It takes much more effort – and much more stress on the domestic natural environment – for China to achieve the standard of living long enjoyed in the U.S. In fact, some believe that it is unlikely that China will ever achieve a similar standard of living under current resource availabilities and the foreseeable future of ameliorative technological progress. Additionally, due to its climate as well as human and physical geography, China is extremely susceptible to different kinds of natural disasters of many kinds. The high population density makes seaborne disturbances such as typhoons particularly damaging, and the impact on the economy – which is anchored by the large coastal cities – tends to be very high. It is estimated that weather-related disasters are close to 10 times that of the U.S.

Pressure for greater development

If sustainable development is about balancing environment and development, China faces a particular challenge because economic growth is so badly needed. Despite the rapid expansion of the Chinese economy, most regions in China are still in the early stages of industrialization and urbanization. There is still a large population under the poverty line. According to the 2011 poverty standard – per-capita annual income under RMB2,300 in rural areas – 122 million people were still living in impoverished conditions (UNICEF China). Although China has exceeded Japan in national GDP and is now the second largest economy in the world, the number of people living in poverty is about the same size as the total population of Japan. Most of the impoverished regions suffer from adverse environmental conditions and thus economic development is particularly difficult. China is still under huge pressure to provide employment opportunities, particularly for the tens of millions of rural workers who are eager to enter cities, and the millions of college graduates flooding into the job market every year. Compounding this difficulty is the rapid aging of the population – a dilemma commonly encapsulated by the question, "Will China grow old before she grows rich?" – which poses a huge burden on future social resources. So far, China is the only country in the world with more than 100 million senior citizens. The provisioning of social security and healthcare to an aging population thus demands continued, vigorous economic growth.

Prospect for Sino-U.S. Cooperation

The complementarity of the Chinese and American economies, and the common necessity to address global environmental problems, creates a convincing case for bilateral cooperation on sustainable development. First, the U.S. is abundant in natural resources. The arable land area in the U.S. is 197 million hectares, two thirds more than that of China; and the per capita arable land area in the U.S. is eight times greater than China's. Contrasts of freshwater and other natural resource availabilities are equally impressive. The complementarity in food production, in particular, could have significant implications for the environment, as it already does for trade.

The U.S. has long been the world leader in technological innovation. The U.S. holds a leading global edge in information and communications technology (ICT), as well as clean energy advancement. These advantages would not only put the U.S. in a leading position in the so-called 'Third Industrial Revolution', but could benefit other countries in their transition to sustainable development. Bilateral cooperation would help China immensely, accelerating the transition to low-carbon growth against the fast-moving timeline of climate change. But the relationship goes both ways: the U.S. can also learn much from China, particularly about consumption. China has developed ways of living with limited resource availability for thousands of years, while maintaining a sustainable relationship with the natural environment. Indeed, traditional Taoist philosophy has influenced countless generations to 'live in harmony with the environment', and impressed on Chinese culture the concept of 'unity of man and nature'. This relationship with nature has been an underlying force in Chinese culture until recent decades, up until the impact of economic globalization and the modern profit-driven ethos undermined the traditional socio-ecological balance. Nonetheless, the widespread efforts by high-level policymakers, as well as growing segments of the public, to embrace resource-use efficiency and conservation – as documented in earlier sections – offer encouraging signals of a shift back to the earlier, sustainable attitude. Both the U.S. and China – the two largest countries on the planet – can benefit from such traditional wisdoms.

In this vein of mutual understanding and common cause, the two countries have made important agreements on climate change and clean energy in recent years. Sino-U.S. cooperation on sustainability reached a breakthrough in April 2013, when Secretary of State John Kerry arrived in Beijing for high-level negotiations to discuss a climate change action plan that was officially added to the influential Strategic and Economic Dialogue. The two countries – the world's two largest economies as well as its two largest carbon emitters – then released a joint statement that will likely represent a landmark in global environmental statecraft. The declaration called for "forceful, nationally appropriate action by the United States and China – including large-scale cooperative action", further stating that "such action is crucial both to contain climate change and to set the kind of powerful example that can inspire the world." The statement, and other discussions and agreements surrounding Secretary Kerry's visit, also highlighted the importance of promoting energy technology, environmental protection and resource conservation, all upon a platform of mutual trust and respect between China and the U.S.

The challenges of sustainable development can provide opportunities for close collaboration and the emergence of a geopolitical relationship that benefits not only China and the U.S., but the world at large. The encouraging developments in recent years certainly point in that direction. Sino-U.S. cooperation on climate change and energy can form a bridgehead to additional collaboration on other issues of mutual and global concern, from security to commerce. In this sense, engagement between the two countries on sustainable development is not only an achievement in and of itself, but an important step toward a broader relationship of goodwill. Indeed, informed opinion on both sides has consistently voiced a desire for comity. Dr Henry Kissinger has recently argued for the imperative of peaceful Sino-U.S. 'co-evolution' in the years ahead, and the need to find common projects to build cooperation (Kissinger, 2011). Although global environmental problems such as climate change are daunting, they present an opportunity to make common cause in a way that is historically novel.

However, there have also been antagonistic voices that postulate the inevitability of conflict and argue for the adoption of more aggressive postures. This would be a truly unfortunate outcome for the two large nations involved and the international community in which they are inextricably linked. Historians have noted that the relationship between the regnant power and the rising power is usually fraught with the potential for misunderstanding. Putting the Sino-U.S. dynamic on a robust foundation requires earnest and honest efforts by both sides to understand each other and align goals. Never before has the world faced such a demanding challenge as the great biophysical changes currently looming, and never has the need for cooperation between the world's two greatest powers been so necessary. Building upon recent achievements, let us hope China and the U.S. can strike the right balance and lead the world to a more sustainable future.

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