2. China's Shift from the Demographic Dividend to the Reform Dividend

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Introduction

'Demographic dividend' refers to the positive impact on economic growth that is generated by a relatively low and falling ratio of dependants to working-age population. The supply factors required for the economic growth of a country increase when the dependency ratio falls and the working-age population rises. The so-called demographic dividend is delivered through rapid increases in the labour force, a high rate of return on capital and more efficiency in labour force reallocations, which are all conducive to economic growth.

Population growth goes through three stages in economic development: 1) the 'high fertility rate, high mortality rate and low growth rate' phase; 2) the 'high birth rate, low mortality rate and high growth rate' phase; and 3) the 'low birth rate, low death rate and low growth rate' stage. The demographic dividend often appears at the end of the second stage or the start of the third stage. The demographic dividend often appears in a specific stage of a country's economic development, which has been confirmed by the historical experiences of many countries (Williamson 1997).

The demographic transition begins with the advent of the era of a low rate of fertility. After a while, the size of the working-age population falls and the population dependency ratio increases, leading to the fall and eventual disappearance of the demographic dividend. The main characteristics of the end of the demographic dividend are a reduction in the supply of labour, which reduces in absolute number, which leads to diminishing marginal returns to other factors of production. The total factor productivity (TFP) growth rate tends to decline when rural-to-urban migration ends. Therefore, the potential growth rate declines when the demographic dividend ends.

China's working-age population, aged between fifteen and fifty-nine years, peaked in 2010 (and the population between fifteen and sixty-four years peaked in 2013). The population dependency ratio increased from 2011. Cai and Lu (2013a) and Lu and Cai (2014) estimate China's potential growth rate will slow to 6–7 per cent over the next 10 years, from the 10 per cent observed in the

past 10 years. The falling potential growth rate is not a phenomenon unique to China. In a recent multi-country analysis, Eichengreen et al. (2011) construct a sample of cases where fast-growing economies slow significantly, in the sense that the growth rate downshifts by at least 2 percentage points, when their per capita incomes reach around US$17 000 (in 2005 constant international prices)—a level China should achieve by or soon after 2015.

The study also points out many other economic factors that influence the point at which the growth slowdown occurs. A higher old-age dependency rate is one such factor, which appears to increase the likelihood of an economic slowdown due to its association with lower savings rates and lower labour force participation rates. A characteristic in China—'getting old before getting rich'—will undoubtedly lead to an economic slowdown ahead of our expectation. At the same time, Eichengreen et al. (2011) emphasise that there is no mechanical relationship between per capita incomes and growth slowdowns, and that how long rapid growth continues depends also on economic policy. For some countries, after an extended period of slower growth, the responsive economic reforms adopted by governments led to a period of faster growth, but this momentum soon eased, leading to a new round of economic slowdown. Examples include the experiences of Argentina, Hong Kong, Ireland, Israel, Norway, Portugal and Singapore.

The supply of factors of production and the improvement of TFP face institutional barriers. Therefore, removing these barriers raises the potential growth rate. In this sense, the greater the presence of institutional barriers, the more radical reforms are needed, and the more significant will be the impact on the improvement of the potential growth rate, should reforms be implemented to overcome those institutional barriers. This outcome can be called the reform dividend. The chapter provides a simulation of the growth effects resulting from various possible reform measures. The short-term and long-term growth effects generated by reform measures are estimated by applying the growth accounting equation, with the goal of identifying the most efficient reform measures. It then provides some policy suggestions with respect to the ways by which the transition from China's demographic dividend to the reform dividend can take place in order to maintain long-term sustainable economic development after the end of the demographic dividend.

The theoretical logic of the reform dividend

A country's potential growth rate, determined by the growth of factors of both production and productivity, slows when the demographic dividend starts to disappear. For example, Kuijs (2010) projects that China's potential growth

rate will slow from 9.9 per cent during 1978–94, to 9.6 per cent during 1995–2009, and further to 8.4 per cent during 2010–15. Kuijs places no particular emphasis on the role of demographic factors in the study. Taking into account the changing demographic structure, Cai and Lu (2013a) argue that as the end of China's demographic dividend approaches, the potential growth rate will slow from more than 10 per cent per year on average in the past 30 years to 7.3 per cent during the period of China's Twelfth Five-Year Plan (2011–15). If we take into account the role of human capital, the impacts of the population dependency ratio on capital formation and the impacts of demographics on the labour participation and natural unemployment rates in the model, China's potential growth rate will slow to 7.75 per cent during the Twelfth Five-Year Plan (Lu and Cai 2014).

Such a result is based on two hypotheses: 1) there is a continual slowdown in the labour supply; and 2) the TFP growth rate remains constant. In other words, the net effect of the demographic dividend on the potential growth rate has been estimated under the assumption that the institutional barriers that block the supply of production factors and the increase of productivity have not yet been removed. Increasing labour supply and human capital through reforms can also increase the potential growth rate from the supply factors. Furthermore, by eliminating the barriers to full competition so as to increase TFP, it is possible to further improve China's future potential growth rate.

In discussing the issue of China's reform, many express the view that there will be a trade-off between reform and economic growth. That means in order to implement the proposed reforms, the Chinese Government needs to sacrifice the economic growth rate; however, one may also argue that reforms could be conducive to economic growth. The theory of institutional change, which says that change occurs only at the point at which the benefits from reform outweigh the costs, refers only to the political benefits and costs that are considered by decision-makers—that is, whether the political support (benefits) brought by a reform exceeds its opposition (costs). But, in general, when the gains surpass the losses in economic terms, there is sufficient reason to convince policymakers to implement reform. China's reforms in many areas aim at improving the efficiency of resource allocation and income distribution. Reform programs have also been implemented to enhance the equalisation of the level of basic public services across different regions in China. These reform measures are consistent with the Government's goals of achieving a more equitable society. Therefore, in implementing these reforms, China can benefit from both the direct and the indirect reform dividends. One would need to identify the sources of economic slowdown in order to implement the relevant reforms that can bring direct effects on improving the potential growth rate, as well as other indirect effects that are conductive to economic growth.

A correct understanding of the reform benefits or reform dividend is important for the formation and cohesion of the reform consensus, helping with the provision of more options, and strengthening the impetus, for reform. Although the reforms can bring about net benefits, the costs and benefits are often asymmetrically apportioned among different parties. Two different methods can be adopted in reform decisions. First, the 'Pareto improvement' says that reforms can be promoted on the premise of not making parties, including vested interests, worse off. Second, the 'Kaldor improvement' says that although some interest groups may be negatively affected by the reforms, the net benefits the reforms bring allow a portion of these to be used to compensate the losers. The current reform task has rarely followed a Pareto improvement. There are, however, opportunities for China to recognise and grasp the benefits of reform, and use the Kaldor improvement to reduce resistance to reform. The estimation reported in this chapter has shown that reforms do bring net benefits to the economy by directly increasing China's potential growth rate. The relationship between China's reform and its economic growth rate is 'mutual promotion' rather than 'substitution'. The findings are supporting the reform agenda as promulgated at the third plenary of the Eighteenth Party Congress, calling for deepened economic and institutional reforms to promote economic growth in China.

'Reform dividend' simulation

Model specifications[1]

We use a standard Cobb–Douglas production function, adding the variable human capital, to project the potential GDP growth rate (Equation 2.1).

Equation 2.1

$$Y = AK^{\alpha}(hL)^{1-\alpha}$$

In Equation 2.1, Y is real GDP, A is total factor productivity (TFP), L is employment, K stands for capital stock (in constant prices), and h stands for human capital. We deduce labour productivity by dividing hL on both sides of Equation 2.1 (Equation 2.2).

Equation 2.2

$$Y/hL = A(K/hL)^{\alpha}$$

1 This method was applied by Lu and Cai (2014).

In Equation 2.2, labour productivity, Y/hL (represented by y), is a function of the *TFP* and capital–labour ratio, K/hL (represented by k). That is, $y = Ak^{\alpha}$. The labour productivity growth rate can then be rewritten and estimated from Equation 2.3.

Based on Equation 2.3, we can calculate the estimated value of return to capital, $\hat{\alpha}$, and return to labour, $(1-\hat{\alpha})$, by using $\Delta y_t/y_{t-1}$ as the dependant variable and $\Delta k_t/k_{t-1}$ as the independent variable.

Equation 2.3

$$\Delta y_t / y_{t-1} = \Delta A_t / A_{t-1} + \hat{\alpha}\Delta k_t / k_{t-1} + \varepsilon_t$$

From the time series of $\Delta y_t/y_{t-1}$, $\hat{\alpha}$, $\Delta k_t/k_{t-1}$, the growth rate of TFP, $\Delta \hat{A_t} / A_{t-1} + \varepsilon_t = \Delta y_t / y_{t-1} - \hat{\alpha}\Delta k_t / k_{t-1}$, could be estimated by using Equation 3.3. Then $\Delta \hat{A_t} / A_{t-1}$ can be calculated by applying the Hodrick–Prescott filter method to diminish error term ε_t.

All steps above are identical with the method that calculates the growth rate of TFP. It is necessary to use potential employment, L_t^*, to calculate the potential GDP growth rate. Where $L_t^* = population_{15+,t} \times Tr_{15+,t} \times (1 - NAIRU_{15+,t})$, $population_{15+,t}$ is the population aged fifteen years and above; $Tr_{15+,t}$ is the trend of the labour participation rate, which can be estimated by the Hodrick–Prescott filter method; and $NAIRU_{15+,t}$ is the natural rate of unemployment. China's time-varying NAIRU is estimated by Du and Lu (2011).

Building on $\Delta \hat{A_t} / A_{t-1}$, $h_t L_t^*$, $\hat{\alpha}$ and $\Delta k_t^* / k_{t-1}^*$, the potential labour productivity growth rate, $\Delta y_t^* / y_{t-1}^*$, could be estimated, where $\Delta y_t^* / y_{t-1}^* = \Delta \hat{A_t} / A_{t-1} + \hat{\alpha}\Delta k_t^* / k_{t-1}^*$, which stands for the growth rate of potential labour productivity; $k_t^* = K_t / h_t L_t^*$; $y_t^* = Y_t^* / h_t L_t^*$, and Y_t^* is the potential GDP in year t. Building on $\Delta y_t^* / y_{t-1}^*$ and $h_t L_t^*$, Equation 2.4 can be deduced.

Equation 2.4

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

$\Delta Y_t^* / Y_{t-1}^*$ is the potential growth rate in year t. In Equation 2.4, four factors influence the potential growth rate—that is, the potential growth rate of the capital–labour ratio, the potential growth rate of employment, the growth rate of human capital and the TFP growth rate. Demographics affect the first three factors directly or indirectly. The TFP growth rate is, however, related more to institutional factors—for example, migration, the *hukou* system, technical

progress, and so on. If the demographic contribution to a country's economic growth can be called the 'demographic dividend' then the contribution of TFP to economic growth can be called an 'institutional dividend'.

Data

1) Y and K

The data for real GDP (at constant 2005 national prices) and real capital stock (at constant 2005 national prices) were obtained from the Penn World Table (*PWT 8.0*). China's capital stock during the period 2011–30, however, was unknown. It was necessary to estimate the missing data for capital stock by the well-known 'perpetual inventory method'—that is, $K_t = I_t + (1 - \delta_t)K_{t-1}$, where K_t and K_{t-1} are the measures of real capital stock at year t and t–1; I_t is the real capital formation of GDP in year t; and δ_t (= 5 per cent) is the rate of depreciation, noting that K_t is a weighted sum of all past levels of investment and depreciated value of the initial real capital stock.

The capital formation rate of GDP varies across countries with the stage of development, demographic structure, customs and other factors. In this chapter, we assume that the capital formation rate of GDP is a function of the population dependency ratio. Specifically, in economics, the life-cycle hypothesis (LCH) is a concept addressing individual consumption patterns—that is, members of the working-age population may save less or consume more in order to support their children and elderly members when the dependency ratio increases. It is easy to recognise, by using the expenditure approach to calculate GDP: with the rise of the population dependency ratio, the capital formation rate of GDP will decline. Thus, the basic relationship between the above two variables is obtained by the historical dataset during the period 1980–2010, $Ct = 62.733 - 0.399Dt–1$, where Ct stands for the ratio of current capital stock to one lag of GDP, and Dt–1 stands for one lag of the population dependency ratio. The capital formation rate of GDP was obtained from the World Development Indicators database (World Bank n.d.). Remarkably, building on the forecast data for population by age and sex, it's not difficult to predict the data value of capital formation and capital stock during the period 2011–50. The population forecast data were obtained from Guo's (2013) estimation.

2) Potential employment

The data for population and employment were obtained from the *China Statistical Yearbook* (NBS various years); the forecast data for population by age and sex were provided by Guo (2013). The potential employment is determined by demographic structure, the labour force participation rate and the natural

rate of unemployment—that is, $L_t^* = population_{15+,t} \times Tr_{15+,t} \times (1 - NAIRU_{15+,t})$. The labour force participation rate is, however, a function of the population's age and sex. Building on the labour force participation rate by age and sex, which is calculated from the Sixth National Census data (2010), the labour force participation rate can be obtained by consideration of the changing demographic structure of China during the period 2011–50. The forecast data for China's economically active population were estimated as Equation 2.5.

Equation 2.5

$$ACT_{i,t}^* = \sum_{n=16}^{n=95} population_{n,i,t} \times Part_{n,i,t} \quad (i = 1, 2;\ 16 \le n \le 95)$$

$$ACT_t^* = \sum_{i=1}^{i=2} ACT_{i,t}^*$$

In Equation 2.5, n stands for age ($16 \le n \le 95$); i stands for sex ($i = 1$ male, 2 female), $population_{n,i,t}$ is the population by age and sex in year t; $Part_{n,i,t}$ is the labour force participation rate by age and sex in year t; ACT_t^* stands for the total economically active population in year t.

The natural rate of unemployment is also a function of population age and sex. That means potential employment could be estimated by Equation 2.6.

Equation 2.6

$$L_{i,t}^* = \sum_{n=16}^{n=95} ACT_{n,i,t}^* \times (1 - NAIRU_{n,i,t}) \quad (i = 1, 2;\ 16 \le n \le 95)$$

$$L_t^* = \sum_{i=1}^{i=2} L_{i,t}^*$$

In Equation 2.6, n stands for age ($16 \le n \le 95$); i stands for sex ($i = 1$ male, 2 female); $ACT_{n,i,t}^*$ is the economically active population by sex and age in year t; $NAIRU_{n,i,t}$ is the natural rate of unemployment by sex and age in year t. L_t^* stands for the potential employment in year t.

3) Human capital

The data for human capital were drawn from the index of *hc* in the Penn World Table (*PWT 8.0*). The *hc* index, in fact, is a re-estimated dataset built on the education returns estimated by Psacharopoulos (1994), and the average years of schooling provided by Barro and Lee (forthcoming). Forecast data for the average years of schooling, by each five years, were estimated by the similar

method provided by Barro and Lee (forthcoming). The data for other years were filled in by a smoothing method, and the index of *hc* during 2011–50, ultimately, could be obtained.

The simulation results

1) The 'short-term' and 'long-term' effects of relaxing fertility policy

When projecting China's potential growth rate, we assumed the TFP remained unchanged, while the other factors in production, including capital, labour and human capital, change with the changes in China's demographic structure. That is, the predicted population by age and sex could influence the potential growth rate directly and indirectly. The population prediction depends on the value of the total fertility rate (TFR). In the existing 'selective two-child policy', however, the TFR will theoretically not be more than two. That means the fertility rate could not reach the replacement level. Therefore, the present study projects the trends of the potential growth rate in China by using the respective values of TFR (1.6, 1.7 and 1.94) on which Guo (2013) has forecast Chinese population by age and sex. The estimation results, which accord with Lu and Cai (2014), are shown in the first three lines of Table 2.1.

Table 2.1 Policy Simulations of China's Potential Growth Rate, 2011–50 (per cent)

Potential growth rate (%)	**2011–15**	**2016–20**	**2021–25**	**2026–30**	**2031–35**	**2036–40**	**2041–45**	**2046–50**
I The impact of a relaxation of the population fertility policy on China's potential growth rate: 2011–50 (%)								
TFR = 1.6	7.73	6.64	5.87	5.40	5.05	4.60	4.17	3.84
TFR = 1.77	7.72	6.58	5.78	5.34	5.16	4.80	4.39	4.04
TFR = 1.94	7.71	6.50	5.66	5.23	5.29	5.08	4.65	4.25
II.1 The impact of increasing the labour force participation rate on China's potential growth rate, TFR = 1.6: 2011–50 (%)								
Add 1 percentage point	7.92	6.68	5.90	5.43	5.07	4.61	4.19	3.85
Add 2 percentage points	8.11	6.71	5.93	5.45	5.09	4.63	4.20	3.86
Add 5 percentage points	8.68	6.82	6.01	5.52	5.15	4.68	4.24	3.90

Potential growth rate (%)	2011–15	2016–20	2021–25	2026–30	2031–35	2036–40	2041–45	2046–50
II.2 The impact of increasing the labour force participation rate on China's potential growth rate, TFR = 1.77: 2011–50 (%)								
Add 1 percentage point	7.91	6.62	5.81	5.36	5.18	4.82	4.40	4.05
Add 2 percentage points	8.10	6.65	5.84	5.39	5.20	4.83	4.42	4.07
Add 5 percentage points	8.67	6.76	5.92	5.46	5.26	4.88	4.45	4.10
III.1 The impact of increasing TFP on China's potential growth rate, TFR = 1.60: 2011–50 (%)								
Add 0.5 percentage points	8.30	7.32	6.62	6.20	5.88	5.44	5.03	4.71
Add 1 percentage point	8.87	8.01	7.37	7.00	6.72	6.30	5.90	5.59
III.2 The impact of increasing TFP on China's potential growth rate, TFR = 1.77: 2011–50 (%)								
Add 0.5 percentage points	8.28	7.26	6.52	6.13	5.99	5.65	5.25	4.92
Add 1 percentage point	8.85	7.94	7.27	6.93	6.83	6.52	6.13	5.80
IV The impact of increasing the enrolment rate on China's potential growth rate: 2011–50 (%)								
TFR = 1.60	7.84	6.73	5.94	5.47	5.11	4.64	4.20	3.86
TFR = 1.77	7.83	6.66	5.85	5.40	5.22	4.85	4.42	4.06
V The impact of increasing training on China's potential growth rate: 2011–50 (%)								
TFR = 1.60	8.14	7.02	6.28	5.80	5.45	4.98	4.49	4.18
TFR = 1.77	8.12	6.96	6.18	5.73	5.54	5.17	4.70	4.37
VI Multi-level simulation: adding 1 percentage point to LFPR, 1 percentage point to TFP, and increasing the enrolment rate								
TFR = 1.60	9.18	8.13	7.48	7.10	6.80	6.36	5.95	5.62
TFR = 1.77	9.16	8.06	7.38	7.03	6.91	6.58	6.18	5.83
TFR = 1.94	9.15	7.98	7.26	6.92	7.05	6.88	6.46	6.05
VII Multi-level simulation: adding 1 percentage point to LFPR, 0.5 percentage points to TFP, and increasing the enrolment rate								
TFR = 1.60	8.60	7.45	6.72	6.29	5.96	5.51	5.08	4.74
TFR = 1.77	8.59	7.38	6.63	6.23	6.07	5.72	5.30	4.95
TFR = 1.94	8.58	7.30	6.51	6.12	6.21	6.01	5.57	5.16

Potential growth rate (%)	2011–15	2016–20	2021–25	2026–30	2031–35	2036–40	2041–45	2046–50
VIII Multi-level simulation: adding 1 percentage point to LFPR, 1 percentage point to TFP, and increasing training								
TFR = 1.60	9.48	8.44	7.82	7.45	7.16	6.72	6.25	5.96
TFR = 1.77	9.46	8.37	7.73	7.37	7.25	6.92	6.47	6.17
TFR = 1.94	9.45	8.29	7.60	7.25	7.37	7.20	6.74	6.38
IX Multi-level simulation: adding 1 percentage point to LFPR, 0.5 percentage points to TFP, and increasing training								
TFR = 1.60	8.90	7.75	7.06	6.63	6.31	5.85	5.37	5.07
TFR = 1.77	8.89	7.68	6.97	6.56	6.40	6.05	5.58	5.27
TFR = 1.94	8.88	7.60	6.85	6.44	6.52	6.32	5.84	5.47

LFPR = labour force participation rate

Source: Authors' estimations.

The impact on the potential growth rate of relaxing fertility policy has different short-term and long-term effects. Newborn babies only increase the population dependency ratio; they cannot increase the working-age population in the short term. Therefore, the saving rate decreases, the consumption rate increases and the capital formation rate then declines. In the long term, however, babies grow into adults (needing at least 15 years to reach working age), and then enter the labour market, so they then decrease the population dependency ratio and increase the supply of labour, and then help increase the potential growth rate. This mechanism describes the impact of the 'baby boom' on the potential growth rate. The trends of the potential growth rates under different assumed TFRs are shown in Figure 2.1. The results accord with the economic theory.

Let us now examine additional scenarios for China's potential growth rate on the basis of different assumptions of the TFP, by increasing the labour force participation rate, human capital and TFP. In addition, the multi-level simulation has also been shown in Table 2.1, and the detailed comparison of results based on each simulation is presented in Table 2.2.

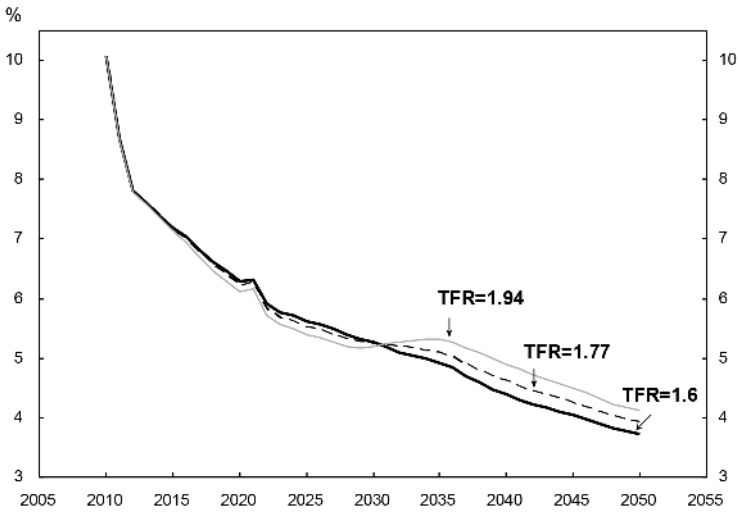

Figure 2.1 China's Long-Term Potential Growth Rate under Different Assumptions (TFR)

Source: Authors' simulations.

Table 2.2 Forecasting the Effects of Policy Measures on China's Potential Growth Rate, 2011–50 (per cent)

Potential growth rate (%)	**2011–15**	**2016–20**	**2021–25**	**2026–30**	**2031–35**	**2036–40**	**2041–45**	**2046–50**
I The influence of increasing the TFR to 1.94 on the potential growth rate: 2011–50 (%)								
Baseline (TFR = 1.60)	–0.024	–0.140	–0.204	–0.168	0.241	0.485	0.477	0.413
Baseline (TFR = 1.77)	–0.009	–0.076	–0.114	–0.103	0.135	0.279	0.259	0.209
II.1 The influence of increasing the labour force participation rate on China's potential growth rate (baseline TFR = 1.60)								
Add 1 percentage point	0.190	0.036	0.029	0.025	0.021	0.017	0.015	0.014
Add 2 percentage points	0.381	0.072	0.058	0.050	0.042	0.033	0.029	0.027
Add 5 percentage points	0.952	0.177	0.142	0.123	0.101	0.080	0.071	0.064

Potential growth rate (%)	2011–15	2016–20	2021–25	2026–30	2031–35	2036–40	2041–45	2046–50
II.2 The influence of increasing the labour force participation rate on China's potential growth rate (baseline TFR = 1.77)								
Add 1 percentage point	0.190	0.036	0.029	0.026	0.021	0.016	0.014	0.012
Add 2 percentage points	0.381	0.071	0.057	0.052	0.042	0.031	0.027	0.024
Add 5 percentage points	0.951	0.176	0.140	0.126	0.101	0.076	0.065	0.059
III.1 The influence of increasing the TFP on China's potential growth rate (baseline TFR = 1.60)								
Add 0.5 percentage points	0.568	0.680	0.748	0.797	0.828	0.844	0.858	0.869
Add 1 percentage point	1.136	1.364	1.502	1.602	1.666	1.700	1.728	1.751
III.2 The influence of increasing the TFP on China's potential growth rate (baseline TFR = 1.77)								
Add 0.5 percentage points	0.567	0.679	0.745	0.794	0.830	0.851	0.865	0.875
Add 1 percentage point	1.135	1.360	1.496	1.597	1.672	1.714	1.743	1.764
IV The influence of increasing the enrolment rate on China's potential growth rate								
TFR = 1.60	0.111	0.084	0.077	0.069	0.059	0.047	0.032	0.019
TFR = 1.77	0.111	0.084	0.077	0.067	0.060	0.047	0.031	0.017
V The influence of increasing training on China's potential growth rate								
TFR = 1.60	0.404	0.381	0.408	0.402	0.400	0.383	0.319	0.344
TFR = 1.77	0.404	0.380	0.406	0.393	0.385	0.370	0.309	0.333
VI Multi-level simulation: adding 1 percentage point to LFPR, 1 percentage point to TFP and increasing the enrolment rate, TFR increased to 1.94								
Baseline (TFR = 1.60)	1.419	1.340	1.394	1.518	2.006	2.285	2.284	2.216
Baseline (TFR = 1.77)	1.433	1.403	1.483	1.582	1.899	2.079	2.066	2.012
VII Multi-level simulation: adding 1 percentage point to LFPR, 0.5 percentage points to TFP and increasing the enrolment rate, TFR increased to 1.94								
Baseline (TFR = 1.60)	0.848	0.658	0.644	0.717	1.159	1.410	1.395	1.321

Potential growth rate (%)	2011–15	2016–20	2021–25	2026–30	2031–35	2036–40	2041–45	2046–50
Baseline (TFR = 1.77)	0.863	0.721	0.734	0.781	1.052	1.205	1.178	1.117
VIII Multi-level simulation: adding 1 percentage point to LFPR, 1 percentage point to TFP and increasing training, TFR increased to 1.94								
Baseline (TFR = 1.60)	1.72	1.64	1.73	1.85	2.33	2.61	2.57	2.54
Baseline (TFR = 1.77)	1.73	1.71	1.82	1.91	2.22	2.40	2.35	2.33
IX Multi-level simulation: adding 1 percentage point to LFPR, 0.5 percentage points to TFP and increasing training, TFR increased to 1.94								
Baseline (TFR = 1.60)	1.15	0.96	0.98	1.04	1.47	1.72	1.67	1.64
Baseline (TFR = 1.77)	1.16	1.02	1.07	1.11	1.36	1.52	1.45	1.43

Source: Authors' simulations.

Note: The baseline hypothesis for human capital accords with Lu and Cai (2014). The present study assumes that, in 2050, the rate for school-age children's enrolment remains unchanged at 99 per cent, with the graduation rates being: primary school (unchanged at 99 per cent), middle school (increased from 95 to 98 per cent) and high school (increased from 90 to 95 per cent), with other conditions unchanged.

2) Diminishing effect of the labour force participation rate

The corresponding simulation results were shown in Table 2.1 (II). The baseline scenario was keeping TFR at a constant 1.60 in II.1 and 1.77 in II.2. It is necessary to estimate the net effect of the potential growth rate by assuming the labour force participation rate increased 1 percentage point, 2 percentage points and 5 percentage points, respectively. The simulation evidence has shown that an increase in the labour force participation rate boosts the potential growth rate, whatever the TFR assumption: TFR = 1.60 or TFR = 1.70. For example, on the basis of the TFR maintaining a constant value of 1.60, China's average potential growth rate increases 0.2 percentage points during the Twelfth Five-Year Plan period if the labour force participation rate can be increased by 1 percentage point each year. The potential growth rate is increased by 1 percentage point during that period if labour force participation rate (LFPR) can be increased by 5 percentage points; however, the net effect declines (see Table 2.2). For example, the average net effect of the potential growth rate decreases from 0.18 during 2016–20 to 0.06 percentage points in 2045–50, by assuming that the labour force participation rate increases 5 percentage points every year in 2011–50. It can be said that reform focusing only on the labour force participation rate is far from a

so-called 'institutional dividend' or 'reform dividend'. That means the Chinese Government cannot rely on such a policy in the long term. We can intuitively understand this conclusion from Figure 2.2.

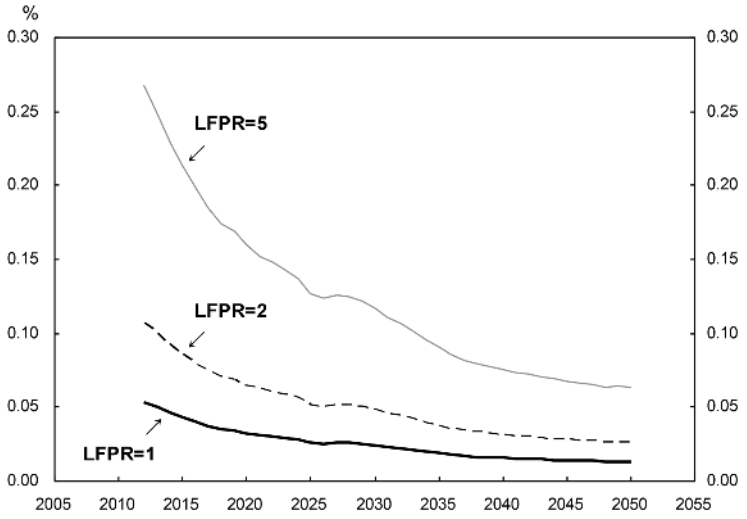

Figure 2.2 The Net Effects on the Potential Growth Rate from Increasing the Labour Force Participation Rate (baseline TFR = 1.60)

Source: Authors' simulations.

3) Ascending effect of total factor productivity

The corresponding simulation results were shown in Table 2.1 (III). The baseline scenario was keeping TFR at a constant level of 1.60 in III.1 and 1.77 in III.2. It is necessary to estimate the net effect of the potential growth rate by assuming TFP increased 0.5 percentage points and 1 percentage point, respectively. As is clearly shown in Figure 2.3, the net effects of the potential growth rate produced by TFP are obvious—for example, China's average potential growth rate will rise to 0.568 percentage points during the Twelfth Five-Year Plan period if TFP can be increased by 0.5 percentage points every year, and the average potential growth rate will rise 1.136 percentage points during that period if TFP can be increased by 1 percentage point. Notably, the 'growth effect' generated by TFP is an incremental curve—for example, China's potential growth rate, on the basis of the same scenario, rises from 0.869 in 2045 to 1.751 in 2050. Figure 2.4 clearly illustrates the 'growth effect' generated by TFP.

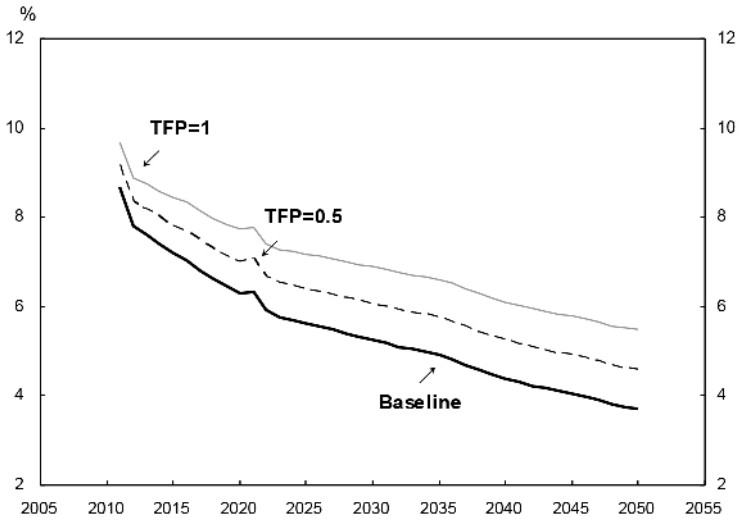

Figure 2.3 The Influence of Increasing TFP on China's Long-Term Potential Growth Rate (baseline TFR = 1.60)

Source: Authors' simulations.

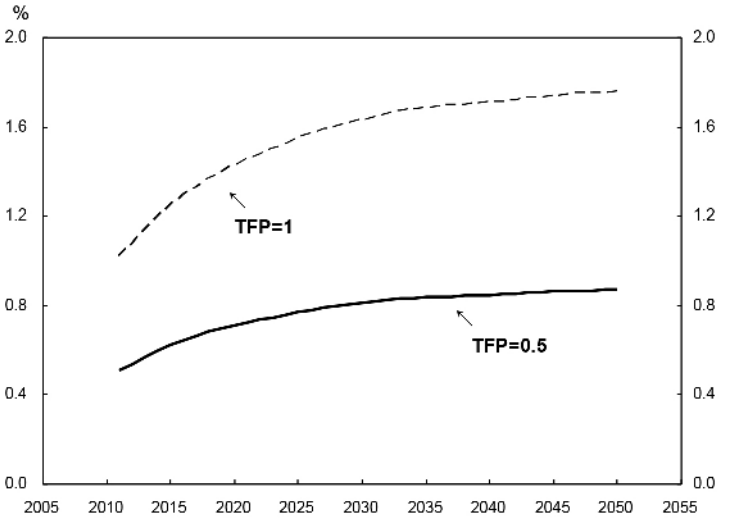

Figure 2.4 The 'Growth Effect' Generated by TFP (baseline TFR = 1.60)

Source: Authors' simulations.

4) The 'growth effect' generated by human capital: enrolment rate versus training

Improving human capital by increasing the enrolment rate is a relatively long-term effect. Our simulations assume that the average years of schooling remain unchanged for those aged over twenty-five. Human capital is estimated by years of schooling. Here we do not consider the scenario of training or further education. The change in human capital can only be affected by the enrolment rate/graduation rate at each stage of education. Specifically, this chapter assumes that, in 2050, the rate for school-age children's enrolment remains unchanged at 99 per cent, with the graduation rates being: primary school (unchanged at 99 per cent), middle school (increased from 95 to 98 per cent) and high school (increased from 90 to 95 per cent), with other conditions remaining unchanged. Overall, the growth rate of the human capital index, hc, shows a monotonically increasing trend, but its marginal growth gradually declines. Human capital also generates a positive effect on China's potential growth rate, but the marginal growth effect declines with the increase of human capital (see Figure 2.5).

In this scenario, increased education has a limited effect on the increase in the potential growth rate, if we consider human capital accumulation. If, however, the quality of human capital can be improved by training or further education in the labour market then an increase in human capital is more significant. If the Government and enterprises can provide regular training or further education opportunities for employees, this is likely to significantly increase the potential growth rate through sharply improved human capital. In order to verify this claim, we make a simplified assumption. We assume, as a baseline, that a typical worker in the labour market can access training opportunities of 1.2 months every year. That means in each year 10 workers increase their education by one school year. In other words, each typical worker's schooling rises by one year due to training programs every 10 years. This assumption implies that each employee has similar opportunities to access training programs. The probability distribution of training by ages, however, is unequal. This assumption is used to simplify our hypothesis, which is that the time for training equals the years of schooling. Based on this hypothesis, we have deduced China's average years of schooling during 2011–50.

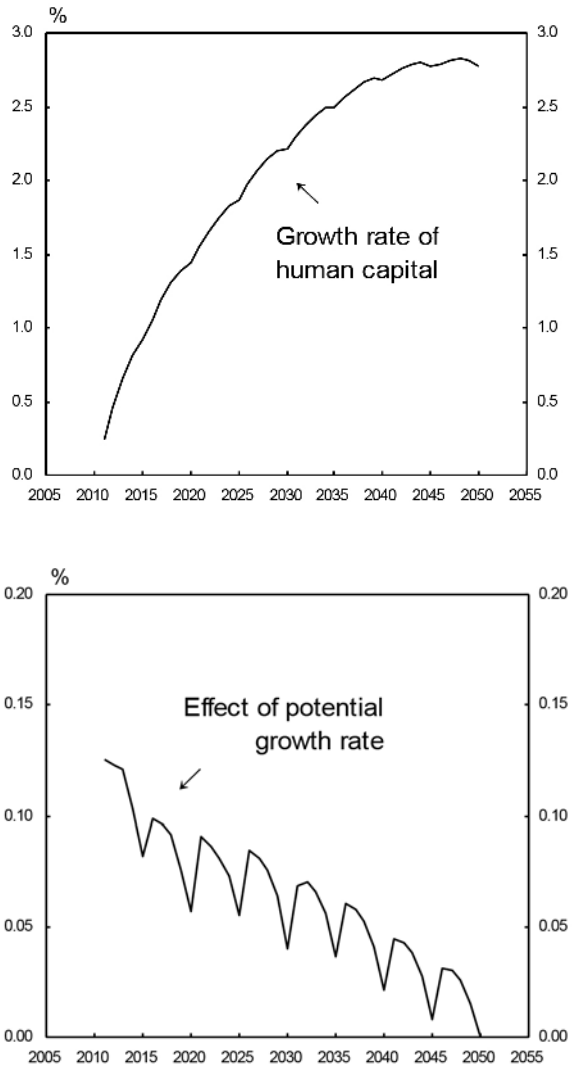

Figure 2.5 The Long-Term 'Growth Effect' Generated by Raising the Enrolment Rate/Graduation Rate (baseline TFR = 1.60)

Source: Authors' simulations.

The simulation results show that increasing the amount of training has a more significant effect in promoting the potential growth rate than increasing the enrolment rate. In the case of the Twelfth Five-Year Plan period, China's potential growth rate could be increased by 0.404 percentage points if a typical worker in the labour market can access training opportunities of an additional 1.2 months every year (from a baseline of zero). Remarkably, for a typical employee, the training has improved the human capital in year t, assuming the time of training equals the years of schooling, and therefore the new human capital in year t (which is calculated based on the amount of training) can be added into the next year, t + 1, and also in later periods. Improving human capital by increasing the enrolment rate is a very slow process. That means even if the enrolment rate could be raised dramatically, the average human capital in a country would only rise a little in the short term. Focusing on training, however, covers all the labour force. Improving the potential growth rate by training shows a significant effect if training can be treated as another way of increasing the years of schooling. According to the simulation results, the growth effect generated by increasing the amount of training does not appear to produce a significant decreasing trend. If the training programs could be started in 2011, the growth effect generated by training can still be maintained as 0.344 percentage points until the year 2045–50 (see Figure 2.6). If the Government and enterprises provide more training opportunities for their employees or the jobless, then increasing the amount of training produces a more significant impact on the potential growth rate.

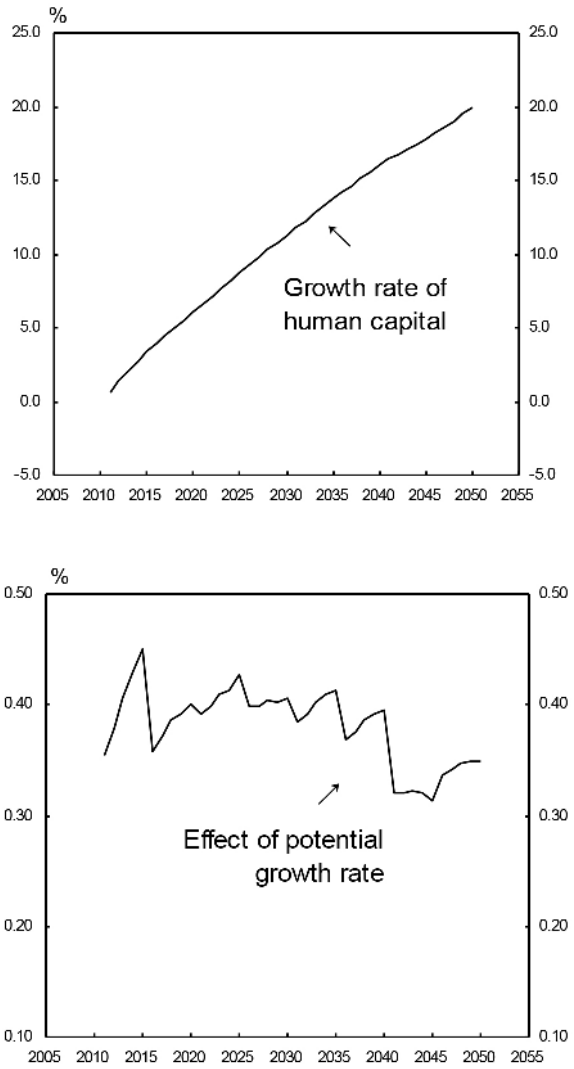

Figure 2.6 The Long-Term 'Growth Effect' Generated by Increasing the Amount of Training (baseline TFR = 1.60)

Source: Authors' simulations.

5) The 'growth effect' generated by combinations of policies

The previous section discussed the short-term and long-term effects on the potential growth rate of improving the TFR, TFP, human capital and the labour force participation rate (enrolment rate versus training). We noted that a single factor may have a limited effect on increasing the potential growth rate; however, choosing a combination of policies to expand the 'growth effect'

will work well. Tables 2.1 and 2.2, respectively, have shown the influence of combinations of policies on China's potential growth rate. Our basis is a combination policy simulation whose hypothesis is that the TFR could be raised from 1.6 to 1.94, the labour force participation rate could be increased by 1 percentage point, TFP could be raised 0.5 percentage points and the graduation rates of middle school and high school students could be increased by 3 percentage points and 5 percentage points respectively in 2050; according to the growth accounting equation, the potential growth rate could be increased by 0.85 percentage points during the Twelfth Five-Year Plan period, and could be further increased to 1.32 percentage points in 2045–50. The combination policies should have a clearer effect on the potential growth rate if we take into account the effect of training on human capital. For example, keeping our other hypothesis unchanged (TFR rising from 1.6 to 1.94, the labour force participation rate increasing by 1 percentage point, and TFP by 0.5 percentage points), if the Chinese Government adopts a policy to increase the amount of training (averaging 1.2 months per year for an employee) instead of increasing the enrolment rate to improve the human capital stock, the potential growth rate could be increased from 3.84 per cent to 5.47 per cent in 2045–50—an increase of 1.64 percentage points.

The simulation results of several combination policies are shown in Figure 2.7, where the baseline scenario assumes the TFR can be kept at the level of 1.6, and we forecast China's potential growth rate. Scenario A shows the trends of China's potential future growth rate on the basis of TFR = 1.60, and by assuming that the labour force participation rate can be increased by 1 percentage point, TFP by 0.5 percentage points and the graduation rates of middle school and high school by 3 percentage points and 5 percentage points respectively in 2050. Scenario B also forecasts the trends of China's potential future growth rate on the basis of TFR remaining at 1.60, and by assuming that the labour force participation rate can be increased by 1 percentage point, TFP by 0.5 percentage points, and the Government adopts an increase in the amount of training instead of increasing the enrolment rate to improve the human capital stock. On the basis of Simulation B, Scenario C shows the trends of China's potential growth rate by assuming that China's TFR could be raised from 1.60 to 1.94 in the future. In the short term, this increases the population dependency ratio, which decreases the capital formation rate of GDP and then the capital stock. This produces a negative impact on China's potential growth rate. However, in the long term, newborns grow to enter the labour market, increasing the supply of labour, which produces a positive impact on the potential growth rate. Therefore, the short-term effect is negative while the long-term effect is positive.

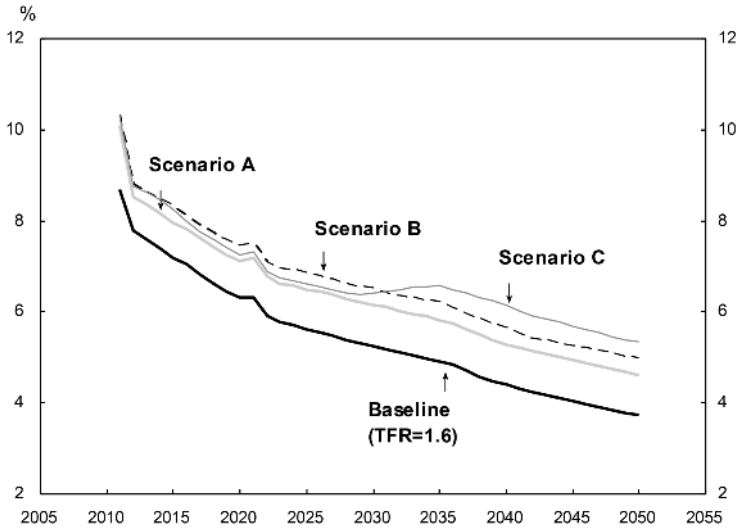

Figure 2.7 The Long-Term 'Growth Effect' Generated by Combination Policies (baseline TFR = 1.60)

Source: Authors' simulations.

Reform priorities and approach

With the reduction of the working-age population and the increase of the population dependency ratio as the main characteristics of the 'demographic dividend' having disappeared, China's potential growth rate decreases; however, this does not mean the Chinese Government is powerless to change the growth rate. A series of reform measures is conducive to clearing the institutional barriers to the supply of factors and productivity, thereby slowing the declining trend of the potential growth rate, which is the key to China's sustainable economic development. It is beneficial for the Chinese Government to choose reform priorities and a reform path based on the simulation results.

First, the Chinese Government should continue to stick to and improve its current family-planning policy. Although relaxation of the family-planning policy does not have an immediate growth effect, compared with the one-child policy, the 'selective two-child policy' produces a weak but negative impact on the potential growth rate in the first 15 years. In the long term, however, relaxing the family-planning policy is conducive to a reasonable demographic structure and an increase in the working-age population, thus generating a positive impact on China's potential growth rate. We need to recognise that while the family-planning policy affects the TFR, the declining TFR is one of the results of economic and social development. A continuing decrease in the fertility rate

will, in fact, generally accompany economic development. We cannot expect a remarkable reversal in this trend in the future. Adjusting the family-planning policy sooner rather than later generates obvious effects. Therefore, the Chinese Government should make the transition from the 'selective two-child policy' to a 'two-child policy' as soon as possible, and further adjust the family-planning policy according to the reality of population development.

Second, improving the market mechanism that plays an essential role in the allocation of resources creates an equal, competitive environment for the entry and exit of firms. There is still important potential to improve productivity—that is, given the large disparities in productivity among firms within the same sector, the mobility of factors of production from low-productivity firms to high-productivity firms, which allows for more efficient enterprises to survive, expand and develop, while inefficient enterprises are eliminated, improves industry as well as national productivity. As is well documented in the economics literature, in a mature market economy like the United States, a 'creative destruction' mechanism creates allocative efficiency relating to the entry, expansion, contraction and exit of firms within narrowly defined sectors that contribute one-third to one-half of national productivity growth (for example, Foster et al. 2001, 2008). In addition, a more recent work (Hsieh and Klenow 2009) has demonstrated that by reallocating capital and labour to equalise marginal products among manufacturers to the extent observed in the United States, China's manufacturing sector could gain a 30–50 per cent increase in its TFP. The meaning of the coincidence in the two figures given by Foster et al. and Hsieh and Klenow illustrates that, so far, China has not yet obtained such a source of TFP. Therefore, associated reform in such economic spheres also could generate obvious benefits.

In fact, mixed ownership reform can give more opportunities for the private economy to enter into competitive industries, and breaking the monopoly of state-owned enterprises (SOEs) through competition could generate a reform dividend. In other words, improving the flow of factors through competition promotes the growth of TFP, and ultimately improves the potential growth rate. Further, allocative efficiency could be improved by financial system reform, which should focus on the promotion of interest rate liberalisation. It is clear that only market-based interest rates can achieve efficiency in the allocation of capital. It is not possible for the interest rate to float, reflecting the rate of return to capital, under the conditions of non-market or controlled interest rates. As a result, production and allocative efficiencies are below the optimal levels, resulting in an unnecessarily low TFP.

Third, the Chinese Government should help migrant workers by reforming the household registration system. The task can be achieved through public policy reforms, which eliminate institutional obstacles to labour mobility and

continue to create resource reallocation efficiency, and help to maintain the increasing rate of TFP. Moreover, this reform can also relieve the pressure for wage hikes, and gain time for enterprises needing to upgrade their industrial structure. Reform of the household registration system could become part of the reform dividend if the Government follows three parallel paths: 1) absorb migrant workers by allowing them to be registered as urban residents; 2) provide equal basic public services to those migrants who cannot become urban residents in the short term; and 3) provide urban and rural residents with full coverage from the social security system. China should address the issue of sharing the cost of reform between the Central Government and local governments, which is conducive to the formation of the incentive compatibility mechanism for different levels of government.

Fourth, the Chinese Government and enterprises should provide a variety of training programs for employees. Taking into account the mobility of employees, companies hesitate to provide training. However, China's future economic development needs high-quality human capital. Similarly, enterprises need to improve their productivity and technological innovation, which also rely on the input of human capital. Therefore, from the point of view of enterprises, well-trained employees are much needed, while from the point of view of employees, moving between enterprises in order to achieve their own utility maximisation is inevitable. Thus, in addition to corporate training programs, the Government needs to provide more training programs to increase human capital, which could significantly improve the potential growth rate. According to this study, China's potential growth rate will increase by 0.3 to 0.4 percentage points if each employee can access one year of training opportunities in every 10 working years.

Finally, the Chinese Government, when facing a package of reforms, should pay more attention to the best order for these reforms. At present, reforms are ordered 'from easy to difficult', 'consensus first' and 'minimum package of reforms'. In fact, the Chinese Government should select reform measures that have the most obvious growth effects—for example, reforms relating to the registration of migrant workers, to transition from a 'selective two-child policy' to a 'two-child policy', reforms of the financial system and SOEs, and to increase the efficiency of the allocation of resources. In addition, increasing the quality of human capital through more training programs is conducive to enhancing productivity and innovation ability. This is also consistent with the views of Premier Li Keqiang, who says that 'reform should start from areas where the most prominent problems exist restricting China's economic and social development'.

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