

Searching for A New Growth Engine:
An Essay on The Evolution of
The Tradable Sector in China

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Abstract

After an absence of two centuries, China once again returns to the center stage of the world economy now. In the past three decades, China's economic performance was extraordinary. Over 500 million people were lifted out of poverty. The World Bank reclassified China as an upper-middle income country in July 2011. Although China told the world a miraculous yet unique development story in the past three decades, the challenges and risks the country is facing now are no less daunting than before. In the post-World War II era, economies have tended to experience stagnant growth after reaching middle-income status. This phenomenon is known as the middle-income trap. This paper examines the challenges China is facing now and how can China learn from international experiences to avoid the middle-income trap. In addition, this paper analyzes the importance and nature of the global value chains and why moving up the value chains will help China sustain its growth and remain competitive in the global market. In the end, this paper discusses the most primary framework conditions the Chinese government needs to enhance in order to achieve a successful transition from a middle-income country to a high-income economy.

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A. Summary on China's Recent Economic History

Adam Smith, replying on travellers' reports, wrote in *The Wealth of Nations*: China has long been one of the richest, that is, one of the most fertile, best cultivated, most industrious, and most populous, countries in the world. It seems, however, to have been long stationary.¹

China enjoyed an extraordinary growth in the Sung Dynasty, 960-1280, when per capita income rose by one third and population almost doubled. During the same period, there was a significant opening to the world economy, which, however, ended abruptly in the early Ming Dynasty (1368-1644), when China decided to turn its back on the world economy. As China instituted and adopted the isolation policy, many commercial and diplomatic relations were halted. After a long period of lukewarm economic progress and intermittent national setbacks, population rose more than three-fold between 1700 and 1840 with no noticeable fall in per capita income. There was an expansion of the national territory, but China remained isolated from the outside world and repudiated foreign efforts to establish diplomatic and commercial relations at the end of the 18th century. From 1840 to 1950, China suffered from internal conflict (e.g. Taiping Rebellion) and collusive foreign intrusions on its territory and sovereignty (e.g. the Siege of the International Legations) because of technological backwardness and weakness of governance after a long period of isolation. The economic results were disastrous. GDP fell from a third to a twentieth of the world total and per capita income fell in a period when it rose three-fold in Japan, four-fold in Europe and eight-fold in the United States.²

In 1949, the Chinese Communist Party (CCP) came to power and founded the People's Republic of China (PRC). The establishment of the PRC proved to be a remarkable separation from the past, bringing the country a new mode of governance and a gradual recovery of per

¹ Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations*, 1776.

² Angus Maddison, *Chinese Economic Performance in the Long Run*. OECD, 2007.

capita income. During the Maoist period (1950-78), the growth was, however, interrupted by disastrous economic and social experiments. “The Great Leap Forward starved perhaps 30 million or more people. The Cultural Revolution, starting in 1965 and lasting ten years, was not primarily an economic policy choice, but it had significant negative economic impacts. Much talent was lost or sidelined and underutilized”.³ In addition, wars with Korea, India and Vietnam and long years of almost complete autarchy in China further stymied its economic growth.

In 1978, after a policy struggle in the wake of the death of Mao, Deng and other pragmatic Chinese leaders began to reform China’s centrally planned economy into a market economy, which once again opened China to foreign investment, global trade, modern technology, and export-led growth strategy. From 1978, there were tremendous gains in efficiency from agriculture, an explosive expansion of foreign trade and accelerated absorption of foreign technology through large-scale foreign direct investment.⁴

B. China’s Current Position in the World Economy

After an absence of two centuries, China once again returns to the center stage of the world economy now. The recently released China 2030 report, organized by China’s Ministry of Finance, the Development Research Center of the State Council (DRC) and the World Bank, indicates that China’s economic performance over the last three decades has been impressive by any standard. GDP growth averaged 10 percent a year, and over 500 million people were lifted out of poverty. The World Bank reclassified China as an upper-middle income country in July 2011. China is now the largest exporter and manufacturer and the second largest economy in the

³ Michael Spence, *The Next Convergence: The Future of Economic Growth in a Multispeed World*. Farrar, Straus and Giroux, 2011.

⁴ Angus Maddison, *Chinese Economic Performance in the Long Run*. OECD, 2007.

world. With its over-three-trillion-dollar foreign exchange reserves, China is not only the world's producer, but also the world's banker. Although China told the world a miraculous yet unique development story in the past three decades, the challenges and risks the country is facing now are no less daunting than before. The difficulty is further compounded by the fact that any economic-social-political reforms taken in China now will have far-reaching effects on the global economic prosperity and the international political harmony.

C. Why China Grew at Unprecedented High Rates?

Deng Xiaoping, a revolutionary politician in China, played an important role in opening the country to the global economy, which helped launch China on its current growth trajectory. Two things came with the opening that brought China unprecedented growth rates: (1) a huge potential market and (2) access to knowledge.⁵ The global market provided China an invaluable platform to specialize in producing what it was comparatively good at. As a low-income country, China had limited domestic demand, which constrained the producing side of the economy. With the opening to the global market, China began to trade and export products abroad. With an abundant supply of industrious and cheap workers, China became the logical and ideal place for low-cost and labor-intensive manufacturing in the 1980s. Such a catch-up strategy was not uncommon among developing countries. The East Asian Tigers (Hong Kong, Singapore, Taiwan and South Korea) all followed the same strategy in their early stages of growth. The truth is that a low-income country with abundant labor or natural resources and scarce capital will have a comparative advantage in labor- or resource-intensive industry sectors. The right strategy for a

⁵ Michael Spence, *The Next Convergence: The Future of Economic Growth in a Multispeed World*. Farrar, Straus and Giroux, 2011.

developing country is to follow its comparative advantage at each stage of its development. Since the comparative advantage is constantly shifting as other domestic and global conditions change, the development strategy needs to be reformed and adapted accordingly. The East Asian Tigers did so and moved to high-income levels; some Latin American countries, however, failed to closely follow their comparative advantages and remained trapped in middle-income status (we will return to both cases later).

The other benefit of the opening to the global economy is the transfer of knowledge, which is the driving force of economic growth in the long run. By imitating and licensing, a process that is much less expensive than creating knowledge, promoting innovation and investing in technology, China was able to produce the same products with much lower costs. In addition, open economy made foreign direct investment possible, which was another important channel for inbound knowledge and technology transfer in China. China exploited the latecomer advantage through absorbing and adopting advanced knowledge and technology, which would otherwise take the country many decades to develop by trial and error. Such a process again required China to remain consistent with its comparative advantage at that time – cheap labor, which was missing in advanced countries. Nevertheless, as the knowledge accumulates and the capital structure evolves, China would need to abandon its old comparative advantage and implement a new development strategy.

D. Implications of The Middle-Income Trap

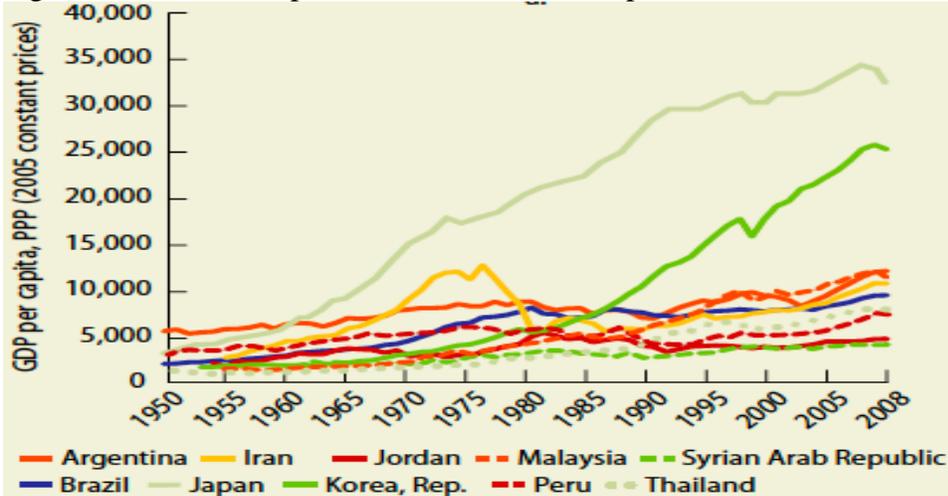
Although its extraordinary growth in the past three decades has brought the country to upper-middle-income level, there is no guarantee that China can go to high-income status. The truth is that China was able to compete in the global market and to achieve unprecedented

growth because China could provide the world with labor-intensive and low-cost products using technology developed abroad. Tremendous productivity gains were achieved through a reallocation of labor and capital from low-productivity agriculture to high-productivity manufacturing. As China reaches upper-middle-income level, its comparative advantage in unemployed low-cost rural labor force is gradually disappearing and the productivity gains from adopting foreign technology are almost exhausted. Some of the labor-intensive productions might move inland, where labor costs are still quite low. Production base relocation within the country, however, can hardly be a solution in the long term. If China failed to make adjustments in accordance with the changing conditions, it would stumble into the middle-income trap, a term first used by Gill and Kharas in 2007. The World Bank calculated 2011 Gross National Income (GNI) per capita using the World Bank Atlas method and divided countries into 4 groups: low income, \$1,025 or less; lower middle income, \$1,026 - \$4,035; upper middle income, \$4,036 - \$12,475; and high income, \$12,476 or more.⁶ International experiences have demonstrated that growing up to high-income level is hard to achieve (Figure 1). Few countries have successfully escaped the middle-income trap in history. Latin America and the Middle East provide compelling support for the trap hypothesis: “in the two regions, most economies reached middle-income status as early as the 1960s and 1970s and have remained there ever since”.⁷ Fortunately, China’s policy makers are already focusing on changing the country’s growth strategy and helping China avoid the middle-income trap. Such willingness is reflected in the 12th Five Year Plans, which focus on increasing human capital investments, promoting economic efficiency and shifting to high-value services. In the following paper we will discuss one of the solutions to help China avoid the middle-income trap – moving up the global value chains.

⁶ Income Levels, *World Bank’s Annual World Development Report (WDR)*, 2013.

⁷ *China 2030 Building a Modern, Harmonious, and Creative High-Income Society*, World Bank, 2012.

Figure 1: Hard to Escape the Middle-Income Trap



Sources: Heston, Summers, and Aten 2011.

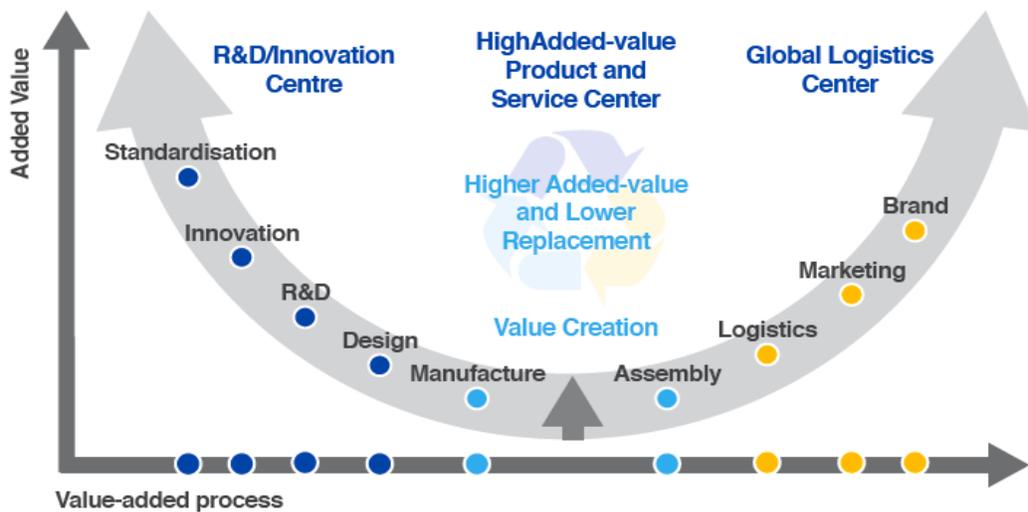
E. Definition and Importance of the Global Value Chain

The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. The process includes activities such as design, production, marketing, distribution and support to the final consumers. The activities that comprise a value chain can be contained within a single firm or divided among different firms. Value chain activities can produce goods or services, and can be contained within a single geographical location or spread over wider areas.⁸ In the context of global trade, the production of goods and services is shared and performed by firms all over the world. Facilitated by the trend of globalization and the advancement of technology, the global economy is increasingly structured around global value chains, which bring robust growth in global trade, GDP and employment. The low value added part of a value chain includes manufacturing and assembling, which can be done by any developing country with an abundance of unskilled and cheap labor force using the technology developed by advanced nations. The high value added part including

⁸ Concepts & Tools, *Global Value Chains*, Web, 2013.

innovation and branding, however, requires an intensive and extensive investment in human capital, R&D and technology (Figure 2). China is able to stay at the bottom of the “Smiley Face” because of its abundance in low-cost labor and its fast adoption of foreign technology. Accordingly, the export base of China concentrates in goods with little value added.

Figure 2: “Smiley Face” – conceptual model of the shift to a high value added, globally integrated, service s economy



Sources: Business Week International online extra, May 16, 2005, Stan Shih on Taiwan and China.

F. The Global Value Chain and Its Shifting Nature

The concept of global value chain represents the increasing fragmentation, specialization and interconnectedness of production across different countries in the global economy. Unlike the traditional value chain, where goods and services are first produced domestically and then compete with foreign products in the global market, a global value chain emphasizes on the role of networks, where each country specializes in certain tasks and business functions rather than

specific products. Now the reality is that most goods and an increasing number of are “made in the world” and that countries compete on different economic roles within the value chain.⁹

As mentioned before, the role a country plays in the global value chains mainly depends on its comparative advantages, which are constantly changing according to domestic and international economic-social-political conditions. Although China is still standing in the epicenter of global trade, its disappearing comparative advantage imposes tremendous pressure on the country to embark on another arduous yet inevitable development path.

For any developing country, the key to staying competitive in the global supply chain is to keep consistent with its comparative advantage. Since the 1950s, rapid growth rates have allowed an increasing number of nations to upgrade to middle-income status, but only few have succeeded in taking the additional leap to reach the high-income group. The rest suffered from prolonged middle-income transition and remained trapped in it due to stagnant growth and decreased productivity. Among the successful examples, five are from East Asia – Hong Kong, Japan, Korea, Taiwan, and Singapore – four of which comprise of the so-called “Asian Tigers”. When the “East Asian Tigers” reached middle-income levels, their comparative advantages in low-cost and labor-intensive sectors were disappearing and productivity gains from importing foreign technology were diminishing (the same situation China is facing now). In order to stay competitive in the global supply chain, the “Asian Tigers” started to move up the value chains through reforming labor markets, emphasizing R&D investments, developing advanced infrastructure networks, and pushing the technological frontier from imitating foreign technology to promoting home-grown innovations. As a result of well-functioning political, social and economical system, the four Asian nations all succeeded in upgrading to knowledge-intensive

⁹ Backer and Miroudot, *Mapping Global Value Chains*, OECD, 2012.

and technology-based sectors and remaining competitive in the global market. The truth is that the global value chain is constantly shifting around the world, but as long as the country closely follows its comparative advantage and evolves according to any changing conditions, it will be able to remain competitive and sustain its growth.

G. Why China Needs to Move Up the Global Value Chain?

1) Rising Wages in China

As mentioned in the last section, the global value chain is shifting around and the comparative advantage is constantly evolving too. Since China enters into upper-middle-income level, its comparative advantage in low-cost labor, which brought the country to its current economic prosperity, is rapidly disappearing. Such a trend indicates that China will either lose its global competitiveness in the low-cost manufacturing sector or move up the value chain to compete at a new level. An analysis conducted by the Boston Consulting Group comes to the conclusion - “a combination of economic forces is fast eroding China’s cost advantage as an export platform for the North America market. By sometime around 2015 – for many goods destined for North American consumers – manufacturing in some parts of the U.S. will be just as economical as manufacturing in China.”¹⁰

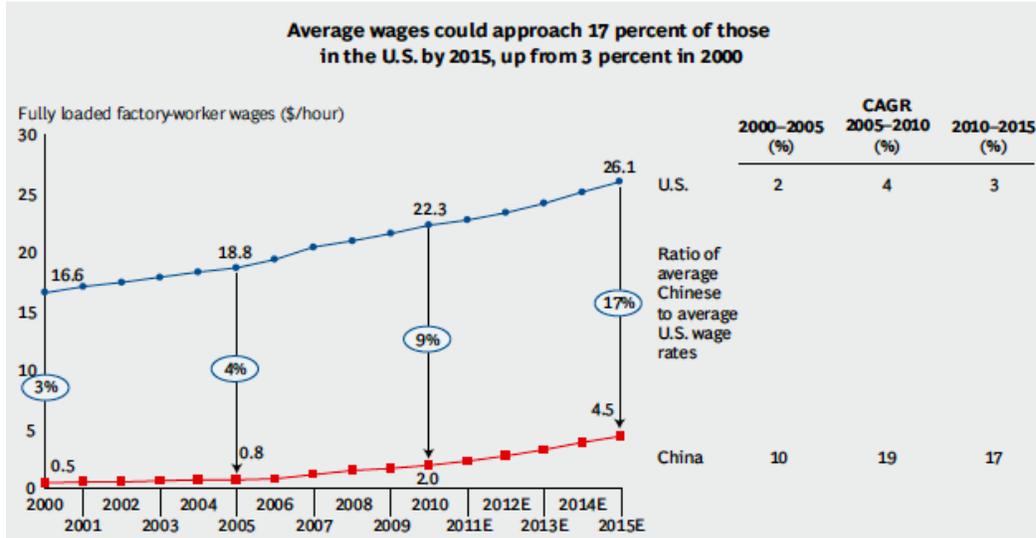
¹⁰ Sirkin, Zinser and Hohner, *Made in America, Again*, the Boston Consulting Group, 2011.

If the estimates in the analysis were accurate, foreign corporations would have no incentives to manufacture in China since the cost savings would be too trivial to even offset the international transportation costs.¹¹ From 2000 to 2005, wages and benefits for an average Chinese factory worker rose by 10 percent annually, while the fully loaded cost of an American factory worker rose only by 2 percent (Figure 3). The similar disparity can be found during 2005-2010 and the trend seems to continue in the next five years based on the projection of the Boston Consulting Group.

Now China is facing a critical juncture in its economic development. On the one hand, China has reached an income level high enough to prevent the country from competing on the same ground with low-income countries, such as Bangladesh and Laos; on the other hand, China is not ready to compete in capital- and knowledge-intensive sectors with high-income economies due to its lack of an enabling factor endowment mix. There is much uncertainty in the global trade pattern, but one unchangeable fact is that an era of low-cost Chinese manufacturing is coming to an end and China will need to regain its comparative advantage in the global market by moving up the value chains.

¹¹ Where the export manufacturing business will move mainly depends on what is being exported and how it can be produced. There can be two possible scenarios: 1. if the manufactured products lie on the bottom of the global value chains, some of the export industry might move further inland into China, where the labor costs are still quite low and the rest might go to other low-cost developing nations; 2. if the manufactured products are capital-intensive, the inner regions in China and other developing nations with poor infrastructure networks will never be able to accommodate the industry. As a result, looking for production sites with low-cost labor cannot be a sustainable solution for China. In addition, how the manufacturing production process evolves is another important factor we need to consider. If the automated manufacturing process driven by advanced technology became more economical compared to traditional labor-intensive production process, then the export manufacturing would move to anywhere close to its final markets, since unlike labor force, capital machinery and equity is mobile.

Figure 3: The Rapidly Growing Wage Rates in China
Unit: \$/hour Year: 2000-2015

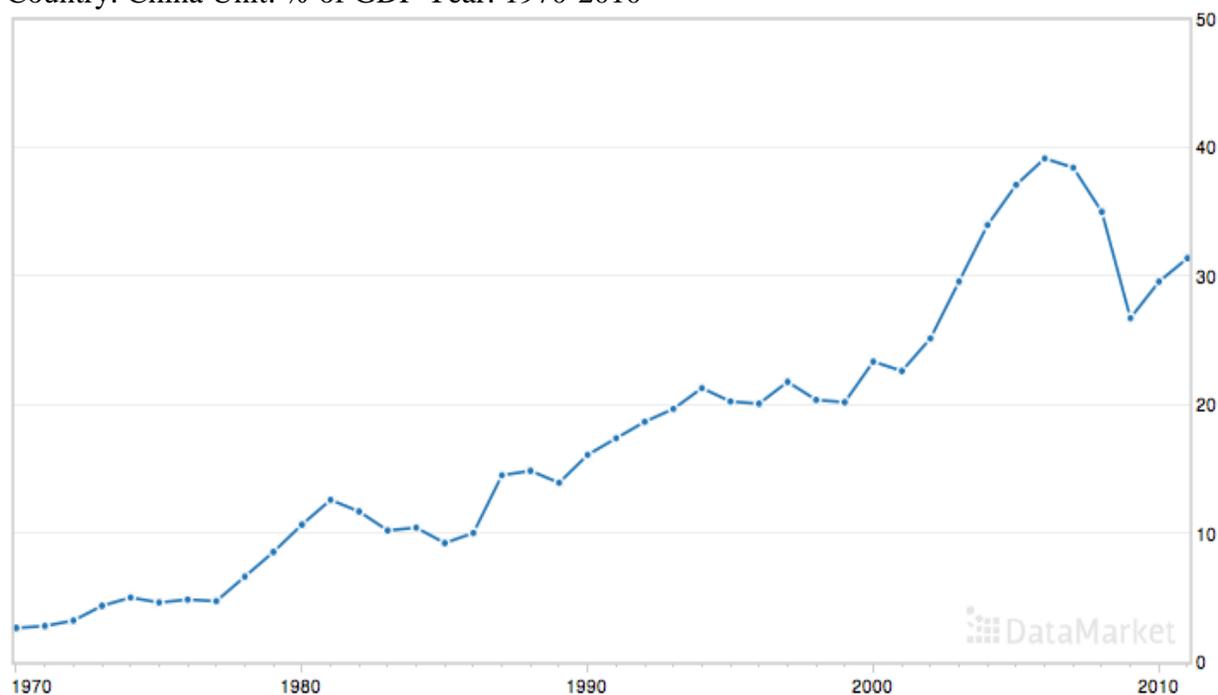


Sources: Economist Intelligence Unite; U.S. Bureau of Labor Statistics; BCG analysis.

2) Heavy Dependence on Exports

The fact that the Chinese economy is heavily dependent on exports further complicates the situation (Figure 4). Exports accounted for about 40 percent of China's GDP in 2007. The financial crisis, however, interrupted the increasing trend and caused its exports to suffer from the first sharp decrease since the country's opening to the global economy in 1970. Historically, from 1990 until 2012, China Exports averaged 49.8 Billion USD. With continued globalization, China's export sector is and will continue to be a significant component supporting the country's economy.

Figure 4: Exports of Goods and Services
Country: China Unit: % of GDP Year: 1970-2010

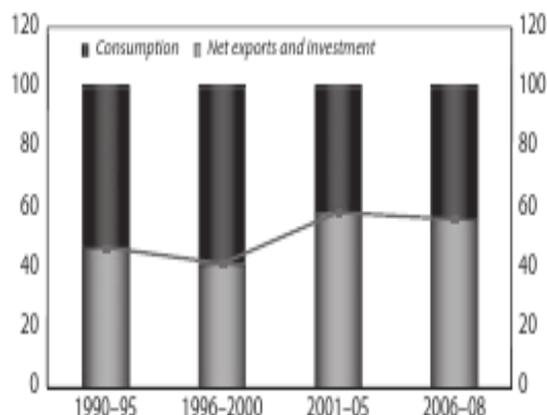


Sources: World Bank national accounts data and OECD National Accounts data files

Exports have long been one of the most important growth engines for China and are becoming increasingly important for its economic performance. During 2001-2008, net exports and investment, which are predominantly linked to building capacity in the tradable sectors, have accounted for about 60 percent of China's economic growth, up from 40 percent in the 1990s (Figure 5).¹² From the production side, exports are estimated to contribute 30 percent of China's GDP growth from 2001 to 2008, which double the percentage during 1990-2000 (Figure 6). Exports become increasingly important for China as the size of its economy keeps growing. Without any doubt, China cannot afford to lose its global competitiveness in the exports market. As a result of its rising labor costs and heavy reliance on exports, China must move up the global value chain to maintain its leading position in the world trade and sustain its robust growth to avoid the middle-income trap.

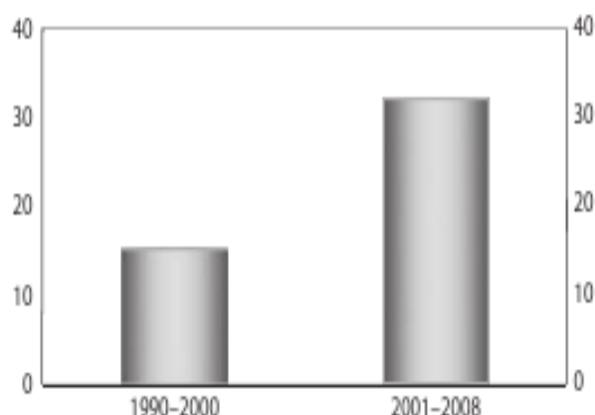
¹² Arora and Cardarelli, *Rebalancing Growth in Asia: Economic Dimensions for China*, International Monetary Fund, 2011.

Figure 5: Contribution to Growth
Unit: % of Total Growth
Year: 1990-2008



Sources: CEIC Data Co. Ltd. and IMF staff estimates.

Figure 6: Estimated Contribution of Exports to GDP Growth
Unit: % of Growth

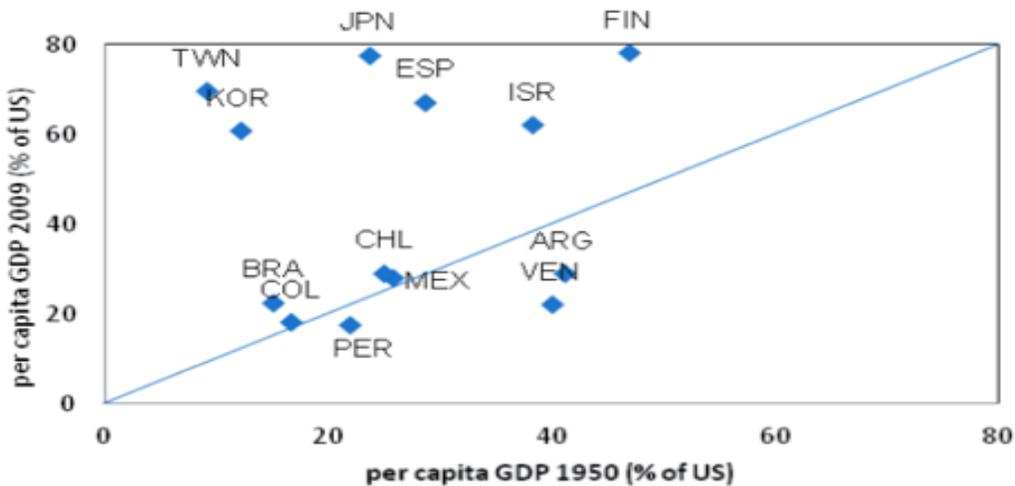


3) International Experiences: East Asia and Latin America

As mentioned before, Latin America and the East Asian Tigers experienced the opposite extremes of the middle-income transition (Figure 7). The chart plots the per capita income levels in 1950 and 2009 for the seven largest Latin American economies and a sample of European and Asian countries that have recently reached high-income levels. The relative income framework on the chart indicates that Latin America experienced difficulty in achieving income convergence. Argentina and Venezuela, which were both the richest middle-income countries in the 1950, lost the most ground relative to the U.S. income during the period (12 percent and 17 percent respectively). Against all the trends, only Brazil made some progress (moving from 15 percent to 24 percent of the U.S. income level), mainly due to a much lower initial income and a later entry into middle-income status. By contrast, the sample of major Asian economies drastically reduced their relative income gap with the United States, maintaining an average of 42 percent between 1950 and 2009. Especially Korea (KOR) and Chinese Taipei (TWN), both

with an initial income lower than Brazil, managed to reduce the gap with the U.S. income level by 49 percent and 68 percent respectively.¹³

Figure 7: Per Capita GDP in 1950 and 2009 (as % of U.S. per Capita GDP)



Sources: Penn World Table Version 7.0

In order to find out the causes of the two opposite results experienced by Latin America and East Asia, we need some indicators to evaluate the structural transformation of the two regions.

- a. RCA represents the number of products that a country exports with revealed comparative advantage, an indicator of export diversification in the country. A country will be competitive in exporting good i if its RCA with respect to i is greater than 1. To put it in another way, the share of good i in the country's export basket is more than the share of the same good in the global market.

$$RCA_{ci} = \frac{\left\{ \frac{xval_{ci}}{\sum_i xval_{ci}} \right\}}{\left\{ \frac{\sum_c xval_{ci}}{\sum_i \sum_c xval_{ci}} \right\}}$$

¹³ Jankowska, Nagengast and Perea, *The Product Space and The Middle-Income Trap: Comparing Asian and Latin American Experiences*, OECD Development Center, 2011.

where, $xval_{ci}$ is the value of country c 's export of commodity i (Balassa 1965).

- b. PRODY is a proxy for the capabilities embedded in a product. The PRODY variable originally suggested in Hausmann *et al.* (2007). As stated by the authors, the PRODY variable “represents the income level associated with that product”. Thus, PRODY is an estimate of the level of sophistication or value-added embedded in the good.

$$PRODY_i = \sum_c \left\{ \left[\frac{xval_{ci}}{\sum_i xval_{ci}} \right] / \sum_c \left[\frac{xval_{ci}}{\sum_i xval_{ci}} \right] \right\} \times GDP_{PC_c}$$

- c. Hausmann *et al.* use PRODY to construct a variable called EXPY, the weighted average of the level of sophistication of the all the products that a country exports. EXPY is the index of sophistication of the country's export basket.

$$expy_c = \left\{ \left[\frac{xval_{ci}}{\sum_i xval_{ci}} \right] \times PRODY_i \right\}$$

In general, a country will substantially increase the number of industry in which it has a reveal comparative advantage (RCA), which measures the export diversification of a country.

The dramatic expansion of international trade and emergence of new products since the

Industrial Revolution is a direct result of each country following its comparative advantage.

EXPY measures the level of export upgrading in a country. To put it in another way, EXPY

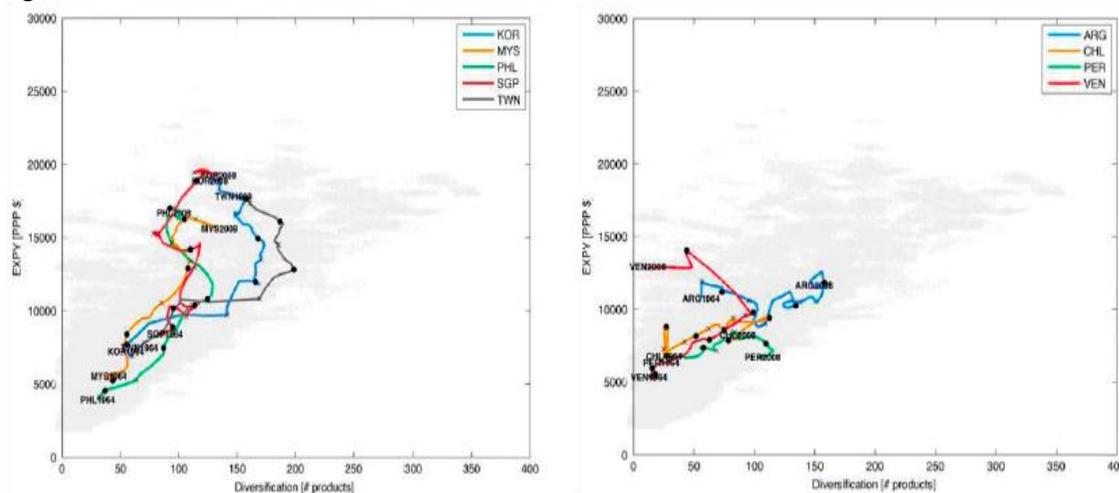
represents a country's relative standing along the global value chains. The charts below (Figure

8) demonstrate scatter plots of EXPY versus RCA for some countries in East Asia and Latin America.¹⁴ The graph on the left side included South Korea, Chinese Taipei, Singapore, Malaysia and the Philippines. Both South Korea and Chinese Taipei shows an early and extensive growth in export diversification without much upgrading at the same time. Such pattern shifts as the export portfolios change in both countries. There is a noticeable increase in EXPY without adding many new industry sectors. The diversification of export baskets actually declines in the cases of South Korea and Chinese Taipei. “In other words, upgrading seems to be achieved through a concentration on higher quality industries, which in turn leads to abandoning those that contribute less to EXPY”.¹⁵ The other three countries follow the same pattern, but with much less diversification at the beginning stage. By moving up the global value chain, all the five Asian economies experience sustainable growth to varying degrees. The graph on the right side tells a much different story. In Argentina, Chile and Peru, export upgrading seems to be completely unrelated to increases in diversification, leading to relatively horizontal lines in the scatter plot. In the case of Argentina, its increases in diversification seem to be negatively correlated with its export upgrading. Thus, the country moves down the value-added chains while adding more sectors in its export basket. By and large, Argentina, Chile, Peru and Venezuela all failed to upgrade their export portfolios, despite the fact that they have relatively high starting points in both export diversification and sophistication. As a result, they remain trapped in the middle-income transitions.

¹⁴ The authors of *The Product Space and The Middle-Income Trap* built the sample through a combination of two datasets that offer a highly disaggregated (4-digit SITC) breakdown of trade data across industries. The bulk of the sample, covering the years 1963-2000, relies on the World Trade Flows database (Feenstra *et al.*, 2005). For the years after 2000, the authors make use of the United Nations Commodity Trade Statistics Database (COMTRADE). Here the two charts are only used to explain the importance of export upgrading for a country to sustain its growth.

¹⁵ Jankowska, Nagengast and Perea, *The Product Space and The Middle-Income Trap*, OECD Development Center, 2012.

Figure 8: EXPY Versus Diversification



Sources: Jankowska, Nagengast and Perea, *The Product Space and The Middle-Income Trap*, OECD Development Center, 2012.

The table below (Figure 9) provides us with a detailed look at the evolution of export upgrading in Brazil, Mexico and Korea by demonstrating the top five export components in each country from 1963 to 2009. In the 1930s, agriculture and livestock products dominated the export portfolios in Brazil, Mexico and Korea. The pattern started to change in the 1970s, when Korea started its export-led growth strategy and expanded its production in light manufacturing. Clothing accessories and light manufactured goods took up almost 30 percent of the total export basket. Tremendous productivity improvement and remarkable economic growth were achieved in Korea. Meanwhile, Brazil and Mexico kept exporting similar products as before. In the 1980s and 1990s, although manufactured goods were still present in the top 5 exports, there was a clear movement toward technology-intensive products, such as electronic microcircuits and passenger cars. By the end of 2009, the top exports of Korea were all occupied by capital- and technology-intensive products, displaying a successful upgrading in export sophistication. In the case of Brazil, the top exports were mainly agricultural products and natural resources throughout the decades, despite the fact the transitory appearance of passenger cars in the early 2000s. Mexico

started to add more sophisticated products in its export portfolio, but the efforts were not persistent or strong enough to help the country avoid the middle-income trap.

Figure 9: Top Exports by Value
Unit: % of Total Exports Year:1963-2009

	Brazil	Export Share	Mexico	Export Share	Korea	Export Share
1963	1. Coffee	58.7%	1. Cotton	29.9%	1. Raw silk	13.8%
	2. Cotton	30.1%	2. Coffee	6.8%	2. Base metal ores	9.5%
	3. Wood	3.9%	3. Silver	5.5%	3. Live swine	9.3%
	4. Agave Textile Fibers	3.0%	4. Beef	5.2%	4. Materials of animal origin	8.9%
	5. Cocoa beans	2.9%	5. Lead	3.5%	5. Cotton gauze	8.8%
1973	1. Coffee	24.5%	1. Silver	8.12%	1. Clothing accessories	22.0%
	2. Oil Cake	9.3%	2. Cotton	7.78%	2. Light manufactured goods	5.8%
	3. Soybeans	8.9%	3. Coffee	7.43%	3. Iron/steel	5.6%
	4. Sugar	8.5%	4. Tomatoes	6.0%	4. Woven fabrics of silk	5.3%
	5. Cotton	4.5%	5. Sugar	4.9%	5. Raw silk	4.5%
1983	1. Coffee	14.2%	1. Parts for sound recording equip.	7.6%	1. Ships	5.0%
	2. Oil-Cake	11.5%	2. Silver	5.7%	2. Footwear	4.6%
	3. Iron ore	4.0%	3. Internal combustion engines	4.4%	3. Tugs	4.1%
	4. Footwear	2.5%	4. Natural gas	4.1%	4. Fabrics	3.9%
	5. Juices	2.2%	5. Coffee	3.7%	5. Electronic microcircuits	3.9%
1993	1. Oil-Cake	6.7%	1. Petroleum oils	7.33%	1. Electronic microcircuits	8.88%
	2. Footwear	5.6%	2. Passenger cars	6.48%	2. Passenger cars	4.57%
	3. Iron ore	3.4%	3. Insulated Electrical wire	4.52%	3. Fabrics	3.43%
	4. Iron/Steel alloy	3.2%	4. Car parts	3.55%	4. Ships	2.97%
	5. Coffee	3.1%	5. TVs	3.18%	5. Footwear	2.03%
2003	1. Soybeans	6.10%	1. Petroleum oils	10.3%	1. Passenger cars	9.41%
	2. Passenger cars	3.78%	2. Passenger cars	7.7%	2. Electronic microcircuits	8.23%
	3. Oil cake	3.70%	3. Car parts	4.3%	3. Electronics (radio, telephone)	7.47%
	4. Iron ore	3.24%	4. Trucks	4.1%	4. Ships	5.56%
	5. Petroleum oils	3.02%	5. TVs	3.9%	5. Automatic Data processing machines	4.46%
2009	1. Soy beans	7.8%	1. Petroleum Oils	11.7%	1. Ships	11.1%
	2. Iron ore	7.2%	2. TVs	8.2%	2. Electronic microcircuits	7.2%
	3. Petroleum oils	6.4%	3. Passenger Cars	6.8%	3. Optical instruments and apparatus	6.9%
	4. Sugar	4.1%	4. Phone and Radio Electronics	4.5%	4. Passenger cars	6.7%
	5. Poultry	3.4%	5. Car parts	4.2%	5. Electronics (radio, telephone)	5.4%

Sources: Feenstra *et al.* (2005), UN Comtrade and OECD (2012).

International experiences have shown a direct connection between sustainable economic growth and export upgrading. In order to avoid the middle-income trap, China needs to learn from the past and move up the value-added chains to stay competitive in the global market.

H. General National Framework Conditions

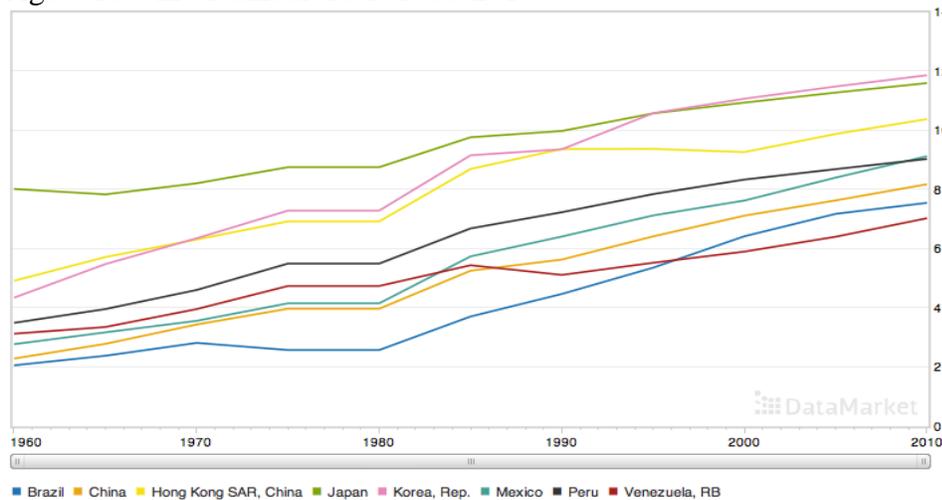
To sustain its economic growth and avoid the middle-income trap, China will need some structural reforms to strengthen the foundations for its tradable sector. The government will play an indispensable role in the process of moving up the global value chains. On the one hand, the Chinese government needs to understand that the structural reforms will be mainly driven by market forces and the competition within the private sector. It will need to provide necessary and effective market regulations during the transformation process, but not interferences. On the

other hand, the Chinese government will need to build a human capital and technology base that can facilitate the industrial transformation to high value-added sectors. The following section will discuss three of the most critical areas that China needs to improve to move forward.

1) Improving the Education System

The importance of education cannot be overemphasized in any development strategy. It helps restructure the factor endowments and shift the comparative advantage from low cost and labor-intensive to high technology and capital-intensive. Human capital formation needs to be a strategic priority for the Chinese government to facilitate structural reforms and industrial upgrading. The chart below (Figure 10) shows the average years of education of citizens over the age of 15 in Peru, Brazil, Mexico, Venezuela, China, Hong Kong, Japan, and Korea. Korea demonstrates the most impressive improvement in its education system; the average schooling years in Korea have been more than doubled in the last five decades. Despite starting from similar levels of average education in 1960, Latin America and Korea show a substantial disparity in the length of average schooling over the subsequent four decades. According to the chart, an average total schooling of 10 years seems to be the watershed between the high-income level and the middle-income status. More importantly, the chart demonstrates a positive correlative between the income status of a country and the average education level of its citizens. Although the average total schooling years in China had increased rapidly in the past five decades, it still hovered around 8 years in 2010, which was below the average education level in Mexico and Peru.

Figure 10: Average Years of Total Schooling
Age: +15 Unit: Number Year: 1960-2010

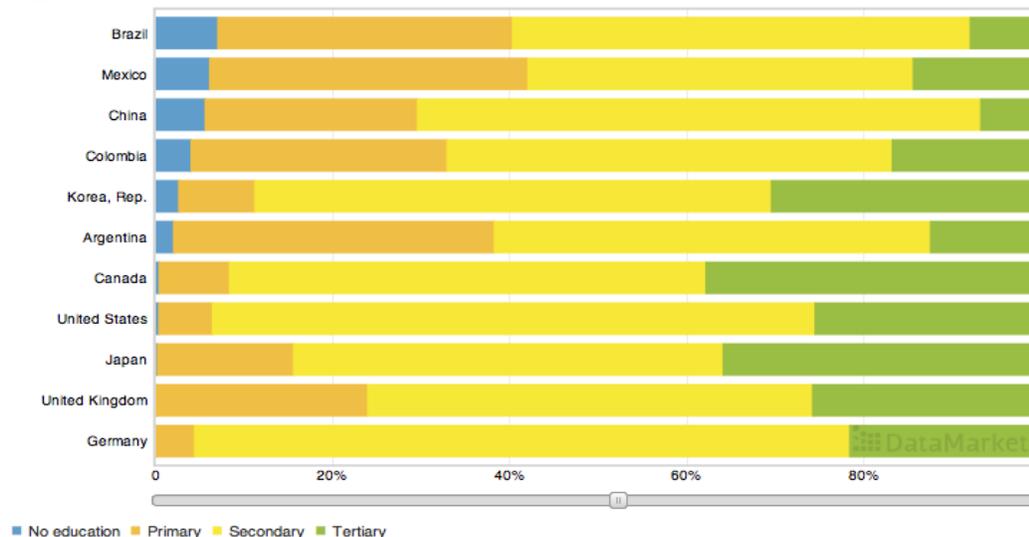


Sources: World Bank and Barro-Lee Education Attainment dataset

In order to avoid the middle-income trap experienced by Mexico and Peru, China needs to learn from Korea and to improve its education system. The chart below (Figure 11) demonstrates the population of each country at different education levels. Based on the chart, almost no illiteracy exists in high-income economies, like Germany and the United Kingdom. Although a noticeable level of illiteracy appears in Korea, almost one third of its population receives tertiary or higher education. Two common characteristics shared by the advanced economies: almost no or minimal illiteracy and high prevalence of tertiary or higher education. Since 1986, Mainland China has adopted the nine-year compulsory education system in order to universalize primary education, which in turn facilitated the initial export diversification into light manufacturing of the country. However, as the country moves up the value chain to more capital-intensive sectors, the Chinese government needs to provide its people with an easy and efficient access to secondary education and extensive vocational schooling relevant to the development of new target sectors. Thus, the Chinese government must promote secondary education in the country. As the country moves towards more knowledge-intensive sectors, the

process will be accompanied by a strong focus on tertiary education probably with quotas and incentives for study in technology and science related areas. Currently, there is a similar percentage of illiterate people and of people who have received tertiary or higher education in China. Therefore, the Chinese government will need to incentivize its citizens to receive tertiary education to satisfy the increasing demand of highly educated employees from the high-value-added sectors and to fight illiteracy to increase the overall average education level in the country.

Figure 11: Population in Thousands by Education Levels
Age: +15 Unit: Percent Year: 2012



2) Increasing the Pace of Innovation

After the Industrial Revolution in England in the mid-10th century, painstaking researches and constant experiments became the primary driver of scientific discovery and technological innovation. With continuous investment in research and development, innovations and inventions became autogenous among the developed countries. As a result, the divergence between the developing and the developed economies began to emerge. China took advantage of the technology developed abroad at its early stage of development; as many segments in the

country approach the technology frontier and the contribution of capital to economic growth declines, China needs to increase the pace of innovation as a means of achieving sustainable growth. The table below lists the research and development expenditures as a percentage of GDP in Argentina, Chile, China, Korea, Mexico, Peru, Singapore, the United Kingdom and the United States. All the high-income countries spent more than 2 percent of GDP on research and development on average. In the case of Korea, it started to invest more than 3 percent of GDP on R&D since the early 21st century. It is not surprising to find that the R&D expenditure hovers around 0.5 percent for all the Latin American countries listed. In the case of Peru, investment in R&D is almost non-existent. China does invest more and more each year in R&D, but it is not enough if the country wants to sustain its economic growth and enter into high-income status.

To promote innovation in China is not just to increase national expenditures on R&D. The Chinese government needs to take more initiatives to build national research network and connect it with the global R&D network. It should pay more attention to innovative firms in the private sectors and encourage such firms to emphasize R&D and innovation by reducing tax on R&D spending and subsidizing new experiments.¹⁶ Without doubt, the focus on improving current education system will facilitate the process of promoting the national innovation system and generating innovative thoughts. The Chinese government needs to put in place an effective system bringing together firms, universities, and research institutions to adapt new knowledge to national needs.

In addition, the Chinese government must understand that competition will accelerate innovation. Protecting existing monopolies, favoring state-own enterprises (SOEs) and restricting market entry and exit will distort free competition in the country and slow down the

¹⁶ *China 2030 Building a Modern, Harmonious, and Creative High-Income Society*, World Bank, 2012.

innovation process. The Chinese government will play a supporting role in the industrial upgrading process and focus its facilitating policy on sectors with potential comparative advantages. That way, once the new sectors are established, they will be more likely to innovate within the industry and become competitive domestically and globally.

Research and Development Expenditure

Unit: % of GDP Year: 1996-2008

Year	Argentina	Chile	China	Korea, Rep.	Mexico	Peru	Singapore	United Kingdom	United States
1996	0.418	0.528	0.568	2.425	0.309		1.335	1.834	2.552
1997	0.42	0.492	0.645	2.481	0.344	0.082	1.427	1.766	2.576
1998	0.411	0.5	0.653	2.342	0.377	0.098	1.752	1.758	2.596
1999	0.453	0.508	0.757	2.252	0.429	0.096	1.846	1.823	2.64
2000	0.439	0.525	0.903	2.296	0.373	0.109	1.851	1.814	2.709
2001	0.425	0.525	0.951	2.473	0.394	0.107	2.057	1.79	2.719
2002	0.389	0.681	1.07	2.404	0.436	0.102	2.098	1.788	2.616
2003	0.41	0.668	1.134	2.486	0.396	0.104	2.048	1.746	2.613
2004	0.438	0.675	1.23	2.683	0.4	0.149	2.132	1.683	2.542
2005	0.461		1.325	2.792	0.412		2.195	1.729	2.568
2006	0.495		1.388	3.009	0.386		2.169	1.747	2.608
2007	0.508	0.327	1.396	3.21	0.37		2.372	1.779	2.667
2008	0.524	0.395	1.47	3.361			2.66	1.774	2.785
2009								1.869	
2010								1.824	

Sources: World Bank and United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics

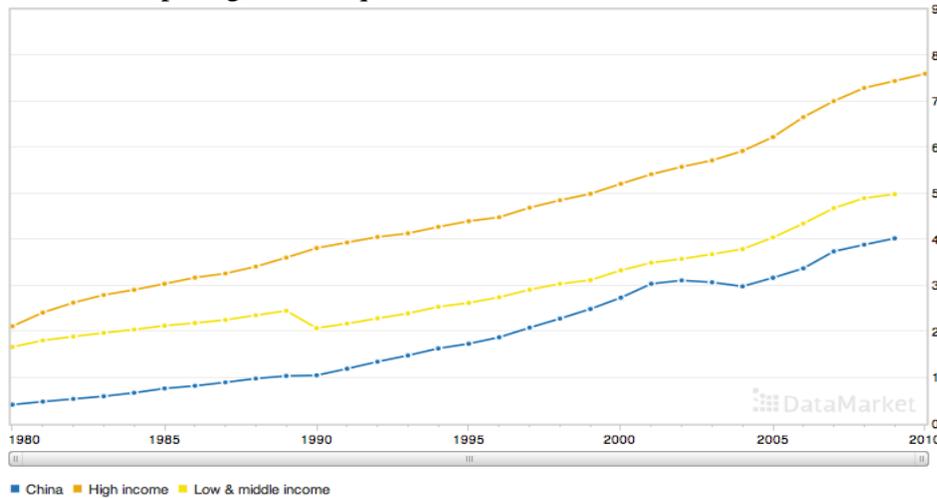
3) Emphasizing Green Development

The economic growth pattern of China is not environmentally sustainable to any extent; it is achieved through the exploitation of natural resources and some irreversible damages to the environment. According to the China 2030 report, “the costs of environmental degradation and resource depletion in China approached 10 percent of GDP over the past decade – air pollution account for 6.5 percent, water pollution 2.1 percent, and soil degradation 1.1 percent (China 2030). As China moves up the value chain, the country’s energy demand will continue to grow rapidly, because energy is an essential ingredient for any economic growth.

Chinese government needs to pay more attention to natural resource consumption, energy efficiency and environmental sustainability. The Chinese government should not consider the environmental responsibility a regulatory burden or an obstacle to achieve national economic targets. In fact, promoting green development and clean energy is in China's own self interest because of the three primary factors: the desire to sustain its economic growth, the possibility of attracting new businesses and the concern over the health and economic impacts of the pollutants.

The growth pattern of China's economy is particularly intensive in energy and natural resource use. Although some actions were taken to reduce energy intensity in various sectors, rapid national growth, increasing urbanization and constant structural changes within manufacturing have combined to make China the world's largest energy user, surpassing the United States in 2010. If China kept the same growth pattern, energy deficiency might impose a severe obstacle on its growth in the near future. Now China is one of the least efficient energy users in the world; the Chinese government needs to focus on energy efficiency management in order to avoid any future energy crisis. Figure 9 plots GDP of per kg use of oil from 1980 to 2010. According to the graph, China's energy efficiency is substantially less than the average in low- and middle-income countries and is about half of that in high-income economies. It is painfully obvious that China still has a long way to go if the country wants to join the group of high-income levels.

Figure 9: GDP per Unit of Energy Use
Unit: PPP \$ per kg of Oil Equivalent Year: 1980-2010



To reduce energy inefficiency, the Chinese government can use market incentives, such as tradable quotas, in the private sector and employ more strict regulation, such as pollution penalty, to enforce its national environmental and emission targets. Through implementing stringent and effective environmental laws, the government will not only reduce energy inefficiency among Chinese corporations, but also raise green awareness among its citizens. Starting its green development now is the only way to secure the foundation of the future economic growth in the country. In addition, green development will create job opportunities, attract new businesses and bring potential economic benefits to China. The development and expansion of emerging green sectors, such as clear energy and electric cars, can become a new driver for the future growth and employment. Another incentive for the Chinese government to promote green development in China is the detrimental effects of environmental pollution, which causes irreversible damages to its citizens, its economy and its international standing. Alarmingly high pollution levels have shrouded Beijing in smog many times since the beginning of 2013. Flights and trains were canceled, more than one hundred factories were temporarily shut down,

and residents were warned to stay indoors. The air pollution in Beijing caused immeasurable economic and social welfare loss for China not just in the short term, but more importantly in the long run; it will gradually force much talent to move, discourage foreign investors and undermine the international reputation of China. Improving the education system and increasing the pace of innovation will facilitate the Chinese government to manage natural resource and energy use to achieve environmental sustainability. The education system can help raise public awareness and the national innovation system will accelerate the development of emerging green industries.

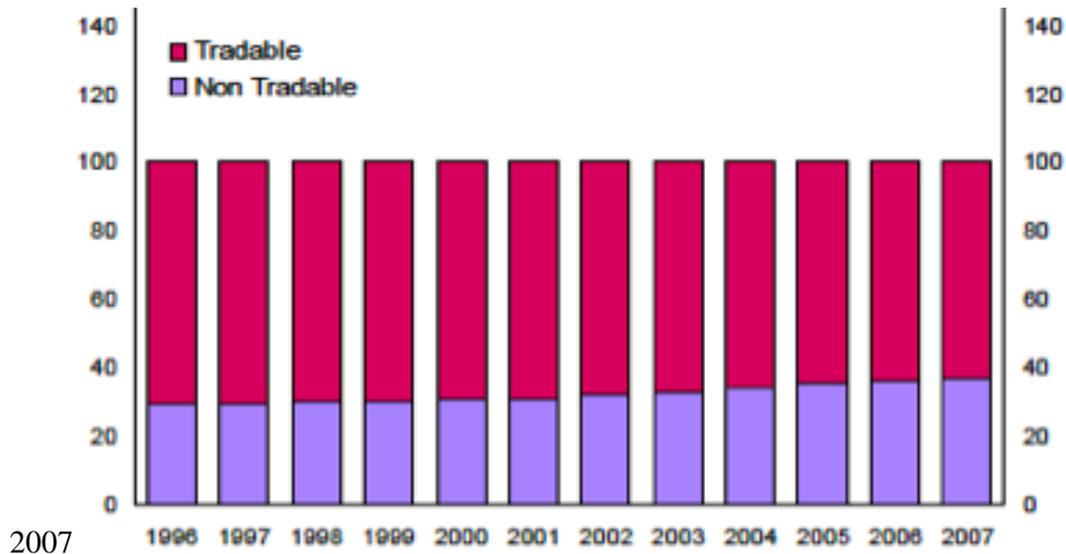
The coherence of general framework conditions will allow China to receive more benefits from the trade-driven growth strategy and to develop a more skilled and integrated economy. Here we only discuss three of the framework conditions – education policy, innovation system and green development - that will help China move up the value chain, there are many more other important factors. Some of the challenges the Chinese government will face are the following: further strengthening its fiscal system so that the country will be more prepared to meet any domestic and global economic shocks in the future; ensuring adequate levels of public goods and services at prices that encourage efficient use in its rapidly growing urban areas; deepening the financial system to satisfy the funding needs from new sectors and the expansion plans of existing ones; building an advanced infrastructure networks to facilitate its domestic industrial upgrading and to attract foreign investments; improving its social security system to increase labor mobility and allow flexibility in its labor market so that people can always move to places where the best jobs are offered.

I. Looking Forward

As China moves up to more technology-based and capital-driven sectors, the jobs currently created by labor-intensive manufacturing will drop significantly. Given the prospect of decreasing employment rate in the tradable sector, more jobs need to be created in the non-tradable sector in China. As shown in Figure 12, during the period 1996 – 2007, the employment share in the non-tradable sectors rapidly increased from 30 percent to 36 percent. In an advanced economy, 60-70% of the economy generally goes to non-tradable sectors. As shown in the Figure 12, China is facing the opposite situation – 60% of the employment belongs to the tradable sectors. Given the size of China's economy and the enormous potential of its domestic market, more employment growth is expected in the non-tradable sectors. As discussed before, the Chinese government will need to play a facilitating role as the country moves up the value chain. It will need to advance its education system, enhance its legal framework, strengthen its infrastructure networks, and improve its social welfare, all of which will inevitably create jobs in the non-tradable sectors. The truth is that the process of moving up the value global value chain and the creation of jobs in the non-tradable sectors will be concurrent, complementary and codependent. In addition, as the employment share increases, the productivity growth in the non-tradable sectors will become another growth driver for China's economy in the future.

Figure 12: Employment Share of Tradable and Non-tradable Sectors in China

Year: 1996 –



Source: CEIC database and IMF staff estimates.

J. Conclusion

China's economic performance since its opening to the global economy is extraordinary. As the country reaches upper-middle-income status, many challenges start to emerge. The old comparative advantage in low-cost labor, which brought the country to its current economic position, is disappearing. The productivity gains from labor force reallocation and technology catch-up are almost exhausted. China is at a critical point where a new development strategy is needed to sustain its economic growth. In addition, China's increasing global importance further complicates the situation. As the second largest economy in the world, any reforms China needs to undertake now will have far-reaching effects on the global economic prosperity and the international political harmony. Moving up the global value chains will be a great start for China

to upgrade its tradable sector and move to high-income status. At the same time, the Chinese government will need to facilitate and regulate the transformation process, which includes enhancing its non-tradable sector to balance the possible employment loss from the upgrading in its tradable sector. Ideally, the process of upgrading its tradable sector and the advancement of its non-tradable sector will facilitate and complete each other.

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