4 The End of China's Demographic Dividend:

The Perspective of Potential GDP Growth

Cai Fang and Lu Yang

Introduction

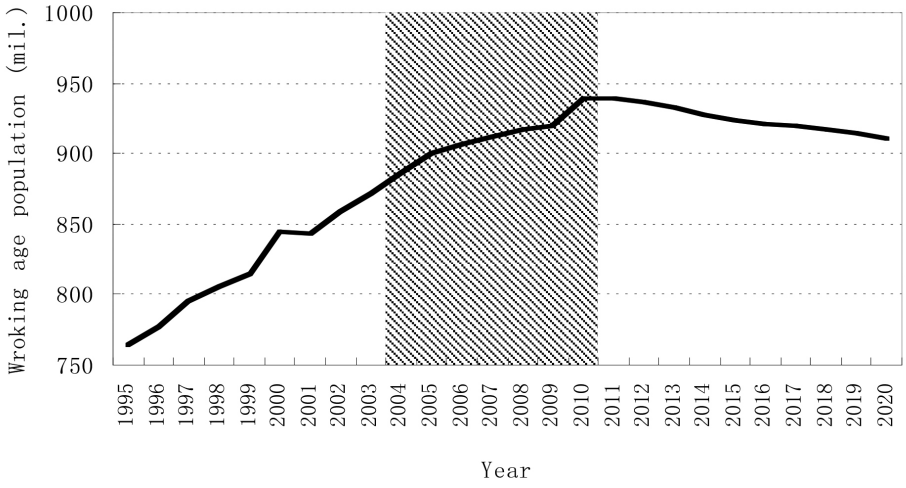
The unprecedented economic growth in China over the past 30 years can be attributed largely to the demographic dividend. That is, growth of the working age population guarantees an adequate supply of labour; a decline in the dependence ratio (the ratio of the dependent population to the working age population) helps to maintain a high savings rate, which is the condition for capital formation; and an unlimited supply of labour prevents return on capital from diminishing, which allows heavy investment to be the main source of GDP growth (Cai and Zhao 2012).

As is well documented (e.g. Bloom and Williamson 1998; Williamson 1998), the demographic dividend is not derived from population size or the growth rate of the population, but from a specific feature of the population age structure. Simply put, an increase in the proportion of the working age population in the total population, and a decline in the dependence ratio provide a country an opportunity to situate themselves so that a high savings rate, heavy investment and rapid economic growth can be obtained; the country thus benefits from the demographic dividend. Over the recent period of fast growth, few would consider the population age structure as a constraint of economic growth in China.

The population age structure is, however, ever-changing. As a result of population ageing, the working age population stops growing and the dependence ratio no longer decreases; eventually, the demographic dividend will cease to exist. While debating the Lewis turning point, Ross Garnaut (2010) suggests using the phrase 'Lewis turning period' instead of Lewis turning point, so that the feature of China's regional heterogeneity can be captured. Accepting this advice, we consider 2004, the year in which labour shortages first appeared and migrants' wages started to increase, as the starting time and 2010, in which working age population between 15 and 59 peaked, the ending time of the Chinese Lewis turning period (Figure 4.1). Since China has now passed such a period, all those things that are predicted by economic theories are becoming

a reality. That is, labour shortages, diminishing returns on capital, and a decline in the savings rate will lead to a slowdown in economic growth. This is what has occurred in China in recent years, particularly since 2004.

Figure 4.1 The Chinese Lewis turning period



Source: China Development Research Foundation (2012).

The potential GDP growth rate is determined by supply-side factors, including labour, capital and total factor productivity (TFP). In a growth accounting equation, holding the labour force participation rate (LFPR) and the natural unemployment rate (i.e. the non-accelerated inflation rate of unemployment (NAIRU)) constant, a reduction in the working age population will directly reduce the potential GDP growth rate. In addition, the reduced supply of labour, which causes diminishing returns to capital, and the increase in the dependence ratio, which causes a decline in the savings rate, do not support the fast growth of capital formation. Therefore, holding the other factors constant, a reversal of the growth trend of the working age population in China will inevitably slow its economic growth.

In fact, the process of demographic transition has taken place in China much more rapidly than anyone could have expected, and the number of people from ages 15 to 59 years has already decreased.[1] Based on the data of the 6th national

1 In this study, we assume that people aged 15 to 59 years make up the working age population, instead of people aged 15 to 64 years. The reason is twofold. First, the official retirement ages are 60 years for male workers and 55 years for female workers. Second, for China's working age population, the older the person, the lower the educational level. For example, the average years of schooling drop from nine years for people aged 20, to six years for people who are aged 60 (Wang and Niu 2010). Both reasons indicate that, at present, there is little chance for people older than 60 years to successfully remain in the labour force.

census, the China Development Research Foundation (CDRF 2012) predicts the trend of the population age structure to change, and shows that the working age population, when assumed to be aged 15 to 59 years, started to decline in size in 2011, while the population dependence ratio, which is calculated based on the working age population (aged between 15 and 59 years), began shrinking in the same year. This trend will not be reversed, even if there is a moderate relaxation of the one-child policy. Given that the population factor has had such far-reaching impacts on the determinants of China's economic growth, including labour supply, the savings rate, the marginal return on capital and total factor productivity, such a change in the population age structure is bound to reduce the potential GDP growth rate in China.

Based on the latest population data, the chapter simulates a decline in the average potential GDP growth rate from 9.8 per cent over the period 1995–2009, to 7.2 per cent during the 12th five-year plan period (2011–2015) and 6.1 per cent over the 13th five-year plan period (2016–2020). Therefore, determining how to sustain economic growth is an important challenge facing China. In light of the properties of the potential growth rate and the experiences of China and the rest of the world, we make the following two suggestions.

First, the government should not seek an actual growth rate that exceeds the potential growth rate. Because the potential growth rate is fixed by assuming full employment of existing factors of production, artificial stimulus aimed at lifting the actual economic growth rate above the potential rate would have unhealthy consequences. For example, frequently implemented stimulus plans could cause inflation; overactive industrial policies might result in overcapacity by inappropriately protecting inefficient enterprises and backward production capacity; and, regional and industrial policies using heavy subsidies could lead to distortion of prices of production factors, and affect regional industrial structure by impacting comparative advantage.

Second, the potential growth rate can be enhanced through the application of measures to enlarge the supply of labour and capital, and to improve productivity. This requires deepening reforms in various areas, such as reform of the household registration system, and institutional reform. That is, economic reform is the key to sustaining China's economic growth. Homi Kharas (2011) points out that it would take ten years or more for China to see any obvious effects of such reforms, which implies that the Chinese Government should waste no time in initiating urgent reforms, while being ready to accept lower growth rates. There exist reform opportunities, however, that could enhance China's potential growth rate fairly swiftly, which we discuss in the present chapter.

While suggesting the slowdown of the potential rate of China's future economic growth in accordance with the trend of population structure changes, the present chapter recommends that policy measures to stimulate economic growth so that it exceeds the potential growth rate should not be taken. Instead, two scenarios are simulated and the results suggest that an increase in the labour force participation rate and improvements in TFP can significantly expand the potential growth rate in the future.

Estimation of the Potential Growth Rate in China

We use a standard Cobb-Douglass production function to project potential GDP growth rate. This method was applied both by Louis Kuijs and Wang (2006) and Kuijs (2009).

$$Y = AL^{\alpha}K^{1-\alpha} \quad (1)$$

Where Y is real GDP, A is TFP, L is employment, and K stands for capital stock (in constant price).[2] We deduce the labour productivity by dividing L on both sides of the equation (1).

$$Y/L = A(K/L)^{1-\alpha} \quad (2)$$

In equation (2), labour productivity Y/L (represented by y) is a function of the TFP and capital–labour ratio K/L (represented by k). That is $y = Ak^{1-\alpha}$. With some manipulation, labour productivity growth rate can then be rewritten and estimated from model (3):

$$\frac{\Delta y_t}{y_{t-1}} = \frac{\Delta A_t}{A_{t-1}} + (1-\hat{\alpha})\frac{\Delta k_t}{k_{t-1}} + \varepsilon_t \quad (3)$$

Based on equation (3), we can get the estimated value of return to capital $(1-\hat{\alpha})$ and return to labour $\hat{\alpha}$ by using $\Delta y_t / y_{t-1}$ as the dependant variable and $\Delta k_t / k_{t-1}$ as the independent variable.

2 Capital stock is almost always constructed by the 'perpetual inventory method'. The well-known equation is $K_t = I_t/p_t + (1-\delta_t)K_{t-1}$, where K_t is the measure of the real capital stock at time t, K_{t-1} is the measure of the real capital stock at time t-1, It is the normal investment in time t, P_t is the price index of investment in fixed assets in time t, and δ_t (=5%) is the rate of depreciation. The K_{1978} is calculated by Guo and Jia (2004). Note that K_t is a weighted sum of all past levels of investment and depreciated value of the initial real capital stock.

From time series of $\Delta y_t / y_{t-1}$, $1-\hat{\alpha}$, $\Delta k_t / k_{t-1}$, the growth rate of total factor productivity $\Delta \hat{A}_t / A_{t-1} + \varepsilon_t = \Delta y_t / y_{t-1} - (1-\hat{\alpha})\Delta k_t / k_{t-1}$ could be calculated by using equation (3). And then, $\Delta \hat{A}_t / A_{t-1}$ can be estimated by applying the Hodrick–Prescott filter method to diminish error term ε_t.

All steps above are identical with the method which calculates the growth rate of total factor productivity. It is necessary to use potential employment L_t^* to calculate the potential GDP growth rate. Where $L_t^* = Population_{15-59,t} \times Tr_{pt} \times (1 - NAIRU_t)$, $Population_{15-59,t}$ is the working age population aged 15 to 59 years, Tr_{pt} is the trends of labour participation rate which can be estimated by the Hodrick–Prescott filter method, and $NAIRU_t$ is natural rate of unemployment. In this chapter, $NAIRU_t = 4.13\%$ (Du and Lu 2011).

Building on $\Delta \hat{A}_t / A_{t-1}$, $1-\hat{\alpha}$, L_t^* and capital stock K_t, the potential labour productivity growth rate $\Delta y_t^* / y_{t-1}^*$ could be calculated as follows:

$$\Delta y_t^* / y_{t-1}^* = \Delta \hat{A}_t / A_{t-1} + (1-\hat{\alpha})\Delta k_t^* / k_{t-1}^* \quad (4)$$

Where $k_t^* = K_t / L_t^*$, $y_t^* = Y_t^* / L_t^*$, and Y_t^* is just the potential GDP in year *t*. Building on $\Delta y_t^* / y_{t-1}^*$ and L_t^*, the following equation can be deduced:

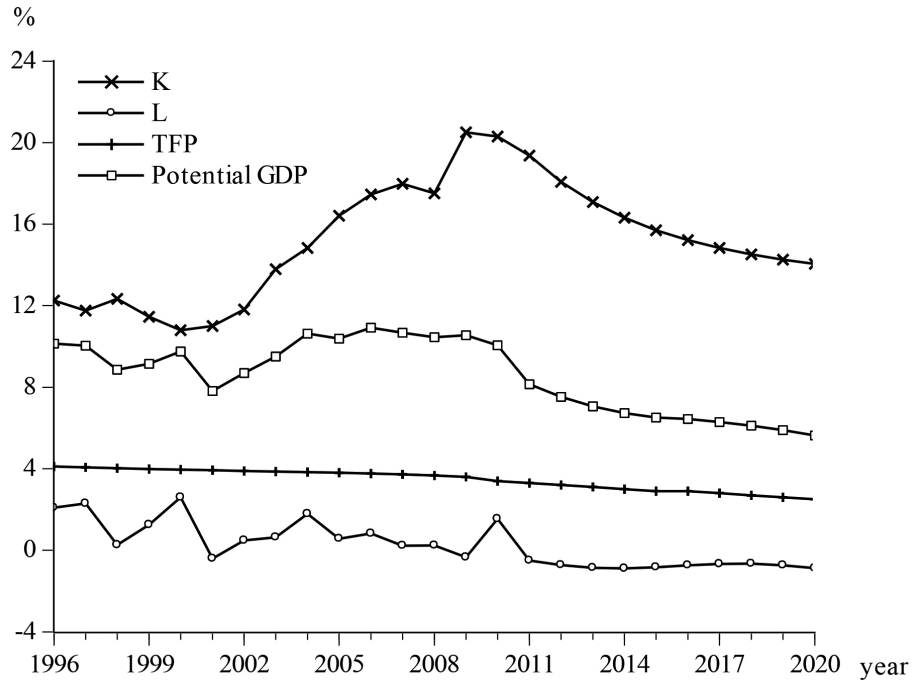
$$\Delta Y_t^* / Y_{t-1}^* = (\Delta y_t^* / y_{t-1}^* + 1) \times (L_t^* / L_{t-1}^*) - 1 \quad (5)$$

$\Delta Y_t^* / Y_{t-1}^*$ is the potential GDP growth rate in year *t*. where $\Delta y_t^* / y_{t-1}^*$ is the growth rate of potential labour productivity, a function of the growth rate of TFP and the potential capital–labour ratio, and L_t^* / L_{t-1}^* is potential employment growth.[3] From equation (4) and (5), three factors would influence the potential GDP growth rate, that is, potential growth rate of capital–labour ratio, potential growth rate of employment and potential TFP growth rate. The working age population will affect the first two factors directly.

Before estimating the potential growth rate, it is also necessary to make some assumptions regarding the capital formation and TFP growth rates in the period to come. The predicted employment growth, the assumed growth rates of capital formation and TFP, and the estimated potential GDP growth rate are presented in Figure 4.2. In what follows, we explain the reasons for such assumptions and present detailed results from the estimation.

3 For detailed explanations on the estimation procedure, see Lu (2012).

Figure 4.2 Trends of potential growth rate and of its factors in China: 1996–2020



Notes: K, assumed growth rate of fixed assets investment (capital formation); L, potential growth rate of employment.

Source: Authors' own estimations.

Assumption I: Capital Formation Growth will Slow Down in the Next Ten Years

Examining the historical data, we find that the annual growth rate of fixed asset investment, deflated by the price index of fixed assets, was 13.43 per cent in 1978–1994 and 16.89 per cent in 1995–2009. In the latter period, the annual growth rate of fixed assets investment reached 20 per cent between 2003 and 2007. In tackling the global financial crisis, the growth rate of fixed assets investment rose to 33.15 per cent in 2009. Even if the outlier of 2009 is eliminated, the rate was still as high as 15.64 per cent in the period from 1995 to 2008.

Such rapid growth of fixed assets was not sustained in the years to come for three reasons. First, as a result of widespread labour shortages, marginal return to capital is declining at an accelerating pace (Cai and Zhao 2012), which will impede such a high speed of investment growth. Second, as population dependence ratios increase, the savings rate tends to fall, which results in

a slowdown of investment growth. Last, but not least, relatively slower growth of capital formation will help China transform its growth pattern that overwhelmingly relies on domestic investment, and move to a more balanced and sustained pattern of growth.

In an equation based on least squares regression, we incorporate return to capital (wK) as an independent variable to regress the dependent variable of the growth rate of total investment in fixed assets in the whole country (excluding state budgetary investment). Data used in the regression cover the years from 1982 to 2005. The estimated results are as follows:

$$I = -6.1395 + 0.9459^{*}wK$$
$$(19.7312)\ (0.8422)$$
$$R^2 = 0.0542 \text{ D.W.} = 0.9765$$

The average return to capital of 20.22 per cent in 1996–2005 estimated by Bai et al. (2006) is put into the estimated equation, thus obtaining an annual growth rate of investment of 12.99 per cent. The annual growth rate of investment in fixed assets in China is preset as 13 per cent in the period from 2012 to 2020.

It is worth noting that the assumption is not made as a result of the above simulation, but in light of economic theory and China's economic reality. That is, a rational response to the substantial fall in marginal return on capital, with an absence of government intervention, should be slower growth of capital investment. In fact, such a predetermined annual growth rate of 13 per cent is still higher than the actual growth rate in the period from 1996 to 2005.

Assumption II: Labour Force will Decrease in the Future

The demographic and economic trends have led to a changed relationship between labour supply and demand. Take the annual increase in the number of people between the ages of 15 and 59 on the supply side, and annual increase in the number of urban workers on the demand side. When the two trends are examined together, the changing dynamics of the labour market become obvious. Since the number of agricultural workers has been falling, while that of non-agricultural workers in rural areas is not expected to expand, the increases in the number of urban workers, migrant workers included, can be treated as representative of the magnitude of the overall labour demand of the Chinese economy.

Below is a closer examination of the general employment situation in China, by comparing the demand and the supply of labour for urban sectors. There are two parts to the statistical data on urban employment in China. The first includes the total number of urban employees, which is published by

the National Bureau of Statistics (NBS). This number does not, however, cover most migrant workers in urban areas. According to estimates made on the basis of micro data from 2009, only 12.5 per cent of the total of 310 million urban employees were migrant workers. The second part includes the total number of people classifiable as migrant workers according to NBS official definition. According to that definition, an individual qualifies as a 'migrant worker' if s/he has been away from the town or township of their household registration for six months or more. Surveys have shown that of all migrant workers, 95.6 per cent work and live in cities of varying sizes. Factoring in the overlap between these two numbers, we can calculate the actual number of urban workers, inclusive of both registered urban residents and migrant workers. We can then compare this number with the total number of people of working age in the country (Table 4.1).

Table 4.1 Increases in demand for and supply of labour force (million, %)

	Urban resident workers		Migrant workers		Working age population	
	Numbers	Growth rate	Numbers	Growth rate	Numbers	Growth rate
2001	236	–	80	–	844	–
2002	241	2.1	100	24.7	859	1.8
2003	246	2.0	109	8.8	872	1.6
2004	250	1.8	113	3.8	886	1.5
2005	254	1.7	120	6.4	900	1.6
2006	259	2.0	126	5.0	907	0.8
2007	265	2.1	131	3.7	912	0.6
2008	268	1.3	134	2.5	917	0.5
2009	272	1.4	139	3.5	920	0.3
2010	277	1.6	146	5.3	939	2.1
2011	280	1.0	152	3.7	939	-0.1

Source: Authors' calculation based on *China Statistical Yearbook* (various years), *China Yearbook of Rural Household Survey* (various years), *China Population Yearbook* (various years), and Du and Hu (2011).

Between 2001 and 2011, the labour demand of urban sectors, which encompasses employment among both urban residents and migrants, grew at an annual rate of 3.2 per cent. During the same period, labour supply, measured by the number of people of working age, grew by an annual rate of only 1.1 per cent. For the purpose of this study, we have excluded people older than 60 from working age population because, given China's retirement age—60 for men and 55 for women—they, by default, stand little chance of finding a job in the present labour market. A look at people between the ages of 15 and 59 shows that this population had begun to shrink by 2010. This suggests, among other things, that the problem of high rates of underemployment in both the rural

and the urban labour markets was finally easing. As such, constant surplus of supply relative to demand no longer accurately describes China's labour market after the passage of the Lewis turning period.

Having observed that the working age population aged between 15 and 59 years is in decline, it can be assumed that the natural unemployment rate will remain the same as it was in 2009, namely, NAIRU = 4.132% (Du and Lu 2011), and that the labour force participation rate will follow the trend of the labour force participation rate, which was calculated using the Hodrick–Prescott filter method. As the population aged between 15 and 59 years peaked in 2010, its annual growth rate will be –0.33 per cent in 2011–2015 and –0.31 per cent in 2016–2020. This means that the annual growth rate of employment will be –0.76 per cent during the 12th five-year plan period and –0.74 per cent in the 13th five-year plan period. If the natural unemployment rate and the labour force participation rate remain unchanged in the following two five-year plan periods, the reduction in the size of the working age population will lead to a fall in the potential GDP growth rate.

Assumption III: Total Factor Productivity Growth will be Reduced but Remain Relatively High

Kuijs (2009) attributes the impressive increase in TFP during the period from 1994 to 2009 to restructuring of the state sector, China's entry into the World Trade Organization, and the successful integration of manufacturing into the world economy. Those forces, however, will diminish in the years to come. Hence, he expects a reduction of 0.5–2.3 percentage points in TFP per year in the period from 2010 to 2020. Using a *Hodrick–Prescott* filter decomposition, we assume the trend annual TFP growth rate to be 3.10 per cent in 2011–2015 and 2.70 per cent in 2016–2020.

Based on the assumptions made above on the decline in the labour force and TFP growth and the slower growth of investment, we can estimate the potential growth rate of the Chinese economy for the period of 2011 to 2020. Our finding that the potential growth rate will decline and the trend will continue is not surprising, because many others have reached the same conclusion (e.g. Kuijs 2009; World Bank 2012). The predicted potential growth rate is much lower here, however, than that estimated by others (e.g. see Kuijs, 2009). The potential GDP growth rate we estimate is 7.2 per cent for the 12th five-year plan period, and 6.1 per cent for the 13th five-year plan period (Table 4.2). This conclusion is not an exaggeration, given that the inevitable slowdown of mass labour migration from agricultural to non-agricultural sectors, which has been the main source of TFP growth, is not taken into account.

Table 4.2 Estimated results for potential inputs and outputs in China, 1978–2020

Growth rate (%)	1978–1994	1995–2009	2011–2015	2016–2020
Actual output	10.06	9.90		
Potential output	10.29	9.83	7.19	6.08
Actual employment	2.45	0.97		
Potential employment	3.23	0.90	−0.76	−0.74
Actual labour productivity	6.55	8.84		
Potential labour productivity	6.85	8.86	8.02	6.87
TFP	0.78	3.89	3.10	2.70
K/L	10.38	13.29	18.21	15.43

Notes: K, assumed growth rate of fixed assets investment (capital formation); L, potential growth rate of employment.

Source: Authors' own estimations.

It is not proposed here that policy-makers pursue achieving actual GDP growth exceeding the potential rate, but rather ways are recommended to achieve enhanced potential growth rate through increasing the labour force participation rate and the TFP growth rate, which require a deepening of economic reforms.

Increasing the Labour Force Participation Rate

Data from the 6th national census show that the labour force participation rate was 70.80 per cent for population aged 16 years and above, and 77.26 per cent for population aged between 16 and 64 years in 2010. A further look at geographic distribution shows that the labour force participation rate for population aged 16 years and above was 62.20 per cent in cities, 67.32 per cent in towns and 77.62 per cent in rural areas. For population aged between 16 and 64 years, the labour force participation rate was 68.18 per cent in cities, 73.27 per cent in towns and 84.92 per cent in rural areas. The labour force participation rate at present is lower than in the 1990s, and it is likely to be even lower the following two factors are considered.

First, the exclusion of the agricultural labour force from the calculation would result in a lower labour force participation rate. Because there is no retirement age in agriculture, when the number of workers engaged in agriculture is counted, as is the common practice in statistics, the labour force participation rate tends to be overestimated. At the present stage of economic development in China, economic growth is accompanied by a constant decline in the agricultural share in terms of both output value and employment. Thus, the participation rate of the non-agricultural labour force is a better indicator of the real situation of the labour market.

Based on data of the 6th census, here, the labour force participation rate is recalculated by excluding agricultural sectors, and it is found to be much lower than that calculated by including agriculture (Table 4.3). For example, for the 20–25-year age group, the participation rate of the non-agricultural labour force is 72.55 per cent, which is 9.79 percentage points lower than the participation rate of the total labour force. This implies that, as the agricultural share of the labour force further declines in the future, the labour force participation rate will drop much faster than what previous statistics would suggest.

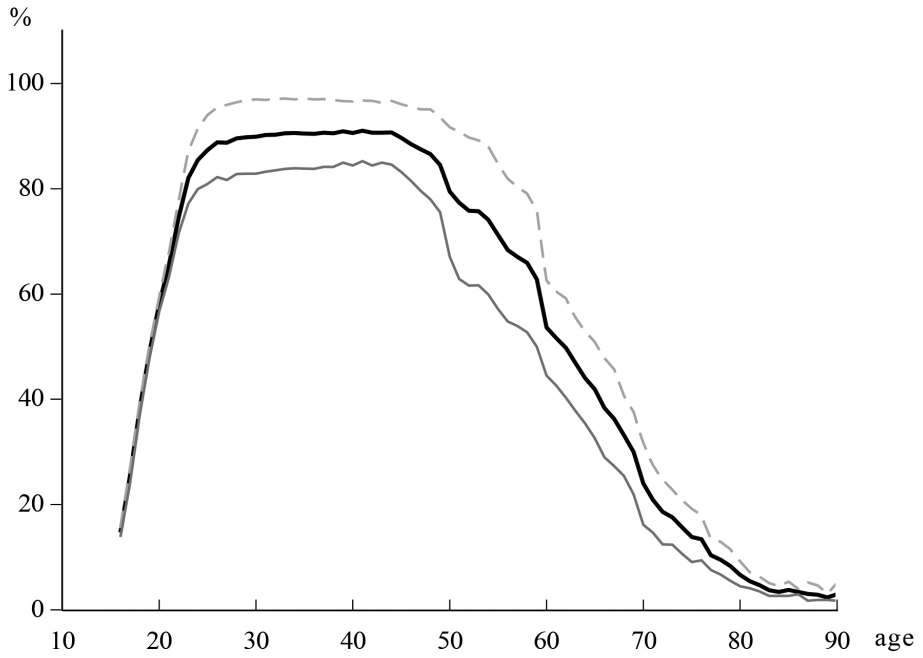
Table 4.3 Labour force participation rates in China by age group and gender (%)

Age groups	Total LFPR (including agriculture)			LFPR of non-agriculture		
	Total	Male	Female	Total	Male	Female
16–20	32.44	33.06	30.72	21.78	22.53	21.31
20–25	72.55	76.66	69.70	62.76	68.91	58.95
25–30	88.88	95.73	82.10	84.33	94.01	74.61
30–35	90.30	97.01	83.47	85.98	95.73	75.79
35–40	90.62	96.92	84.18	85.53	95.36	75.02
40–45	90.73	96.63	84.74	84.43	94.50	73.41
45–50	87.73	95.06	79.58	78.49	91.64	62.87
50–55	76.31	89.90	62.62	56.99	81.62	32.19
55–60	67.29	80.41	53.71	37.57	60.88	15.04
60–65	49.59	58.14	40.11	13.80	22.41	5.89

Source: Authors' calculation based on 1‰ sampling data of 6th census.

Second, the extension of years of schooling would lower the labour force participation rate. As is shown in Figure 4.2, the labour force participation rate distribution by age can be characterised by a reverse U-shaped curve. That is, for lower age groups, more people are still in school, which makes labour force participation low; labour force participation substantially increases when people enter their 30s and 40s; and labour force participation declines as workers get older, because they have either a stronger desire to retire or less sought-after skills to meet the demands of the labour market. For all age groups, the labour force participation rate for men is higher than that of women, and the non-agricultural labour force participation rate is lower than the total labour force participation rate.

Figure 4.3 Labour force participation rate in China, 2010



Source: Authors' calculation based on the 6th census.

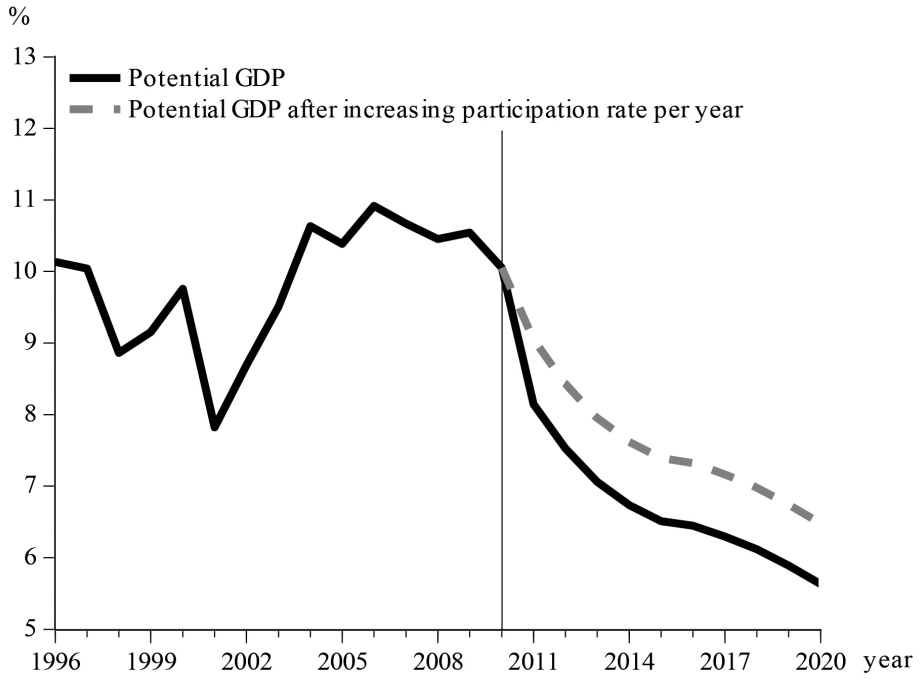
It is worth noting that although the present labour force participation rate in China is still high, it will change dramatically as population aging accelerates. As the size of the working age population is no longer increasing, labour force participation determines the labour supply and, therefore, constrains the potential growth rate.

After 2011, the potential employment growth rate will become negative: –0.76 per cent in the 12th five-year plan period and –0.74 per cent in the 13th five-year plan period. Because the root cause of this negative growth of employment, namely, the reduction of the total population aged 15 to 59 years in 2010 and the population aged 15 to 64 years in 2013, cannot be altered, the enhancement of labour force participation is the only way to increase potential labour supply and, in turn, to expand the potential output.

To test such a hypothesis, Figure 4.4 simulates the impact of an increase in the labour force participation rate on the potential GDP growth rate. Based on the above-described growth accounting equation, a scenario is assumed in which the labour force participation rate increases one percentage point every year in the period from 2011 to 2020. This results in an average potential growth rate increase from 7.19 to 8.09 per cent during 2011–2015 and an average potential

growth rate increase from 6.08 to 6.94 per cent during 2016–2020. As a result, the potential GDP growth rate will increase by an extra 0.88 percentage points per annum in the period from 2011 to 2022 (Figure 4.4).

Figure 4.4 Effect of one percentage point increase in labour force participation rate on potential GDP growth rate



Source: Authors' simulation.

There are three potential ways for China to increase labour force participation. The first is to postpone the retirement age so that the labour force participation rate of workers at older ages can be increased. Although this measure is widely used in developed countries, it is not equally relevant for China, because older Chinese workers are often not sufficiently educated to meet the labour market demand for skills, and are likely to be in a vulnerable position if they postpone retiring. Therefore, this policy option should not be chosen in the short run.

The second method is to further promote labour migration from rural to urban areas. Compared to countries with similar per capita income, China has a relatively larger share of labour in agriculture. The possibility exists for labour migration to occur so that labour force participation can be increased in non-agricultural sectors. The existing household registration or *hukou* system that segregates the labour market between rural and urban areas still prevents rural-to-urban migrant workers from settling down in urban areas legitimately and

permanently. Therefore, the *hukou* reform, which is aimed at legalising migrant workers' citizenship in cities, will significantly stabilise supply of labour, tap into the potential labour force, and, therefore, increase potential output.

The third approach is to raise the employment rate or to lower the unemployment rate. As China is moving away from possessing an unlimited supply of labour, and towards a neoclassical labour market framework, today's employment problems show both neoclassical and dual economy characteristics. That is, while there is still surplus labour in agriculture, the more frequent emergence of cyclical unemployment, structural unemployment and frictional unemployment raises new challenges in regards to China's macroeconomic and employment policies. The manner in which such challenges are responded to can reshape potential GDP growth in the future.

Improving Total Factor Productivity

In the face of a declining potential growth rate, the central and local governments would tend to adopt industrial policies, regional strategies and stimulus plans to pursue a growth rate exceeding the potential rate. The temptation is great because those policy measures are simple for governments to implement and they generate immediate effects. The lessons from China's economic growth per se, however, and from its forerunners in economic development (e.g. Japan) show that those policies are likely to become distortionary, and eventually impact on the sustainability of economic growth.

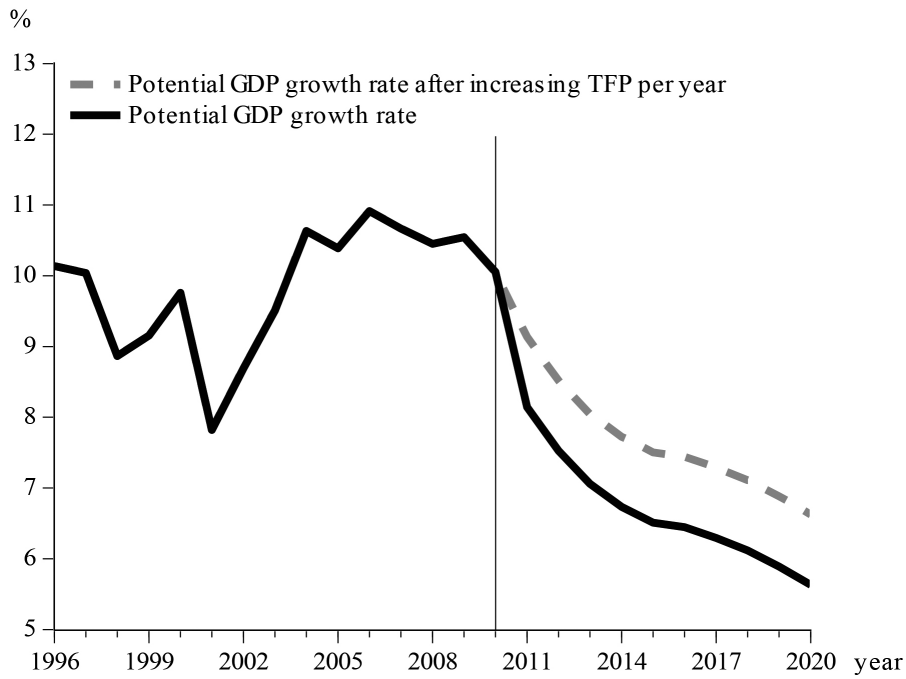
In contrast, deepening economic reform in various areas to expand the potential growth rate would require considerable long-term effort. As the returns to capital diminish, the old pattern of China's economic growth cannot continue, and the challenge to seek new sources of economic growth intensifies. According to the neoclassical theory of growth, such new sources must come from improvements in TFP.

The residual output that cannot be explained by inputs of production factors comes from TFP growth, which includes technological advancement, resource allocative efficiency, technical efficiency, and institutional and managerial innovation. In a neoclassical model of economic growth, TFP growth is the dominant, if not the only, driver of potential growth of output.

Based on the existing model, the scenario in which TFP grows at a rate that is one percentage point higher per year in the period from 2011 to 2020 can be assumed. That is, the annual TFP growth rate would increase to 4.01 per cent from the current 3.01 per cent. Our simulation shows that such a higher TFP growth rate would lift the annual growth rate of potential output to 8.19 per

cent in 2011–2015 and 7.07 per cent in 2016–2020 (Figure 4.5). Overall, if China could manage to accomplish an extra percentage point of TFP growth, its potential annual growth rate would increase by 0.99 percentage points in the period from 2011 to 2020.

Figure 4.5 Effects of one extra percentage point of TFP growth on potential GDP growth rate



Source: Authors' simulation.

Over the past 30 years of rapid economic growth in China, the impressive performance in TFP has been largely attributed to resource allocative efficiency through labour mobility from agricultural to non-agricultural sectors. In the course of the dual economy development, with an unlimited supply of labour, such productivity gains have been like *low-hanging fruit*. As the surplus labour force has become gradually absorbed by the unprecedented expansion of secondary and tertiary sectors, the mass labour migration has slowed down, and the opportunity to gain resource allocative efficiency has decreased.

Furthermore, the arrival of the Chinese economy at a higher phase of development means that the gap in technology between China and developed countries has narrowed, which makes it relatively harder for China to increase TFP through technological advancement.

Therefore, China should search for new ways to improve TFP to expand its potential growth. In fact, as China's economic growth follows more of a neoclassical framework, it will be difficult for China to add even one additional percentage point to its TFP growth rate. It is essential for the government to be determined to complete the task and is aware of where the extra productivity should come from. For China, apart from the traditional sources of TFP improvement, such as achieving technological parity with developed countries and labour migration from rural to urban sectors, there is tremendous opportunity to gain allocative efficiency in the following areas.

First, given the large disparities in productivity among subsectors within, say, the secondary sector, the mobility of factors of production from the low productivity subsector to the high productivity subsector can improve the overall productivity of the economy as a whole. Second, the flow of factors of production among enterprises can also provide allocative efficiency because there are huge disparities in productivity performance among enterprises within narrowly defined sectors. A so-called *creative destruction* mechanism could be created, which allows for more efficient enterprises to survive, expand and develop, and causes long-term inefficient enterprises to be eliminated. This mechanism could generate the third resources allocative efficiency.

As is well documented in the economics literature, in a mature market economy like the United States, allocative efficiency relating to entry versus exit and expansion versus contraction of firms within narrowly defined sectors contributes one-third to a half of the productivity growth (e.g. Foster et al. 2008). Based on an empirical and comparative study, Chang-Tai Hsieh and Peter Klenow (2007) find that by reallocating capital and labour to equalise marginal products among plants to the extent observed in the United States, China's manufacturing sector could gain a 30 to 50 per cent increase in its TFP.

To gain resource allocative efficiencies in the areas described above requires a policy environment within which factors of production can freely flow among regions, sectors and enterprises. There still exist institutional barriers preventing investors from freely entering certain sectors where state-owned enterprises dominate, resulting in a great loss of allocative efficiency. The Chinese Government should redefine the role and function of the state enterprises to keep them within necessary and limited arenas of economic activities, while creating equal competition opportunities for all sectors and enterprises.

Conclusion and Policy Implications

As a result of the changes in the population age structure, the working age population (aged 15 to 59 years) stopped growing in 2010. Meanwhile, economic growth continues to generate a large demand for labour, thus absorbing the

surplus labour force in agriculture. As the surplus labour force in agriculture is substantially decreasing, the Chinese economy is entering a phase of transition shifting from a kind of dual economic development to the pattern of neoclassical growth.

According to the neoclassical theory of growth, it is unlikely that developed economies can realise growth rates comparable to their developing counterparts, which are still in the process of catching up. Accordingly, fast growth will eventually slow down as an economy moves to a certain turning point, as experiences worldwide suggest (Eichengreen et al. 2011).

There is no need to fear the slowdown of the potential growth rate. The new stage of development, however, requires China to accomplish a fundamental transformation of its economic growth pattern, from sole reliance on inputs of capital and labour to greater improvements in TFP. Therefore, the key to sustaining economic growth through expanding the potential growth rate lies in supply-side factors. If the government policies wrongly focus on stimulating demand-side factors to reach a growth rate exceeding the potential capacity of production, long-term economic growth will not be healthy and will cause a great deal of distortions. Instead, sound policies should be implemented bearing the following in mind.

First, the central and local governments should accept slower economic growth. Policy decisions should be made by adjusting supply-side factors rather than demand-side factors. Even an undesirable fall in the growth rate, caused by shocks from demand-side factors, should not be a reason for policy-makers to introduce expansionary macroeconomic policy measures. Instead, policy-makers need to determine whether growth rates have been reduced to below-potential levels. If this is not the case, a situation where export demand and investment demand are weak could be taken as a chance for the economy to accelerate its transition towards a consumption-driven pattern of growth, and to sustain growth in a more balanced manner.

Second, economic reforms should modify the traditional growth pattern. Reforms have been a major driving force of the unprecedented economic growth over the past 30 years. A competitive environment is vital for enhancing the potential growth rate in China over the next decade or so.

Third, there is an important role for the government to play in helping improve China's TFP. Paul Krugman (1994) was critical of Singapore's growth model, to which the Singaporean Government responded by introducing a national goal of two per cent annual TFP growth (Felipe, 1997). It is worth noting that improving TFP will critically depend on how China adopts further measures to deepen its reforms in many areas, including its labour market, the financial sector, the enterprise system as well as the government system.

References

Bai, Chong-En, Hsieh, Chang-Tai, & Qian, Yingyi, 2006, 'The Return to Capital in China,' *NBER Working Paper* No. w12755, National Bureau of Economic Research, Cambridge, MA.

Bloom, David E. & Williamson, Jeffrey G., 1998, 'Demographic Transitions and Economic Miracles in Emerging Asia', *World Bank Economic Review*, Vol. 12, No. 3, pp. 419–55.

Cai, Fang & Zhao, Wen, 2012, 'When Demographic Dividend Disappears: Growth Sustainability of China', in Masahiko Aoki & Jinglian Wu (eds), *The Chinese Economy: A New Transition*, Palgrave Macmillan, Basingstoke.

CDRF (China Development Research Foundation), 2012, *China Development Report, 2012*, China Development Publishing House, Beijing.

China Population Statistics Yearbook, compiled by Department of Population, Social, Science and Technology Statistics, National Bureau of Statistics of China, Beijing, China.

China Statistical Yearbook, compiled by National Bureau of Statistics of China, Beijing, China.

China Yearbook Of Rural Household Survey, compiled by Rural Social and Economic Survey Office of the State Statistics Bureau, Beijing, China.

Du, Yang & Ying, Hu, 2011, 'Working age population and labor force supply', Working Paper of Institute of Population and Labor Economics, http://iple.cass.cn/news/655101.htm.

Du, Yang & Yang, Lu, 2011, 'The Natural Rate of Unemployment in China and its Implications', *The Journal of World Economy*, vol. 34, no. 4, pp. 3–21.

Eichengreen, Barry, Park, Donghyun, & Shin, Kwanho, 2011, 'When Fast Growing Economies Slow Down: International Evidence and Implications for China', *NBER Working Paper* No. 16919, National Bureau of Economic Research, Cambridge, MA.

Felipe, Jesus, 1997, 'Total Factor Productivity Growth in East Asia: A Critical Survey', *EDRC Report Series*, No. 65, Asian Development Bank, Manila, Philippines.

Foster, Lucia, Haltiwanger, John & Syverson, Chad, 2008, 'Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?' *American Economic Review*, vol. 98, no. 1, pp. 394–425.

Garnaut, Ross, 2010, 'Macro-Economic Implications of the Turning Point', *China Economic Journal*, vol. 3, no. 2, pp. 181–90.

Guo, Qingwang & Jia, Junxue, 2004, 'Estimating Potential Output and the Output Gap in China', Economic Research Journal, no. 5, pp. 31–9.

Hsieh, Chang-Tai & Klenow, Peter J., 2007, 'Misallocation and Manufacturing TFP in China and India', *NBER Working Paper*, No. 13290, National Bureau of Economic Research, Cambridge, MA.

Kharas, Homi, 2011, 'China's Transitions to a High Income Economy: Escaping the Middle Income Trap', in Edwin Lim & Michael Spence (eds), *The Medium and Long Term Development and Transformation of the Chinese Economy: An International Perspective*, CITIC Publishing House, Beijing, pp. 470–501 (in Chinese).

Krugman, Paul, 1994, 'The Myth of Asia's miracle', *Foreign Affairs*, vol. 73, no. 6, pp. 62–78.

Kuijs, Louis, 2009, 'China Through 2020—A Macroeconomic Scenario,' *World Bank China Office Research Working Paper*, No. 9, Beijing.

Kuijs, Louis & Wang, Tao, 2006, 'China's Pattern of Growth: Moving to Sustainability and Reducing Inequality', *China and World Economy*, vol. 14, no. 1 , pp. 1-14.

Lu, Yang, 2012, 'China's Natural Growth Rate of Output and its Forecast,' in Cai Fang (ed.), *The China Population and Labor Yearbook No.13: Demographic Transition and Economic Rebalance in China*, Social Sciences Academic Press, China, pp. 98–111.

Wang, Guangzhou & Niu, Jianlin, 2010, 'Composition and Development of the Chinese Education System,' in Cai Fang (ed.), *The China Population and Labor Yearbook Volume 2: The Sustainability of Economic Growth from the Perspective of Human Resources*, Brill, Leiden; Boston, pp. 43–62.

Williamson, Jeffrey G., 1998, 'Growth, Distribution, and Demography: Some Lessons from History,' *Explorations in Economic History*, vol. 35, no. 3, pp. 241–71.

World Bank, 2012, 'China 2030 Building a Modern, Harmonious, and Creative High-Income Society', http://www.worldbank.org.