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Population dividend and economic growth in China, 1978–2018

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ABSTRACT

China witnessed important demographic transitions during the past 40 years. The significant decline in fertility rate, as a result of both policy change and economic factors, generated the so-called population dividends – rising proportion of working age population – during the past several decades. This paper demonstrates important channels through which broadly defined population dividends contribute to economic growth in China, by magnifying roles of capital, by improving labor quality, alongside increases in labor supply, and by strengthening labor mobility. As population aging now takes over from population dividends as the main demographic trend, it is possible for China to continue its strong growth by focusing on both the traditional growth factors, such as further reducing the proportion of agricultural workers, and new growth factors, such as further improving productivity by strengthening human capital and weakening institutional obstacles.

KEYWORDS

Demographic transition; population dividends; economic growth; China

JEL CLASSIFICATION

J13; J61; O110

1. How has the population dividend affected China's economic growth?

China's remarkable economic growth performance since 1978 has been accompanied by a dramatic demographic transition, highlighted by a rapid decline in fertility. On the one hand, China achieved a real growth rate of gross national income (GNI) of 9.6 percent over 1978–2015. On the other hand, according to UN (2015), China's total fertility rate (TFR) dropped from 2.5 to 3.0 in the late 1970s and early 1980s to a replacement level of 2.0 in the first half of the 1990s. The TFR has remained constant at about 1.5 since the second half of the 1990s.

However, the level of China's TFR has been a subject of controversy. Calculations directly based on various censuses and using 1 percent population sampling surveys show incredibly low TFRs. For example, it was 1.22 from the 2000 Census, 1.34 from the 2005 sampling survey, 1.19 from the 2010 Census (Guo, Wang, and Cai 2014, 21), and 1.05 from the 2015 sampling survey (NBS, 2016, 361). Even after data adjustment based on some assumptions of statistical error, most scholars conclude that China's TFR has consistently remained at 1.4, a level lower than what is published by the United Nations.¹ The TFR increased moderately only after two steps of policy relaxation – first, the government allowed couples with being an only child to have a second child, and second, it allowed all couples to have two children.

Nevertheless, it is undisputable that China's TFR has been significantly lower than replacement level for a quarter century. Before the level of the TFR eventually causes population aging, which is supposedly unfavorable for economic growth, the demographic transition should help increase the proportion of working-age population and reduce the dependency ratio (the ratio of dependents to working-age population), which economists often describe as the 'demographic dividend.' The contribution of the demographic dividend to economic growth has been recognized and documented in the literature (for example, Williamson 1997).

Researchers have examined the interplay between economic development and demographic transition and estimated the contribution of the population factor to growth during China's reform period. For example, Wang and Mason (2008) find that the decline in the dependency ratio contributed 15 percent to economic growth in 1982–2000, and Cai and Wang (2005) estimate the contribution of the dependency ratio to be 26.8 percent in the same period.

Let's consider a standard Cobb–Douglas production function:

$$Y = A * F(K, L) = K^\alpha * (AL)^{1-\alpha}$$

where Y denotes output (e.g. gross domestic product (GDP)) growth; K , physical capital input; L , human capital input, which can be divided into the number of workers and educational attainment of labor; and A , total factor productivity (TFP), which can be decomposed into allocative efficiency and a residual. In addition, some economists, acting as 'right-hand warriors' (Srinivasan and Bhagwati 1999), add to the growth regression dozens of explanatory variables that are considered theoretically expectable and statistically significant. The dependency ratio, as a proxy for the demographic dividend, is one of those variables.

However, defining the broad demographic dividend as a contributing factor to economic growth requires looking into almost all the variables on the right-hand side of the production function, while the contribution of the dependency ratio as a variable to economic growth is at most a residual of the demographic dividend.

Based on the experiences of China and other East Asian economies and drawing lessons from the dual economy theory developed by Lewis (1954), the neoclassical theory of growth can be extended to explain the effects of the broadly defined demographic dividend on economic growth. In what follows, I explain the relevance of growth factors to demographics and reveal broadly defined demographic dividends obtained during China's transition.

First, the population dividend magnified the contribution of capital to economic growth by increasing the saving rate and slowing diminishing capital returns, as a result of unlimited labor supply. In an early study on China, World Bank (1998) finds that capital accumulation contributed 37 percent to GDP growth in 1978–1995. Covering a much longer period, Cai and Zhao (2012) estimate the contribution of capital accumulation to be double that amount. More recent research suggests that labor productivity enhancement was a significant driver of economic growth during the reform period (for example, Zhu 2012; IMF, 2006). Among the factors that increased labor productivity, capital deepening or the capital-labor ratio played a major and increasing role (IMF 2006; Kuijs 2010).

Some economists have criticized such growth in which capital plays an overwhelming role as of an extensive pattern, which is believed to be neither a miracle nor sustainable (for example, Young 2003; Krugman 2013). As can be learned from the experiences of China and other East Asian economies, however, in the Lewisian-type dual economy development stage, unlimited labor supply prevents the phenomenon of diminishing returns to capital for a certain period of time. For example, research findings suggest that during most of the reform period, returns to capital investment remained extraordinarily high (Bai et al., 2006). And after the Lewis turning point characterized by labor shortage and wage inflation, returns to capital rapidly diminished (Bai and Zhang 2014). These findings prove that the contribution of capital to growth is indeed part of the demographic dividend.

Second, the population dividend not only increased the supply of labor but also improved the quality of labor over the past decades in China. Sufficient supply of labor has been widely recognized as a favorable factor in economic catching-up. What is often neglected is that improvement of human capital in less-developed countries overwhelmingly relies on the favorable age structure of the population, which ensures a steady flow of new entrants with more years of schooling into the labor market.

According to World Bank (1998), the estimated contribution of labor inputs, measured in quantity and quality, to GDP growth was 17 percent. Fang and Zhao (2012) estimate that labor and human capital contributed 8 and 4 percent, respectively. Adding the effects of workers' years of schooling and education on productivity, Whalley and Zhao (2010) estimate the direct and indirect contributions of human capital to be as high as 38 percent.

Third, the population dividend, especially the resultant labor mobility between rural and urban areas and among sectors and regions, brought about significant improvement in the allocative efficiency of resources, an important part of TFP growth.

By decomposing the sources of TFP growth in China into the allocative efficiency of resources and a residual, World Bank (1998) finds that the former – productivity growth resulting from labor mobility from low-productivity sectors (labor surplus agriculture and labor redundant state-owned enterprises, or SOEs) to high-productivity sectors (non-agriculture sectors and newly established enterprises) – contributed 16 percent to the growth in GDP during 1978–1995. Cai and Wang (1999) find that movement of labor from agriculture to non-agriculture sectors constituted the overwhelming part of TFP growth and contributed 21 percent to per capita GDP growth during 1978–1998. Zhu (2012) finds that the sound performance of China's TFP during 1978–2007 can be well attributed to the rapid expansion and fast productivity growth of non-SOEs.

Fourth, for a country, greater population size tends to intensify demand for and supply of innovation, which fuels economic growth through speeding technological progress and increasing TFP. This argument, which comes from a new development by growth theorists and economic historians, has been tested empirically (e.g. Jones 2002). To my knowledge, however, there has been no empirical study of this for modern China.

Favorable population structure that is theoretically propitious to economic growth does not spontaneously translate into a demographic dividend, that is, a realistic driver

of growth. Indeed, the economic performance of many countries that have experienced a similar demographic transition cannot rival that of China.

According to the World Bank and IMF (2016, 268–73), countries and territories with TFR greater than the replacement level of 2.1 in 1985 and a working-age population that will decline or be unchanged during 2015–2030 can be categorized as ‘late-dividend economies.’ Along with other 53 other economies, China belongs to this category. During 1978–2015, China realized an annual growth rate of per capita GNI of 9.73 percent, compared with the arithmetic average of 3.77 percent for the 44 other economies with available data. Even taking into account a convergence effect – that is, observing the poorest countries in the late-dividend category, which would be expected to have a potential similar to China to grow faster – China’s economic growth stands out.

In general, economic reforms aim to ameliorate key obstacles that prevent the economy from growing. Such reforms could accelerate growth in the absence of the conditions that are widely seen as essential for development.² China’s the outstanding growth performance has been the result of reform and opening-up, cashing in on advantageous conditions for growth. Concretely, through improving incentive mechanisms in micro management; getting prices right; developing factor markets; eliminating institutional barriers that prevented the mobility of factors of production; and embracing the world economy for its market, technology, and competition, China has translated its demographic dividend into high potential rates of growth and ultimately realized unprecedented actual growth.

The rest of this paper is organized as follows. [Section 2](#) reviews the formation of China’s population policy, its impacts, and the process of adjustment, showing that the demographic transition was due to not only population policy but also economic and social development. [Section 3](#) describes how reforms in related areas released surplus labor from agriculture and expanded employment in non-agriculture sectors. [Section 4](#) empirically tests the effect of labor reallocation on labor productivity improvement and thus economic growth. Based on the prospects for further population change, [Section 5](#) draws policy implications for further reform.

2. What caused the demographic transition?

In the 1950s, Professor Ma Yinchu’s academic view on population and policy proposal for birth control were severely criticized by his fellow scholars and political leaders (including Chairman Mao Zedong). However, the top decision makers began to be alert to the mushrooming population with the results of First National Population Census, which was conducted in 1953. However, there was no decision made for concrete policy measures at the time. It was only after the failure of the Great Leap Forward and the bitter experiences of the Great Famine in the late 1950s and early 1960s that the Chinese leaders determined to take action to check the population boom.

By the end of 1962, the central government advocated the implementation of family planning aimed to mitigate the momentum of population growth. In 1970, the central government officially incorporated the population issue into the National Economy Development Plan. It was not until 1980 that the Chinese government formally announced the famous One-Child Policy. From the official terms publicized in 1988

– that is, advocating late marriage and late childbearing, fewer children, better care, and one child for one couple – the family-planning proposal seemed not to be compulsory. However, the word ‘advocacy’ here should be read as ‘mandatory requirement.’ In the 1990s, population regulations focusing on implementing the One-Child Policy were successively approved by all the Provincial People’s Congresses (the local legislatures) and implemented by provincial governments.

It is not accurate, however, to interpret the family planning policy implemented in China for over three decades as simply the One-Child Policy. After long evolvement, around 2010, the structure of the policy package could be depicted as the following four policies: (1) the One-Child Policy, which was applied to all urban residents and rural residents in six provinces and covered 35.9 percent of the total population of China; (2) the one-and-a-half children policy, namely, rural couples whose first child is a girl are allowed to have a second child, covering rural residents in 19 provinces and accounting for 52.9 percent of the total population; (3) the two-children policy, which is applicable to rural residents in five provinces and covers 9.6 percent of the total population; and (4) the three-children policy, which is applied to farmers and minority herds people in some areas and covers 1.6 percent of the total population. In addition, in the Tibetan Autonomous Region, Tibetan urbanites are allowed to have two children, and there are no birth restrictions for farmers and herds of Tibetan and other ethnic minorities with very small population size (see CDRF, 2014, chapter 4).

The strictness of the implementation of the family-planning policy has not been immutable or frozen over time. First, the family-planning policy was introduced together with the initiation of the market-oriented reform and its resultant economic growth. While adhering to the population control target, the policy implementation has been more and more compliant with the promotion of the economy, poverty alleviation, family development, social governance, and economic incentives. Second, since long ago, some provinces have relaxed the restrictions on fertility, for example, by permitting couples both being an only child in urban areas and couples with one being an only child in rural areas to have two children. Finally, more fundamental family-planning reforms have been successively carried out by allowing couples with either being an only child in 2014 and then all couples in 2016 to have two children.

In any country, economic growth and social development are the forces driving the demographic transition. China’s unique policy is only an additional, and diminishing, factor beyond the economic and social factors that worked. Du (2005) examines three factors that are theoretically expected to reduce the fertility rate: implementation of population policy, increase in per capita GDP, and improvement of human capital. Du regresses these factors as explanatory variables and finds that they all significantly contributed to the reduction in the fertility rate during the first decade China’s reform. Further, the effect of the policy variable disappeared while that of the income and human capital variables still existed in the second decade of the reform.

To a reasonably large extent, it is the outstanding performance of China’s economic growth and social development that brought down its TFR to below replacement level in the early 1990s and further reduced it later. As a result, the natural growth of the population has dramatically slowed. In this, China has followed the universal law of demographic transition. What is unique about the country’s experience is that it took only about 30 years for China to complete the transition from high fertility to low

fertility, compared with Western countries that took more than double that time to complete the same transition. Further, China entered a low-fertility phase much earlier compared with other developing countries with a similar level of per capita income, which characterizes China as a country of ‘growing old before getting rich.’

Figure 1 shows the changes in the birth rate, mortality rate, and their difference, namely, the natural growth rate of the population, since the founding of the People’s Republic of China. The abnormal decline in the birth rate, increase in mortality, and thus enormous drop in the natural growth rate in China in the late 1950s and early 1960s can be considered an external shock. Eliminating the overall effects of this shock from the long-term trend, China’s population change over the past nearly seven decades has followed the general trajectory experienced in emerging countries.

Prior to the mid-1960s, the sharp fall in mortality and lagging response of the birth rate resulted in increased population growth. Such a baby boom aroused the concern of academic circles and decision makers, because no one at the time could possibly foresee the fall in fertility that would occur sometime later.³ During the entire 1970s, while the death rate continued to decline, although at a relatively lower pace, the birth rate declined substantially. That brought about a sharp plunge in the natural growth rate of the population. Then came an era in which the mortality rate remained nearly unchanged and, consequently, the birth rate and natural growth rate moved synchronously. They rebounded for a couple of years in the 1980s and dropped again in the 1990s. China’s natural growth rate of the population has been less than 10 per 1000 since 1998, and it has been less than 6 per 1000 since 2004.

Such changes in fertility and the population growth rate have expectedly altered the age structure of the country’s population. According to data released by UN (2015), the Chinese working-age population between ages 15 and 59 increased from 373 million in

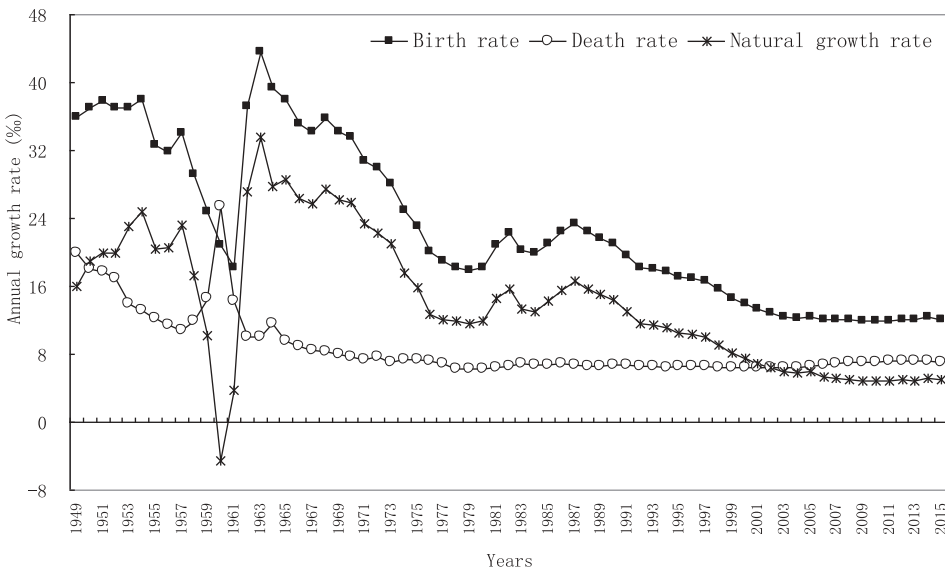


Figure 1. Birth rate, death rate, and natural growth rate of the population in China.

Source: National Bureau of Statistics, various years.

1965 to the peak of 941 million in 2010, while the dependency ratio calculated based on this definition fell from 0.89 to the rock bottom of 0.43 in the same period.

That is, China enjoyed the most productive population structure between the mid-1960s and 2010, and the coincident period of economic reform – that is, 1978–2010 – can be deemed as the population window of opportunity or demographic dividend. The year 2010 was therefore an obvious turning point. As the working-age population declines and the dependency ratio increases, the demographic dividend that spurred the high growth of the Chinese economy is rapidly disappearing. If the population trend remains unchanged, it is predicted that the working-age population will drop to 674 million and the dependency ratio will increase to nearly 1 in 2050 (UN, 2015).

3. How did policy promote employment?

In economic history, the situation of a massive surplus of laborers in agriculture who cannot be transferred to non-agriculture sectors through dual economy development (Lewis 1954) is sometimes called agricultural involution. This situation impedes labor productivity improvement in agriculture and delays industrialization (see Huang 2002). In that case, the advantageous population structure would not be translated into a demographic dividend, but it would instead become a population burden. The same goes for the ‘iron rice bowl’ and overstaffing in SOEs caused by planned assignment of jobs in urban areas, which depress efficiencies in enterprise management and resource allocation.

The full and efficient utilization of abundant labor is the precondition for translating favorable population properly into a factor that spurs economic growth. Now that this is in place, it is necessary to examine how reform helped to promote employment and reallocate the labor force. This will help in understanding the process of cashing in on the demographic dividend in China’s reform period.

Reforms that are conducive to the movement and reallocation of production factors in general and of the labor force in particular include many areas at the micro and macro levels. Overall, the economic growth led by reform has created plenty of jobs. The elimination of institutional barriers through deregulation has motivated laborers, following market signals indicating employment opportunities and relative income, to leave low-productivity jobs, migrate among regions and sectors, and take new, high-productivity jobs. Therefore, a narration of how migrant laborers obtained the rights of exit, mobility, and entry can concisely document the processes of related reforms and their effects.

First, rural reforms released surplus laborers. The introduction of the household responsibility system (HRS) was a critical reform that granted farmers the right to exit from agriculture with very low marginal productivity of labor. Even without official permission prior to 1978, the HRS was secretly piloted in some villages in the remote countryside. Right after the 3rd Plenum of the 11th Central Committee of the Communist Party of China, which was convened in 1978, a symbol of the beginning of economic reform, the HRS was successively implemented, accepted, and eventually encouraged by the government.

By the end of 1984, all the production brigades and 98 percent of the households in rural China adopted the HRS and, simultaneously, the People’s Commune System was abolished. The original motive of the reform was to improve incentives for production and work in agriculture by granting farmers autonomy of operation and rights of

residual claimants under the prerequisite of guaranteeing state and collective rights. An unexpected result was that rural households have since obtained autonomy of owning and allocating factors of production, as the logic of the reform and actual situation afterward have shown.

Under the People's Commune System, employment was confined to farming or, in many cases, solely to grain planting. Work places were restricted to production brigades in home villages, and the hours of labor were directly determined by the brigades. All those served to keep the pattern of misallocation of resources unaltered. Under the HRS, after paying the agricultural tax, meeting the state procurement task, and turning over the collective retention, households had autonomy in deciding what crops to plant and how to allocate their work time. With these two autonomies, when labor surplus became overt, farmers began to reallocate their laborers and other factors of production.

Second, the reforms promoted the mobility of laborers among sectors and regions. Under the planning system, the troika of the institutional arrangement – the People's Commune System, household registration (or *hukou*) system, and rationing system of major agricultural products – strictly restricted labor mobility across sectors and regions. As incentives improved and labor efficiency increased, labor surplus in agriculture appeared. A study shows that, in the mid-1980s, the surplus labor numbered 100 million to 150 million, accounting for 30 to 40 percent of the total workforce (Taylor 1993). As the institutional barriers were eliminated, surplus laborers began to move outside where they had been engaged.

The rural labor force successively experienced movements from planting, or even sole grain production, to diversified farming; from farming to broadly defined agriculture sectors including farming, forestry, animal husbandry, fishery, and sideline businesses; from agriculture to rural industry (township and village enterprises); and from local nonagricultural work to urban employment.

There have been several breakthroughs in rural labor reallocation. One, with the abolition of the People's Commune System and substantial enhancement of farm products, farmers were permitted to transport and sell their own farm products beyond their hometowns, which, for the first time, broke the geographic restriction on farmers' employment. Two, farmers were allowed to work in neighboring towns by bringing with their own rations, which, for the first time, broke the boundary of employment between the rural and urban sectors. In the early 1990s, with the abolition of the rationing system, there were no longer practical obstacles preventing rural laborers from working and residing in cities.

The existing *hukou* system still segments the provision of public services in accordance with residence identity, preventing migrant workers and their accompanying family members from equal access to compulsory education, basic social security programs, the minimum living guarantee program, and the subsidized housing program in cities. However, the *hukou* system no longer serves as an obstacle deterring labor mobility and population migration. In that sense, the *hukou* system reform has made a final breakthrough.

Third, the reforms have broken the barriers deterring labor from entering high-productivity sectors. When the labor market was undeveloped and divided between rural and urban areas, laborers shifting from agriculture could only find marginal jobs in non-agriculture sectors. For example, until the 1980s, township and village

enterprises were the major absorber of shifted laborers. After 1992, the rapidly expanded labor-intensive manufacturing and nonpublic sectors in coastal regions began absorbing mass cross-regional migrant workers, creating the first migration tide. In the late 1990s, the radical reform of the employment system in SOEs began to link rural and urban labor markets. As a result, barriers deterring labor mobility across regions and sectors have been gradually eliminated.

Fourth, the reforms have created jobs and reallocated the labor force in urban sectors. The new entry of laborers to the labor market and relocation of the unemployed and laid-off in urban areas have followed a similar logic as the transfer of surplus laborers in rural areas. On paper, the reforms that were carried out as early as the 1980s granted SOEs autonomy in hiring and firing. However, SOE managers were not encouraged to use their autonomy, because the undeveloped labor market and imperfect social security system were unable to cope with the possible resulting lay-offs. There was lack of employment opportunities outside SOEs for relocating the laid-off and no unemployment insurance system protected them at the time.

In the late 1990s, under the pressure of severe operational difficulties, SOEs began the reform characterized by breaking the long-lasting 'iron rice bowl' for their employees; that is, SOEs began laying off redundant workers. That became the tipping point for reform of the urban employment system. The basic elements of the labor market have formed gradually since then. One, to secure basic living standards for those who were laid off, unemployment insurance and other social security programs were established. Two, the laid-off and unemployed were reemployed mainly through the labor market, with the assistance of the government's proactive employment policy. Three, migrant workers gained more equal opportunity to compete for jobs with urban workers in the labor market, which activated the adjustment of the labor stock in urban sectors.

Finally, participation in the global division of labor expanded aggregate employment. One of the important factors that allowed China to cash in on its demographic dividend was the expansion of labor-intensive manufacturing. Manufacturing has absorbed mass migrant workers and gained a huge share in the international commodities market. That is what makes the Chinese experience outstanding in the course of economic globalization.

Spence and Hlatshwayo (2011) analyze the growth of employment and its composition in the United States. They show that, as a result of the massive transfer of manufacturing abroad, U.S. jobs were correspondingly lost. New employment in the United States almost all came from nontradable sectors during 1990–2008. Spence and Hlatshwayo conclude that offshoring has destroyed the U.S. economy. Taking the U.S. case as a reference, I examine the expansion of China's nonagricultural employment.

I use data from the China Economic Censuses conducted in 2004, 2008, and 2013 and a similar categorization method as in Spence and Hlatshwayo (2011). I classify China's nonagricultural employment on the basis of corporate units in the Censuses into that in tradable sectors and nontradable sectors, with special focus on manufacturing and construction, which make up the lion's shares in the two sectors, respectively. The total expansion and structural change of employment in these categories are shown in [Figure 2](#).

As shown in [Figure 2](#), nonagricultural employment in urban and rural China expanded at an annual growth rate of 5.9 percent during 2004–2013, and it totaled 352 million in 2013. Its growth in the tradable and nontradable sectors was relatively balanced, with annual growth rates of 6.9 and 4.7 percent, respectively. As these rates

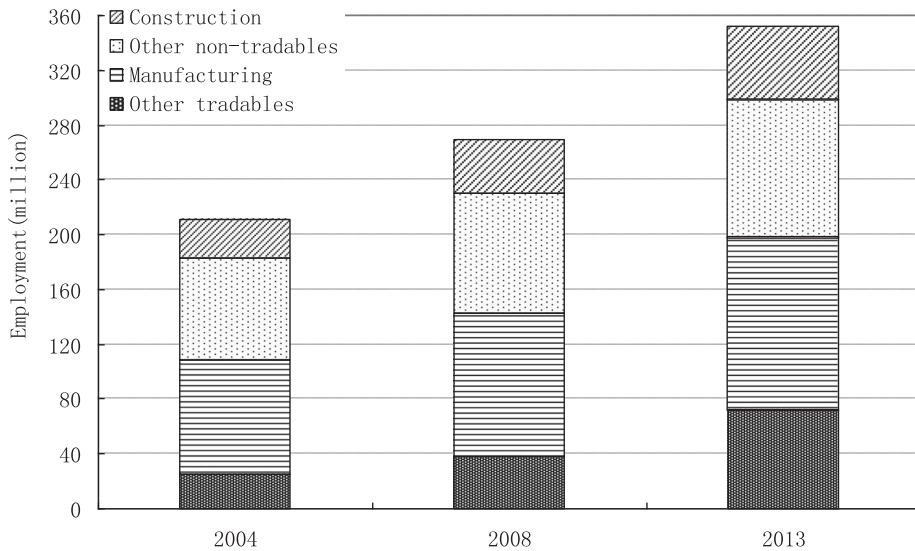


Figure 2. Expansion and composition of nonagricultural employment.

Source: Data from the 1st, 2nd, and 3rd Economic Censuses, NBS official website, <http://www.stats.gov.cn>.

are based on the reporting from corporate units, they greatly underreport the actual nonagricultural employment and its expansion in the period examined. In what follows, by complementing different sources of statistics, we can examine the degree to which actual employment is greater than what the official data directly tell us.

The official annual statistics on urban employment are based on data collected on ‘establishments’ instead of ‘corporate units;’ thus, they generate much more nonagricultural employment. According to this source, urban employment amounted to 178 million in 2015. Incorporating employment in private enterprises and self-employed individuals, the figure for urban employment increases to 368 million.

In addition, most temporary employees and dispatch laborers, of which migrant workers are a part, are not reported by enterprises; thus, these workers are missing from the statistics. Therefore, the household-based survey conducted in accordance with the definition of the International Labor Organization shows even greater urban employment, at 404 million. The difference between these survey data and the preceding data can be viewed as urban informal employment.

Even this number omits some of the migrant workers in urban sectors. A rough estimate shows that about 20 million migrant workers were excluded from the statistics on urban employment (see Cai et al., 2016). That is, if migrant workers were fully included in the urban employment statistics, total employment in urban areas would increase to as much as 424 million in 2015.

4. What were the effects of labor reallocation?

As Kuznets (1957) points out, the essence of structural change is to reallocate factors of production (especially labor) from low-productivity sectors to high-productivity sectors,

and therefore to increase the allocative efficiency of resources. Based on the experiences in East Asia (mainly China, Japan, and Korea), Aoki (2012) identifies a unique stage of development led by structural transformation and called the K(uznets)-phase. Other research finds that labor transfer to gain reallocative efficiency (1) characterizes the typical process of structural change in Asian economies (McMillan and Rodrik 2011), explains an important part of TFP and thus labor productivity growth in China (Bosworth and Collins 2007), and (3) contributes significantly to the growth of the Chinese economy as a whole (Du 2014).

In China, reforms in related areas have eliminated a host of institutional barriers deterring labor mobility and spurred labor reallocation from low-productivity to high-productivity sectors and regions. Such a Kuznets process has increased the allocative efficiency of resources, contributing to the improvement of TFP and supporting outstanding performance of economic growth. That is, the demographic dividend has been embodied in economic growth and structural changes in China during the reform period. The resource reallocation effects can be empirically examined as follows.

General experiences of economic development suggest that the share of agriculture in output and employment declines over time as a country's income level increases. After 40 years of economic development and demographic transition, total employment in China expanded from 402 million in 1978 to 775 million in 2015. Meanwhile, as the result of the large-scale transfer of agricultural labor, according to officially published data, the share of laborers in the primary sector declined from 70.5 to 28.3 percent; the share of laborers in the secondary and tertiary sectors increased from 17.3 to 29.3 percent and from 12.2 to 42.4 percent, respectively.

As some researchers argue, the official data are likely to overstate the size and share of agricultural labor (see Cai et al., 2013; Rawski and Mead 1998). Cai (2017) re-estimates the share of laborers engaged in agriculture to be 18.3 percent, and the corresponding shares of laborers in the secondary and tertiary sectors to be 33.4 and 48.3 percent, respectively, in 2015. That is, the actual share of agricultural labor is at least 10 percentage points lower than what the official data indicate. Table 1 compares the shares of labor by sector between different data sources and the average levels in the world and country groups by income level.

The official data suggest that China's labor distribution among sectors has deviated from the normal pattern in international experiences, which is particularly presented as a larger share of labor in agriculture and a smaller share in services. Relatively, the re-estimated data are found to be in line with what can be expected by the performance of economic growth and structural adjustment in China after three decades of reform. The share of agricultural labor, based on the re-estimated data, is lower than the average level of upper middle-income countries and substantially high compared with the average level of high-income countries.

China reached per capita GNI of US\$7900 in 2015 and is approaching the threshold from upper middle-income status to high-income status. According to the World Bank's classification, 13 countries are comparable to China and have data available for comparison. Namely, they ranged from per capita GNI of US\$9200 (similar to China's current level) in Gabon to US\$12,760 (close to the threshold of US\$12,600) in Croatia. In 2015, the arithmetic average share of agricultural labor of the 13 countries

Table 1. International comparisons of labor distribution by sector (%).

Countries and regions	Primary sector	Secondary sector	Tertiary sector
China (official data)	28.3	29.3	42.4
China (adjusted data)	18.3	33.4	48.3
China (ILO data)	28.9	23.7	47.3
World average	29.5	21.5	48.9
Low-income countries	68.5	8.3	23.2
Lower middle-income countries	40.4	21.3	38.3
Upper middle-income countries	23.9	24.0	52.1
High-income countries	3.1	22.5	74.3
High-income economies in East Asia	4.1	35.3	60.3

Sources: (ILO 2017); NBS various years; author's estimation.

Note: The first line in the table shows official statistics; the second line, the author's estimates; and the statistics in the other lines are International Labour Organization (ILO) model estimates. Figures on average levels for the world and economy groups are calculated as arithmetic means.

was 12.8 percent (ILO, 2017). That is, during the transition from its current income status to high-income status, China will have to close the gap with those countries in the sectoral distribution of labor.

We are now in position to investigate the contribution of labor reallocation to labor productivity growth. From 1978 to 2015, according to calculations based on official data, China's labor productivity (GDP per worker in real terms) increased 16.7 times, of which labor productivity in the primary sector increased 5.5 times; that of the secondary sector increased 13.5 times; and that of the tertiary sector increased 5.2 times. Calculations based on adjusted data show similar trends but a greater increase in labor productivity in the primary sector.

By adopting methods used to decompose sources of labor productivity growth, proposed by Timmer and Szirmai (2000) and Bosworth and Collins (2007), Fang (2017) estimates the functional and structural factors that contributed to labor productivity growth during China's reform period. The results are shown in Table 2.

First, the decomposition results based on Timmer and Szirmai's (2000) method show that, in 1978–2015, the labor productivity growth of the Chinese economy as a whole can be attributed to the contributions of sectors (55 percent) and structural changes (45 percent). Of the latter, the contribution of the static shift effect generated by the shift of labor toward

Table 2. Labor productivity growth and its contributing factors in China (%).

Decomposition 1, based on Timmer and Szirmai (2000)					
	Total growth	Contribution of			
		sectors	Structural effects	Of which: Static effect	Dynamic effect
1978–2015	1671.3 (1671.3)	55.1 (56.0)	44.9 (44.0)	4.6 (5.5)	40.2 (38.6)
1978–1990	77.5	60.8	39.2	25.8	13.4
1991–2003	205.2	86.2	13.8	7.0	6.8
2004–2015	173.5	66.9	33.1	15.9	17.2
Decomposition 2, based on Bosworth and Collins (2007)					
	Annual growth	Primary sector	Secondary sector	Tertiary sector	Sectoral reallocation
1978–2015	8.08 (8.08)	17.73 (21.86)	44.22 (42.53)	15.39 (14.53)	22.66 (21.08)
1978–1990	4.90	15.65	34.46	16.57	33.32
1991–2003	9.75	7.44	61.30	16.71	14.55
2004–2015	9.58	6.68	48.69	20.27	24.36

Source: (Cai 2017).

Note: The figures in brackets indicate results based on adjusted data.

sectors with a higher labor productivity level at the beginning of the period examined was minor. The contribution of the dynamic effect generated by the shift of labor toward sectors with higher labor productivity growth rates dominated.

Second, although the same decomposition exercise was used to examine 1978–1990, 1991–2003, and 2004–2015, the results show that the structural effects were significant in the first and third periods, and the contributions of sectors to labor productivity growth were overwhelmingly dominant in the second period. The static effect was significant in the second period, contributing 25.8 percent to total labor productivity growth.

Third, from the decomposition based on the method of Bosworth and Collins (2007), yearly growth of total labor productivity was relatively slow in the first period, and then substantially accelerated in the second and third periods. In the entire period, the contribution of the primary sector steadily decreased, and the secondary sector served as a major contributor of total labor productivity growth. In the second period, the contribution of labor reallocation was relatively small.

5. What will the future look like?

During most of its reform period, the Chinese economy may be characterized as a typical dual economy, as described by Arthur Lewis in his seminal paper (Lewis 1954). In such an economy, the elimination of institutional obstacles, which prevented production factors from rapid accumulation and efficient allocation, fostered the demographic dividend and contributed to unprecedented economic growth. In other words, favorable population structure helped China create the necessary conditions for rapid growth, including the high savings rate, large volume of labor supply, rapid improvement of human capital, and improved speed in resource reallocation efficiency through labor mobility.

As the demographic transition has entered a new stage, traditional sources spurring growth tend to be exhausted. First, the negative growth of the working-age population and economically active population has led to and is aggravating a shortage of labor, weakening the comparative advantage of China's industry. Second, the rapid increase in the capital-labor ratio has resulted in diminishing returns to capital. Third, the slower growth of new entrants to the labor market has slowed the rate of human capital improvement. Finally, population aging in rural areas has retarded the process of urbanization and thus diminished the momentum of labor reallocation in enhancing labor productivity.

All those changes point to a rapid disappearance of the demographic dividend, which leads to a decline in the potential growth rate. The estimates by Cai and Yang (2013) show that China's potential growth rate decreases from about 10 percent in the period prior to 2010, to 7.6 percent in the 12th Five-Year Plan period (2011–2015), and 6.2 percent in the 13th Five-Year Plan period (2016–2020). The actual growth rate and its slower pace have so far followed this predicted trajectory.

As is predicted by growth theory and revealed by the experiences of other economies, during the transition from middle- to high-income status, growth rates inevitably and significantly slow down (see Barro 2016; Eichengreen, Park, and Shin 2011). However, the extent of the slowdown varies widely across countries, which leads to different consequences in the long run (Eichengreen, Park, and Shin 2013).

China has important potentials to tap to overcome the ‘middle-income trap.’ First is to maintain the traditional momentum of economic growth. There is still huge potential for China to narrow its gap with the developed countries in the share of agricultural labor. Pushing through the unfinished reform of the *hukou* system to transform migrants from guest workers to legitimate residents in urban areas will largely enhance labor participation in non-agriculture sectors and therefore the reallocative efficiency of resources. The gap in workers’ human capital between China and the developed countries can also be narrowed by reforming the system of education and training to extend the average years of schooling and improve the quality of education. Reforms in a series of areas will create a better policy environment for small and medium-size enterprises and strengthen competition, so that diminishing returns to capital can be deterred.

Second is to tap sustainable driving forces for economic growth through improving TFP. As the room for reallocating resources between agriculture and non-agriculture sectors becomes smaller, the reallocation of resources among industries within non-agriculture sectors and enterprises in narrowly defined industries will be the new source of reallocative efficiency, as long as there exist differences in productivity among them. Reforms aimed to create a level playing field and creative destruction mechanism, for example, in the financial sector and SOEs, can gain sustained sources of long-term growth.

Liu Xiang, a scholar of the Western Han Dynasty (77–6 B.C.), said that 90 miles is only half of a 100-mile journey. For the Great Rejuvenation of the Chinese nation proposed by the 18th National Congress of the Communist Party of China in 2012 – that is, becoming a modernized country by 2050 – the past 40 years of the reform course has indeed been half the distance to the final destination. Judging from past experiences and the potential of the reform dividend, reform and opening-up will remain immense sources of Chinese economic growth at a reasonable rate. In retrospect, the purpose of the past 40 years of reform is to push the necessary reforms to a new level.

Notes

1. Guo, Wang, and Cai (2014) present ample evidence that confirms the very low TFR in present China.
2. This proposition is believed to have been stated by Hollis Chenery. See Brandt and Rawski (2008, 9).
3. It is commonly believed that Notestein (1945) coined the Theory of Demographic Transition, because he was the first to provide a standard theoretical explanation of the decline in fertility as a result of an inevitable stage of demographic transition. However, there was no way for academics like Ma Yinchu and decision makers like Mao Zedong to know that such a theory was stylized from worldwide experiences.

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