

## PRODUCTIVITY IN CHINA: PAST SUCCESS AND FUTURE CHALLENGES

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*The present paper discusses total factor productivity (TFP) in China, including its past success, the current slowdown, and the potential for future growth. It begins by documenting the development of TFP growth over the past three and a half decades, its driving forces and its contribution to the economic growth of the country. It then analyses the reasons for the current slowdown of TFP and economic growth, addresses the institutional imperfections that hinder growth, and explains the government policies and strategies aimed at fostering TFP. Next, it explores the potential for TFP growth from the perspective of institutional reform, investment in research and development and human capital. The paper concludes that although the resources of the past successful TFP have decreased or diminished, further institutional reform, increasing investment in research and development and human capital, and strategies promoting indigenous innovation will become new engines for future TFP growth in China. As the country's TFP is still at a low level compared with advanced economies, there is large scope for China to maintain relatively high TFP growth, although uncertainty and risk are associated with this process.*

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*Keywords:* China's total factor productivity (TFP), institutional reform, indigenous innovation, new normal, strategies for fostering TFP, potential TFP growth.

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### I. INTRODUCTION

During the past three and a half decades, China has achieved unprecedented economic growth, with an average annual gross domestic product (GDP) growth rate of 9.3 per cent over the period 1978-2014. At that rate, real GDP doubles every seven years. The real per capita GDP of China rose from only 5.5 per cent of the level of the United States of America to about 25 per cent in 2014. In 2014 the per capita GDP reached about \$7,584 (current price), or \$12,608 international dollars (2011-year purchasing power parity (PPP) constant price, World Development Indicators), which is about 31 per cent of the level of high-income OECD countries. As a result, China has transformed from being one of the poorest agricultural countries in the late 1970s to the second largest economy in the world, accounting for 16.6 per cent of global GDP in 2014 (PPP current price, World Bank Indicators). China and other emerging markets now represent the majority of the growth of global demand, and have become major engines for economic growth.

However, economic growth in China has shown a declining trend since the global financial crisis in 2008, especially after 2011 (figure 1), and is still subject to downward pressure, which is likely to continue in the next couple of years, according to projections made by the International Monetary Fund (IMF) and other forecasts.

**Figure 1. The growth rate of real gross domestic product, 1990-2015**



Source: WIND Database.

GDP growth decreased to 7.3 per cent in 2014, and 6.9 per cent in the first three quarters of 2015, which is lower than the average for the last three decades, and the lowest level since 2000. The Government of China has stated that the economy has entered a state of “new normal”, meaning that the gear of growth has shifted down from high to medium-to-high speed.

The growth deceleration is caused by both cyclical and secular factors. In response to the global financial crisis in 2008, China launched a very large stimulus package to promote growth through extensive investments, which led to a significant increase in bank loans and fixed asset investment in 2009 and 2010 (Wong, 2011). As bank loans have mainly flowed into State-owned enterprises or the real estate sector, the distortion of capital allocation and the overcapacity problem already existing in most industrial sectors have deteriorated. Domestic and international demand have slowed, resulting in a significant increase in companies' debt leverage rate and loans held by banks, which has led to a decline in fixed asset investment growth, from 33.2 per cent in 2009 to 14.7 per cent in 2014 (WIND Database). This has been the main factor in the short run behind the slowdown in GDP growth in recent years. Meanwhile, the sluggish world economy and international trade have also exerted significant negative impacts on the country's exports and economic growth in the short run.

The debate on whether rapid growth in China is sustainable has been ongoing for several years. One major argument for the non-sustainability of that high growth is built on the belief that it is driven by extensive investment; hence, it has been achieved through heavy dependence on capital-deepening and exports and not through increased productivity. This is indicated by the large share of capital formation in GDP, which increased significantly after the financial crisis in 2008 and the subsequent stimulus policy.

Another argument is related to the so-called middle-income trap. International experience suggests that, when a country's per capita GDP reaches the threshold of about \$15,000, or \$11,000 in year 2005 PPP dollars, high growth begins to slow (Chen, Jefferson and Zhang, 2011; Eichengreen, Park and Shin, 2014). If the economy reaches such a middle-level income and stays at that level, it is said to have fallen into the middle-income trap. As the per capita GDP of China is already very close to the first threshold (about \$11,000 PPP constant price in 2005, World Bank Indicators), the question of whether the Chinese economy can avoid the middle-income trap and advance to becoming a high-income economy has become a hot topic in academic discourse and policy discussions.

The driving forces for rapid economic growth in China over the last three decades can be attributed to the demographic dividend, resource reallocation from low to high efficient sectors, and the increase in labour productivity, which can be decomposed as TFP and the capital/output ratio (Aoki, 2015). The ratio of the population aged 15 to 65 years to total population began to decrease in 2010 after rising steadily in the preceding years, which means that the demographic dividend is also declining. With the diminishing demographic dividend, capital returns will reduce and the contribution from the improved capital/output ratio will decrease. Thus, TFP growth will play a crucial role in economic growth (Aoki, 2015; Cai, 2013). Empirical evidence shows that TFP growth has made important contributions to the spectacular growth of the country over the past three decades (Perkins and Rawski, 2008; Brandt and Zhu, 2010; Zhu, 2012; Feenstra, Inklaar and Timmer, 2015). According to the Penn World Table 8.1 (Feenstra, Inklaar and Timmer, 2015), over the period 1978-2011 China enjoyed an average growth rate of TFP of about 3.5 per cent per year, accounting for about 40 per cent of GDP growth. Studies using aggregate data combining TFP information from both agricultural and non-agricultural sectors typically find that TFP growth contributes approximately half of a country's labour productivity growth (Perkins and Rawski, 2008).

As rapid gains in productivity have contributed a large proportion to economic growth, China needs to focus on how to promote further productivity growth, as it strives to achieve middle-to-high speed growth and attain growth targets in the future.

According to the proposal of the thirteenth five-year plan (2016-2020), China will reach the status of a moderately prosperous society by 2020, when the per capita income will be double of that in 2010. To achieve this target, the Government of China has set economic growth as the priority, and is determined to transform the nature of that growth from relying on investment and exports to being driven more by domestic demand and innovation. A series of policies and measures have been adopted to foster the institutional reform and indigenous innovation, which will bring new engines for economic and TFP growth. However, at the same time, uncertainty and risk can be associated with this process.

In the present paper, TFP of China, its development and role in economic growth, and the sources behind it during the past three and a half decades are discussed. The prospects for the country's potential growth are also examined. More specifically, the author of the paper:

- Analyse the contribution of and driving forces behind the rapid TFP growth in the past few decades;
- Explain the reasons for the current slowdown of TFP and economic growth;

- Discuss the current institutional imperfections hindering TFP growth;
- Introduce the policies and strategies adopted by the Government to foster TFP growth;
- Discuss the challenges and uncertainty for the policy implementation;
- Analyse the potential for future TFP growth and its new engines.

The remainder of the paper is arranged as follows. Section II reviews the development of TFP growth in China, and its contribution to the economic growth in recent decades. Section III analyses the driving forces behind the high TFP growth. Section IV discusses the institutional imperfections and potential new engines for future TFP growth. Section V introduces the policies and strategies adopted by the Government of China to promote TFP growth. Section VI discusses the prospects for TFP growth in the future. Section VII contains a summary of the paper.

## **II. THE HIGH TOTAL FACTOR PRODUCTIVITY GROWTH IN RECENT DECADES**

### **Estimation of the total factor productivity growth**

Estimation of productivity growth in China has been a hot topic in both theoretical and empirical research. Most investigations find that during the last three decades, the country's average TFP growth has been about 3 to 4 per cent per year, and has contributed significantly to GDP growth (Young, 2003; Perkins and Rawski, 2008; Zheng, Bigsten and Hu, 2009; Brandt and Zhu, 2010; Zhu, 2012; Feenstra, Inklaar and Timmer, 2015). Brandt and Zhu (2010) and Zhu (2012) conducted a standard growth accounting exercise that decomposes the sources of growth into capital deepening, labour deepening and productivity growth. They conclude that the average growth of TFP during the period 1978-2007 was 3.2 per cent, which is similar to estimate given in other researches, and that TFP growth contributed about 77.7 per cent of the per capita GDP growth (Zhu, 2012). In contrast, the capital-to-output ratio, namely capital deepening, contributed only 0.51 per cent. In fact, during this period, the capital-to-output ratio barely increased. This finding provides evidence that the main factor behind the country's rapid economic growth is TFP growth, not investment.

Using the same method as Zhu (2012) but extending the sample to 2011, Liu (2015) finds that the growth of TFP significantly decreased after 2008, while the share of capital deepening to growth of GDP increased. The estimation based on the Penn World Table 8.1 (Feenstra, Inklaar and Timmer, 2015) yields similar results.

### **Total factor productivity growth in agriculture, State, non-State owned and service sectors**

The TFP performance of China varies across individual sectors and during different periods. For the period 1978-2007, the average annual growth rates of TFP in the agricultural and non-agricultural non-State sectors were 4.01 and 3.91 per cent, respectively (Zhu, 2012). In contrast, the annual TFP growth in the State-controlled sector was only 1.68 per cent. The non-agricultural State-owned sectors experienced the lowest TFP growth, especially before reform of State-owned enterprises started in 1993. During the first two decades of reform during the periods 1978-1988 and 1988-1998, the TFP growth for the non-agricultural State-controlled sectors was only -0.36 and 0.27 per cent a year, respectively. However, during the period 1998-2007, it increased to 5.50 per cent a year (Zhu, 2012).

Because of a lack of sufficient competition in the non-tradable service sectors, particularly in those areas in which large State-owned firms dominate the market, productivity growth has been notably lower than that in the tradable sectors (Holz, 2006; He and others, 2014). According to the estimation of He and others (2014), TFP growth of the tradable sector was 4.9 per cent for the period 2001-2010, 5.7 per cent for 2001-2005, and 4.2 per cent for 2006-2010, but that of the non-tradable sectors for the corresponding periods was 2.4 per cent, 3.3 per cent and 1.4 per cent, respectively. Within the non-tradable sectors, great intrasector heterogeneity exists (Holz, 2006; He and others, 2014). Holz (2006) finds that education had the highest TFP growth during the period 1979-2002, while financial services had the lowest. In addition, productivity growth differentials between the tradable and non-tradable sectors in China have been much higher than those in developed economies (He and others, 2014). The lower productivity growth in the non-tradable sectors can be largely attributed to overregulation, barriers to entry and low levels of competition. Some service sectors, such as education, health care, banking, insurance, legal services and telecommunications, are still dominated by the State-controlled enterprises. These enterprises are subject to overregulation, which not only deters entry by overseas investors, but it also restricts competition among domestic participants. The strict regulation on entry into the service market has lowered competition pressure and contributed to low productivity growth. Opening up the service sector to private and foreign investors is crucial to foster productivity in the future.

### **III. DRIVING FORCES OF GROWTH IN TOTAL FACTOR PRODUCTIVITY IN RECENT DECADES**

#### **Reallocation of resources**

The reallocation of resources has played an important role in the rapid growth of TFP. The reallocation is seen predominantly in two directions: from the agricultural sector to the non-agricultural sector, and from the State-owned sector to the non-State owned sector.

During the first two decades, after the start of the country's economic reforms in 1978, TFP growth in agriculture increased rapidly, driven largely by institutional reforms and technological progress. The reallocation of labour from the agricultural sector to the non-agricultural sector facilitated TFP growth of the whole economy.

Before the agricultural reform began, the agricultural sector was characterized by a "collective farming system", under which farmers' incomes were not related to their efforts; hence there was no incentive to work hard. As a result, productivity in the agricultural sector was very low, and China experienced recurring food crises. In 1979, the "household responsibility system" was adopted. Under this system, farmers were responsible for their own output, and their incomes were directly dependent on their efforts. Meanwhile, the government gradually increased official prices for grain. Farmers were allowed to sell grain at market prices, only after they had sold a fixed quota to the government at official prices. These institutional and price reforms generated strong incentives for farmers to work harder, and consequently, resulted in a significant increase in agricultural output and farmers' incomes.

Starting in about 1990, the agricultural markets were gradually liberalized. Farmers were able to make their own decisions on their input choices with less intervention from the Government and fewer restrictions. The liberalization of the agricultural markets fostered the adoption of new technologies by farmers, such that, after 1990, most of the growth in agriculture's TFP came from technological progress (Jin and others, 2010).

According to the estimation of Zhu (2012), TFP growth in the agricultural sector during the periods 1978-1997 and 1998-2007 was 5.1 and 3.1 per cent, respectively. The rapid TFP growth not only led to a substantial increase in grain production, which after several years of reform was sufficient to solve the food deficit problem, but also made it possible to reallocate employment from the agricultural to the non-agricultural sector. As labour productivity in the non-agricultural sector is more than five times higher than that in agriculture, this reallocation of workers has been the most important source of aggregate productivity growth.

Before they were reformed, State-owned enterprises dominated all industries. The prices of raw materials and products of those enterprises were determined by the government's plan rather than by the market. The Government kept the profits and were responsible for the losses.

The State-owned enterprise reform began with the introduction of the dual-track price system (Zhu, 2012). Under this system, State-owned enterprises must sell a quota of products at official prices, and then could sell products beyond that quota at market prices, which were usually higher than the official ones. Moreover, those enterprises were allowed to keep part of their profits. The quotas were gradually reduced and eventually eliminated. By the mid-1990s, most products were being sold at market prices. This price system reform not only generated strong incentives for State-owned enterprises to increase productivity, but it also enabled them to access goods and capital from the markets.

Before the second round of State-owned enterprise reform started in 1997, the Government would often asked State-owned banks to bail out loss-making State-owned enterprises to avoid laying off workers or shutting down factories, in order to maintain social and political stability. After 1997, the loss-making State-owned enterprises were allowed to be restructured through bankruptcy or privatization through management buyouts (Zhu, 2012). The previous restrictions preventing the entry of non-State owned firms were gradually eliminated, thus introducing competition, with a consequent improvement in productivity.

As non-State enterprises continue to outperform the State-owned sector, the reallocation of labour and capital from the State to the non-State sector has contributed a large proportion to the growth of TFP, especially before the start of the reform of the State-owned enterprises in 1993. According to the estimation of Brandt and Zhu (2010), from 1988 to 1998, the average annual growth rate of TFP in the State sector was only 0.27 per cent, while the comparable growth rate in the non-State sector was 2.17 per cent. From 1998 to 2005, a more efficient allocation of capital and labour, mainly from State-owned to non-state firms, contributed about two percentage points per year to the aggregate TFP (Jefferson, Rawski and Zhang, 2008; Hsieh and Klenow, 2009).

Since the beginning of the millennium, when the Government of China launched reforms by merging, privatizing and restructuring the remaining State-owned enterprises, the productivity of such enterprises has significantly improved. According to the estimation of Zhu (2012), the TFP growth of State-owned enterprises in non-agricultural sectors increased from 0.27 per cent during period 1988-1998 to 5.5 per cent during the he period 1998-2007.



## **Institutional reforms of trade, investment and migration**

According to the estimation of Tombe and Zhu (2015), reductions in transaction and migration costs were among the main factors supporting aggregate labour productivity growth in China from 2000 to 2005. As the trade cost in China is still high, for example, 40 per cent higher than that in Canada, there is still large scope for further reductions in costs associated with trade and migration, and for promoting increased productivity.

In order to enter the World Trade Organization (WTO) in 2001, the Government of China cut tariffs, broadened trade rights and liberalized its regime for foreign direct investment (Branstetter and Lardy, 2008). Between 1998 and 2007, the share of total urban employment in domestic private enterprises and foreign-invested enterprises increased from 8 to 24 per cent. As foreign-invested enterprises in general have higher than average productivity (Hsieh and Klenow, 2009; Song, Storesletten and Zilibotti, 2011), the policy of opening up the economy and trade liberalization has played an important role in boosting productivity.

Domestic trade reform has led to a reduction in internal trade and migration costs, which, in turn, has resulted in a reduction in the misallocation of labour and the promotion of TFP growth. Local protectionism had been one of the factors contributing to the high domestic trade cost. Local governments had strong incentives to protect their tax base and local State-owned enterprises by preventing interregional competition (Bai and others, 2004). This continued unchecked in the early years of economic reform until 2001, when the Government issued a directive to prohibit local government from engaging in efforts to protect the local markets. Before China entered WTO, some industries in the domestic trade sectors, such as transportation and logistics, were dominated by the State-owned enterprises, and barriers to entry for non-State sectors, especially foreign investors, were prevalent. After its entry into WTO, the barriers were gradually removed and non-State enterprises began to enter the domestic trade sectors, which led to a significant reduction in costs and improved productivity.

To summarize, the sources of TFP growth can mostly be attributed to the institutional reforms that allowed labour and capital to be reallocated from low- to high-efficient sectors, such as from agricultural and the State sectors to the non-agricultural and non-State sectors. Liberalization of domestic and external trade, resulting from economic reforms and the opening-up strategy, reduced trade and migration costs and has been another significant source of the rapid TFP growth. Similar to other developing countries, China has benefited from the catch-up advantage by importing advanced technology from industrialized countries, rather than having to pioneer new technologies.

## IV. NEW ENGINES FOR TOTAL FACTOR PRODUCTIVITY GROWTH

### Economic structural changes and total factor productivity growth

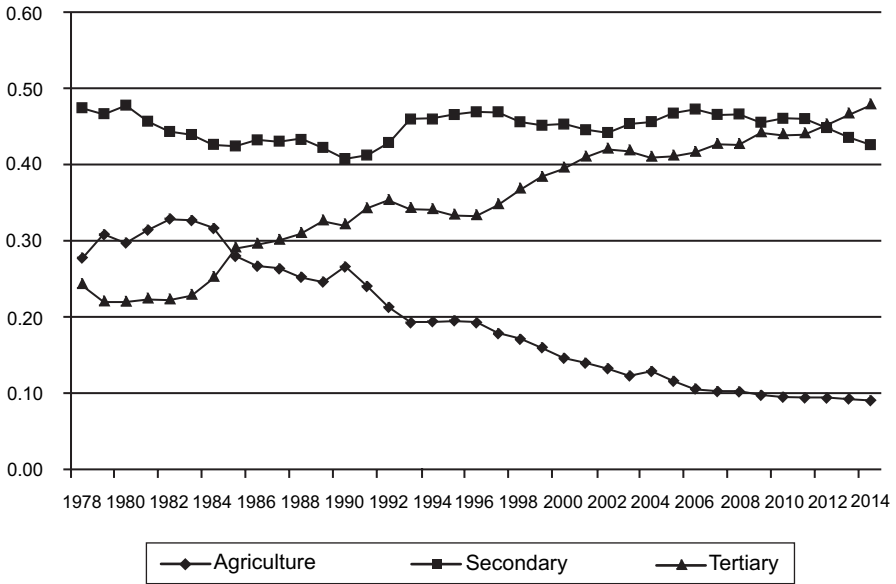
During the period of rapid economic growth, the economic structure of China underwent fundamental changes. Some of the factors that had driven the growth of TFP during the past few decades are less or no longer significant to the overall growth process.

First, in 2012, the output share of the service sector in GDP grew from 32.4 per cent to 48.1 per cent and surpassed that of secondary industry. For a long period, the development of the country's service sector had lagged far behind, and its GDP share had been less than that of secondary industry. Internationally, it was much smaller than not only the average share of industrial countries, but also the world average. Therefore, the increase in the GDP share of the service sector can be regarded as a positive sign of the structural improvement fostered by government policies. With the increase in household's income, the country's consumption pattern is transforming from the consumption of more physical products to using more services. As reallocating resources from a productive export-oriented industry to a highly unproductive services industry could cause a permanent decline in the economy's productivity (Lee and McKibbin, 2014), the structural change will exert downward pressure on TFP growth.

Second, output of and employment within the agricultural and State-owned sectors have decreased steadily. From 1990 to 2014, the share of agricultural output in GDP declined from 26.7 per cent to 9.2 per cent, although it has remained constant in recent years (figure 2). Since the early 1990s, when the reform of State-owned firms was launched, the share of the State sector in urban employment has steadily declined, from 61 per cent in 1990 to 16 per cent in 2014. The employment share of the agricultural sector declined from 70.5 per cent in 1990 to 29.5 per cent in 2014 (figure 3). Employment shares of secondary and tertiary industries, however, are on the rise. In 1995 the employment share of the tertiary sector surpassed that of secondary industry. In 2014 the employment shares of secondary and tertiary industries were 29.9 per cent and 40.6 per cent, respectively.

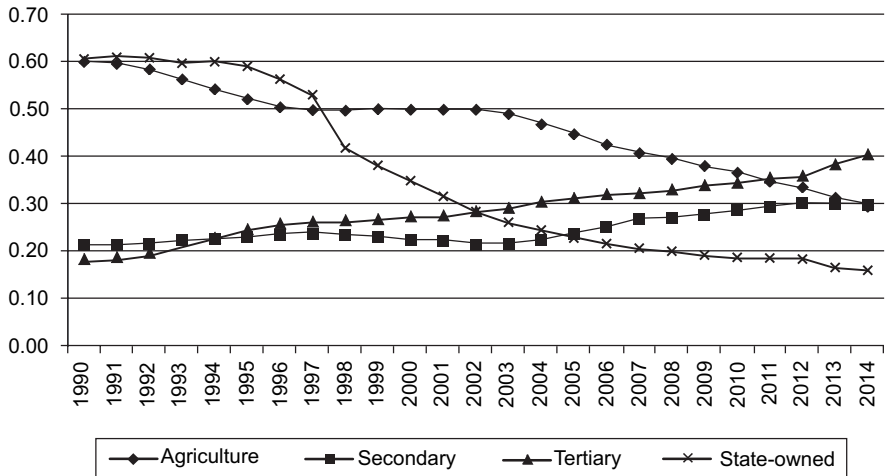
Figure 4 shows the relative labour productivity of agricultural and tertiary industries to that of secondary industry (calculated as labour productivity of agricultural/tertiary divided by that of the secondary sector). The outcome indicates that labour productivity of the agricultural sector is much lower than that of secondary and tertiary industries. Before 2000 the ratios increased significantly, but afterward, they become more or less constant. This may be because, prior to 2000, labour

**Figure 2. Output shares of agricultural, secondary and tertiary sectors in gross domestic product**



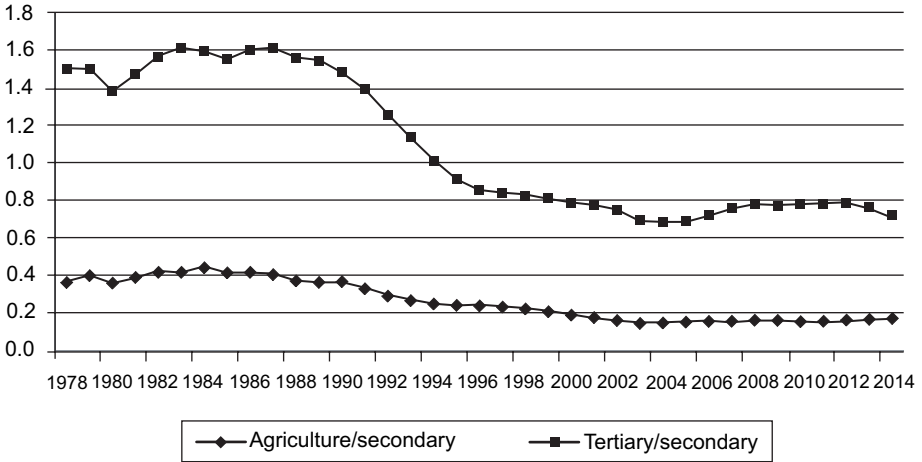
Source: WIND Database.

**Figure 3. Employment shares of agricultural, secondary, tertiary and State-owned sectors**



Source: WIND Database.

**Figure 4. Ratio of labour productivity: agricultural/secondary and tertiary/secondary sectors**



Source: WIND Database.

productivity in the industrial sector was growing more rapidly than in the agricultural and tertiary sectors whereas since 2000 growth has been at almost the same pace.

As the GDP shares of output and employment in the agriculture and State sectors have declined, labour and capital reallocation from those sectors, which has been one of the main driving forces of TFP in the last three decades, will become smaller.

Third, as China approaches the technological frontiers, the catch-up advantage will be smaller and its TFP and economic growth will be more dependent on indigenous innovations.

Given that the reallocation from the agriculture and State sectors has slowed or even dried up in recent years, and the technological gap between China and industrial countries in terms of advanced and cutting-edge technology has narrowed, additional driving forces for productivity growth must be identified and promoted.

**Institutional reform and new engines**

Although some of the factors that supported TFP growth in the last few decades have decreased or diminished, there is still scope to foster the growth of TFP by means of further institutional reform and liberalization efforts.

For example, the current household residential registration or *hukou* system serves as an obstacle to labour mobility and reallocation, and needs to be reformed. Even though more than 50 per cent of the population live in cities, only about 40 per cent of them have *hukou* status for the cities in which they live. Lack of *hukou* status means the migrants cannot get access to some public services, such as children's education, health care and social security, and are usually in an unfavourable position when applying for jobs or involved in wage bargaining. This has impeded labour mobility and increased the costs of labour reallocation. Further reform of the *hukou* system aimed at granting migrants better access to public services is expected to promote labour reallocation and aggregate productivity.

The weak performance of State firms remains another significant obstacle to economic growth. Despite the extensive effort to reform State-owned enterprises, which began in 1998, some sectors, such as energy, transportation, telecommunications and the banking, are still monopolized by State firms. In addition, State-owned enterprises remain active in a wide range of non-strategic sectors, ranging from textiles and papermaking to catering (Du, Liu and Zhou, 2014). Over the past 10 years, reforms of State-owned enterprises have stagnated and, under weak corporate governance, they are increasingly inefficient and unprofitable, with generally lower productivity than non-State firms. Further reform of State-owned enterprises will improve productivity.

The service sector, especially the financial sector, is still protected by barriers to prevent the entry of private or foreign firms. The banking sector is largely State-controlled, and bank loans disproportionately favour State-owned enterprises at the expense of more productive private firms (Liu, 2015). Song, Storesletten and Zilibotti (2011) find evidence that financial imperfection is a big obstacle to reforming State-owned enterprises and TFP growth. Because banks are State-dominated and tend to be supportive of the State-owned enterprises, private small and medium-sized enterprises, which are often more productive than the ones that are State owned, have a more difficult time accessing banking credit; State-owned enterprises with low productivity can survive by means of preferential access to cheap credit. This distortion in the credit allocation stifles competition and innovation from the private sector (both domestic and foreign) and encourages inefficient allocation of resources, overinvestment, and overcapacity in industrial production (Chen, Jefferson and Zhang, 2011; Song, Storesletten and Zilibotti, 2011).

In addition, overregulation and barriers to entry are the main obstacles impeding TFP growth in the service sector. If the restrictions were to be lifted and discrimination removed, this would open up a great opportunity to foster productivity in that sector.

While these potential efficiency gains are substantial, in order for them to be realized, many obstacles must first be eliminated.

## V. POLICIES AND STRATEGIES TO FOSTER THE TOTAL FACTOR PRODUCTIVITY GROWTH

### Government policies and strategies

The Government of China has stated its target for economic growth by 2020 is to double the per capita GDP as compared with the 2010 figure. To reach this target, the average annual growth rate per year during the period 2016-2020 must be at least 6.7 per cent. Given that the country's economic growth is currently trending lower, it will be difficult for the Government to keep economic growth at such a relatively high rate. Therefore, measures need to be taken to foster productivity and economic growth.

As capital returns are decreasing because of the ageing demographic structure and the diminishing demographic dividend (Cai, 2013), increased productivity will be more significant factor behind the economic growth in China, especially in terms of indigenous innovations. According to the official blueprint of the thirteenth Five Year Plan (2016-2020), issued in November 2015, the Government has pledged to take measures to promote better allocation of resources, including labour, capital, land and technology, and to transform the development pattern from being based on extensive investment to one that is more innovation-driven. Further reform of State-owned enterprises, the *hukou* system and fiscal and financial systems, as well as the liberalization of the service sector, boosting innovations, research and the Internet, are at the centre of the agenda.

To facilitate labour mobility and reallocation, the Government is determined to increase the urbanization ratio calculated based on the number of registered residents. It will do this through reform of the *hukou* system, which entails granting migrants greater access to public services in the cities where they work.

Another strategy to be implemented, "Internet Plus", is intended to encourage traditional industries to better integrate and upgrade their Internet capabilities. The Government has stated its intention to enhance investment in Internet infrastructure throughout the country.

The Government has also adopted measures to encourage people to start their own businesses and to be innovative. Some outdated regulations and restrictions, which prevent people from starting businesses, have been abolished. In addition,

people who start their own business are being supported by a series of favourable policies, such as preferential taxation, simplified approval procedures and easier access to financial support. To engage in pioneering work and make innovations are becoming popular ideas in China, in the society as a whole.

Measures have also been taken to encourage foreign direct investment. To support this effort, the Government is issuing a nationwide “negative list”, which clearly indicates sectors and businesses that deny access to foreign investment. This is intended to ensure the protection of foreign investors’ rights and better allocation of their funding. Meanwhile, China continues to promote the Belt and Road Initiative by enhancing cooperation with countries and regions along the route. In addition, some service industries, such as health care, education and telecommunications, which had been closed to foreign direct investment for many years, is being opened up in an orderly way.

Financial system reform will be the focal point over the next five years. The direction of the reforms is to establish a transparent, multitiered and sound functioning capital market. A multilevel and diverse banking system will be encouraged by allowing more private investment in the banking system. The Government is pushing forward a market-oriented exchange rate and interest rate formation mechanism, along with the internationalization of the Chinese renminbi. Other plans include the building of an inclusive financial system to give ordinary citizens access to financial services.

### **Challenges and uncertainties around the policy implementation**

To carry out the planned reforms, and to achieve economic growth, China is faced with extensive challenges and uncertainty.

First, the Government needs to balance the trade-off between short-run growth and structural transformation. Reform and structural transformation may cause economic growth to slow in the short run, and hence could be in conflict with the growth objective for the next five years. Given the current declining trend of economic growth, it may be difficult for the government to reach the growth target of doubling per capita income by 2020, while at the same time promoting structural transformation and institutional reform.

Second, the road map for this round of State-owned enterprise reform is still under discussion and remains unclear. “Mixed ownership” and “capital supervision” are the two key terms for this round of reform, which is intended to encourage private investors to take a controlling interest in State-owned enterprises, and allow employees to hold shares. By introducing mixed-ownership, the Government intends

to improve the governance structure of State-owned enterprises and better supervise the State assets.

There are many challenges in this process. For example, the central Government and local authorities could very well have different attitudes towards State-owned enterprise reforms. Under the current condition of deterioration of the local fiscal condition, the local authorities are particularly enthusiastic about the reforms, to rid themselves of liabilities caused by local State-owned enterprises that have experienced declining profits or losses. However, the central Government is more concerned with State-owned enterprises' social responsibility and the loss of State assets. The central Government's target for State-owned enterprises is to make State assets more vital and influential so as to play a more significant role in the reconstruction and upgrading of the economy, as well as in fulfilling firms' social responsibility. The inconsistent attitudes of local and central Government may lead to uncertainty and sluggishness in the State-owned enterprise reform.

Third, reform of the *hukou* system would lead to an increase in fiscal expenditure on the part of local authorities, which are entrusted with financing local public services, such as education and health care. Under current circumstances, this may be difficult. During the last decade, revenue from land sales has played an important role in local authorities' fiscal revenue. Given that, more recently, the revenue from land-related assets has decreased significantly as investment in real estate has slowed, reform of the *hukou* system will be a great challenge for the local authorities. Further reform of fiscal revenue reallocation between the central and local government is necessary.

## VI. PROSPECTS FOR FUTURE GROWTH OF TOTAL FACTOR PRODUCTIVITY IN CHINA

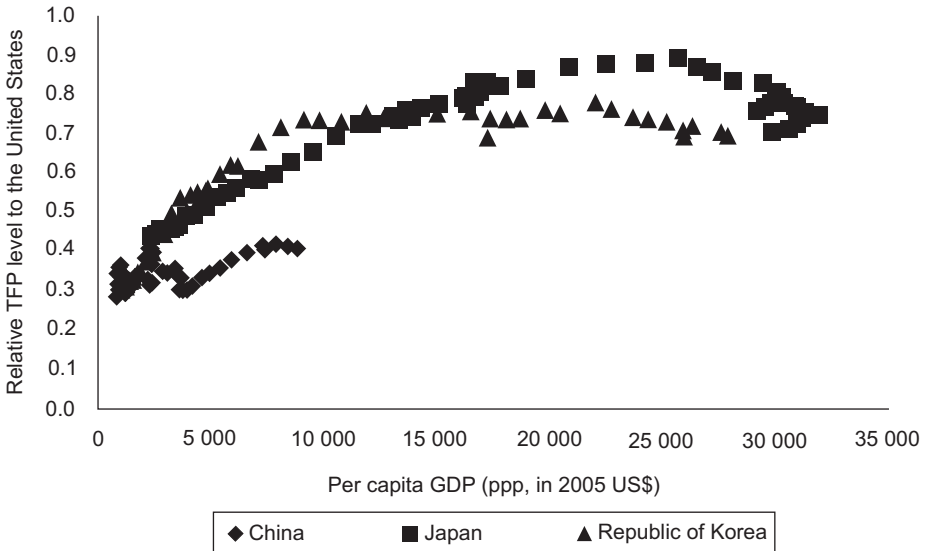
### Productivity in China remains at a relatively low level

In spite of the rapid TFP and economic growth during the last three and a half decades, because of the low starting point, the TFP and development level of China are, in general, still far behind those of the frontier and developed economies. Consequently, there is great scope for China to take advantage of catch-up effects.

Figure 5 shows the development of productivity and economic growth relative to the United States of America, Japan and the Republic of Korea. At the stage of catch-up, both Japan and the Republic of Korea experienced rapid TFP growth, which narrowed the gap between them and the United States. When TFP of Japan relative to the United States reached 83 per cent in 1975, and that of the Republic of Korea



**Figure 5. The correlation between per capita gross domestic product and the total factor productivity level relative to the United States: China, the Republic of Korea and Japan**



Source: Penn World Table 8.1 (Feenstra, Inklaar and Timmer, 2015).

reached 63 per cent in 1990, these economies began to experience slower growth of relative TFP and economic growth. According to Penn World Table 8.1 (Feenstra, Inklaar and Timmer, 2015), the ratios of per capita GDP and TFP of China relative to the United States increased from 5.5 and 30 per cent in 1978 to 20.7 and 40 per cent in 2011, respectively. If China mimics the experience of Japan or the Republic of Korea, its TFP will be at least 60 per cent of that of the United States before TFP growth declines significantly. Therefore, China still has large room to improve TFP by taking advantage of catch-up before relative productivity and economic growth starts to slow.

### Development of research and development and human capital

It is generally believed that technological innovation and human capital are the two key factors for TFP growth. Therefore, in this study, the prospects for future TFP growth through analysing the investment in research and development and human capital are formulated.

In early 2006, the Government of China promulgated the outline of National Medium- and Long-term Program for Science and Technology (2006-2020), in which one of the key indicators is that the gross expenditure on research and development will exceed 2.5 per cent of GDP, with the contribution rate of science and technology progress to economic development exceeding 60 per cent. In recent years, spending on research and development sourced from government and enterprises has increased. Rising labour costs and the overcapacity that is widespread in industry have forced enterprises to increase their investment in innovation and new technology. The ratio of research and development expenditure to GDP has increased steadily, to reach 2.5 per cent in 2015, which is above the EU-28 level (Boeing, Mueller and Sandner, 2016). In terms of volume of research and development, since 2013 China has held the number two position globally behind the United States, and the gap is still narrowing. Over the same period, policies have been issued aimed at strengthening the protection of intellectual property rights, with the objective to create a better institutional environment for innovation. Patent applications have surged in recent years, making China the leading country in annual patent application since 2011.

The general education level of Chinese people has increased steadily. During the period 1985-2012, the years of schooling of the national average labour force increased from 5.96 to 9.91, while for the urban counterpart, it increased from 8.14 to 10.98. The ratio of the population that has a college education to the total population increased from 10 per thousand in 2000 to 15 per thousand in 2015. During the period 1985-2012, rural human capital grew at an average annual rate of 2.91 per cent, while urban human capital grew 8.68 per cent annually (Li, 2015). The increasing urbanization rate and one-child policy have had positive effects on fostering the education level, because of the quantity-quality trade-off. Nevertheless, in spite of the significant improvement, the human capital per capita of China remains relatively small compared to that in developed countries (Li, 2015).

The Government is stressing the importance of high-level leading talents. A number of strategies have been implemented to encourage Chinese scientists and experts living and working overseas to return to China. In recent years, more and more students who have studied abroad have come back to China after graduation, with the growth rate of those returnees in the double digits. The return of students who have studied advanced technology, knowledge and ideas are expected to have a positive effect on narrowing the technology gap between China and the advanced economies.

The Government of China has announced that the economy has entered the stage of “new normal”, which means that growth will depend more on indigenous innovation and TFP growth. The future of TFP growth in China will, in turn, depend on indigenous technological innovation and institutional reform, especially the reform of State-owned enterprises, in order to promote the further reallocation of labour and capital from low to high efficient sectors, which has provided a model of successful experience in promoting TFP growth during recent decades.

## **VII. SUMMARY**

China has experienced unprecedented high TFP and economic growth in the last few decades. Institutional reform, the population dividend and the catch-up effect have played key roles. As the driving forces for the previous high TFP growth have now partially diminished or vanished, new engines are needed for future TFP and economic growth. China has entered the stage of “new normal”, which indicates that the economic and TFP growth will depend more on indigenous innovation. Under these circumstances, the Government of China has formulated strategies and taken measures to foster further institutional reform and strengthen the investment in research and development and human capital. If the reform strategies can be steadily pushed forward and carried out successfully, and if the problems and risks incurred can be tackled appropriately, the ongoing institutional reform may generate new engines for relatively high TFP and economic growth.

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