Chapter 2

Evolving Economic Complementarity between the U.S. and China

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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

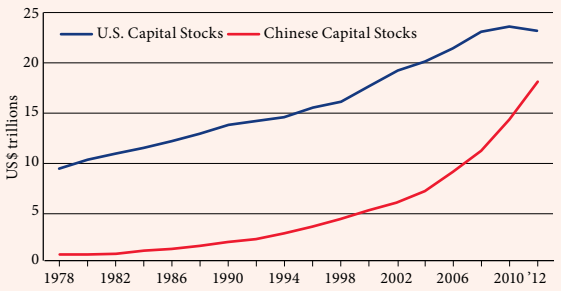
CN: Data from 2008 census; U.S. from WDI, published in 2009 only
Census data from China and the .U.S
Data on R&D expenditure: From OECD statistics; R&D stocks are estimated by Prof Lawrence J. Lau.
Data from http://www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_utl.htm

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%.

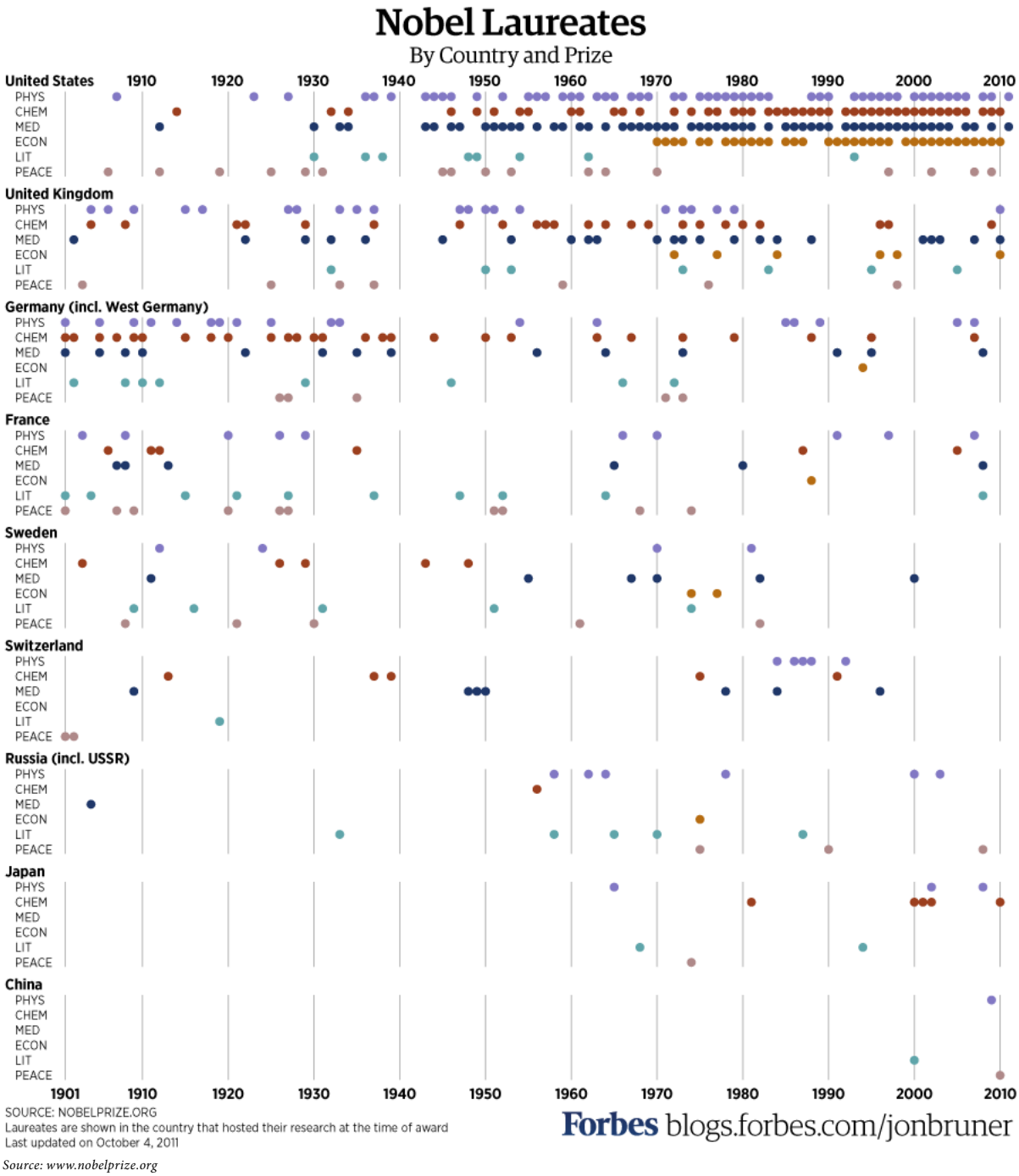
In terms of the total number of university degree holders aged between 25 to 64, the U.S. had 51.15 million while China had 29.94 million in 2010. The age profile of university graduates in the U.S. is much more mature than that of China, as China stepped up significantly its investment in higher education 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 condi-

tions 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.

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.

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.

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