4. Forecasting China's Economic Growth by 2020 and 2030

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Introduction

From the late 1970s, China enjoyed an annual average growth rate of 9.9 per cent for more than three decades. This followed the introduction of reform and opening-up policies in 1978. In recent years, however, growth has slowed, to only 6.9 per cent in 2015. This study analyses the causes of this slowdown and forecasts China's economic growth from 2016 to 2020, and projects China's growth to 2030.

A voluminous literature has identified the main reasons for China's rapid economic growth in the past 30 or more years. First, the transition towards a market economy improved resource allocation and increased economic efficiency. Second, rapid capital accumulation driven by high savings fuelled economic growth. Third, openness to trade and investment enhanced economic efficiency and enabled the economy to enjoy its comparative advantage in labour-intensive industries. Fourth, with China moving into a fast line of industrialisation and urbanisation, there was significant change in economic structure, the allocative efficiency of factors was greatly enhanced and increasing demand exercised a strong pull on economic growth. Fifth, China enjoyed rapid growth of its labour force during the 1980s and 1990s, led by a demographic boom that arrived at the same time as a demographic boom in developed economies, which drove faster growth in both.

The pattern of growth that drove that miracle has, however, broadly run its course. That pattern also helps to explain why the Chinese economy is now burdened with severe structural imbalances that are causing growth to slow.

Four factors are worth special attention.

First, the savings and investment rates have been rising continuously. High investment has led to increasingly severe overcapacity in some sectors. In 2014, China's annual capital formation rate was as high as 46 per cent, while private consumption was a mere 38 per cent of gross domestic product (GDP). Unlike in the early stages of China's development and the reform era, overcapacity now significantly lowers the productivity of capital.

Second, for a long period in the past, the government interfered too much with resource allocation. Corruption was rampant and the size of government was expanded. These are important factors that lower efficiency and therefore slow growth.

Third, economic growth requires a stable macroeconomic environment and prudent macroeconomic policies. But since the outbreak of the Global Financial Crisis (GFC) in 2008 and the subsequent monetary easing measures by the People's Bank of China (PBC), the debt leverage ratio (the ratio of total debt to GDP) has continued to climb. Calculation based on incomplete information from the central bank's social financing statistics suggests that the leverage ratio escalated from 126 per cent in 2008 to 211 per cent in 2015. An excessively high leverage ratio lowers the allocative efficiency of financial resources, heightens financial risk and threatens long-term economic growth.

Finally, a couple of other factors also played a role in the slowdown of the economy. Demand growth for China's exports dropped off a cliff, and this brought an end to the export-led model of growth, forcing China to rely more on domestic consumption; and China passed its peak working-age population share in 2011, reducing labour supply.

In this study, we build a growth model for the Chinese economy to analyse the contribution of the growth in factor inputs and total factor productivity (TFP) to China's economic growth. TFP growth is defined as the sum of the contribution of technological progress and allocative effect, led by various institutional and structural factors. Data spanning more than six decades since the foundation of the People's Republic of China are used to obtain a longitudinal perspective. The rest of the chapter is structured as follows. Section two presents the results of growth accounting based on the model estimates. Section three discusses the impact of demand-side issues on economic growth. Section four forecasts future economic growth based on the results in sections two and three. Section five summarises the main findings and draws policy implications from the analysis.

Growth determinants on the supply side: An empirical model

The study of economic growth often relies on the neoclassical growth model (Solow 1956) and the human capital growth model (Romer 1986; Lucas 1988). Both models establish the functional relationship between factor inputs and output (GDP) and can be empirically tested with econometric methods.

China's growth experience is complex, and it may not be enough to focus just on factor inputs. In the past 30-plus years, institutional reforms and structural changes in China have had a significant impact on TFP and economic growth. Analysis in the literature of economic growth in transitional economies typically incorporates a few institutional or structural variables into the model, such as the urbanisation rate, the non-state share in the economy and foreign shares in capital stock (Collins and Bosworth 1996; Chen 1997; Bosworth and Collins 2008; Zhu 2012). As these examples show, each study has a different emphasis, with some emphasising the role of openness to trade and investment and others highlighting the role of market-oriented reforms.

In the following analysis, we build a growth model amended from that of Lucas (1988). This model incorporates human capital, physical capital and several important institutional and structural variables. This model enables us to comprehensively analyse the impact on growth of a number of factors relating to TFP, including technological progress, market-oriented reform, urbanisation, trade expansion, foreign investment, government administrative costs, the consumption rate and the leverage ratio. Time-series data from 1950 to 2014 are used.

The growth model adopted in this study is defined in Equation 4.1.

Equation 4.1

$$Y = AK^{a_1} H^{a_2} H_a^{a_3} R^{a_4} e^{f(x)}$$

In Equation 4.1, Y is real GDP; A is a constant representing the base level of TFP; K is fixed capital stock; H is human capital stock; H_a is the average education level of the labour force, which is used to estimate the externality of human capital; R is the research and development (R&D) capital stock accumulated from R&D expenditure; and $f(x)$ is a subfunction composed of several institutional and structural variables that affect TFP. It is defined as Equation 4.2.

Equation 4.2

$$f(x) = a_5 m + a_6 u + a_7 i + a_8 d + a_9 g + a_{10} l + a_{11} c + a_{12} c^2 + a_{13} T$$

In Equation 4.2, m is the share of the non-state (that is, private) economy; u is the urbanisation rate defined by the ratio of urban population to the total population; i is the foreign capital share in total capital; d is the foreign trade dependency rate defined as the ratio of total trade value in GDP; g is the ratio of government's administrative cost defined as the share of total government-related budgetary expenditure in GDP; l is the leverage ratio, defined as the ratio of total debt over GDP; c is the consumption rate, defined as the ratio of

total consumption to GDP, and c^2 is its quadratic term; and T is a time trend to capture possibly unexplained TFP. More explanations of these variables are given below.

The econometric model used herein is obtained through substituting Equation 4.2 into Equation 4.1 and taking a logarithm of both sides of the equation. Variables H_a and T are dropped after initial analysis due to statistical insignificance. R&D capital, *lnR*, lacks statistical significance and is substituted by its first difference term, *DlnR*. The consumption rate and its quadratic term are lagged by one period to avoid the possible bicausality problem. To correct the discrepancy caused by autocorrelation, the Prais-Winsten AR (1) method is used in the regression.

In this study, capital stock is calculated with the perpetual inventory method, using data for fixed-asset investment and fixed capital formation since 1950 (unless otherwise indicated, all data are from NBS n.d., various years). We found errors in the two data series in opposite directions in recent years. Therefore, combining these two datasets to calculate fixed capital stock could reduce the discrepancy. Estimation of the initial capital stock in 1950 was with reference to Chow (1993). Considering the acceleration of depreciation in the reform period, rising composite depreciation rates are adopted when we calculate capital stock after 1978. The composite depreciation rate rose from the minimum value of 3.3 per cent to 10 per cent in recent years.

Human capital is measured as total effective labour, which is calculated as the weighted sum of the number of graduates from all levels of educational institutions, using years of schooling as the weights. Uncompleted study and non-degree vocational education are also taken into account in building this data series.

R&D capital stock is calculated with the perpetual inventory method, using annual R&D expenditures. Since a large part of R&D expenditure is already counted in fixed assets investment, this variable is not considered as an input but as a mean to measure the contribution of technological progress to TFP.

The share of the non-state (private) sector in GDP is not available, and therefore is represented by the share of total sales of non-state firms in industry. Since the statistical definition of these firms was changed several times, data were adjusted accordingly for comparability.

The urbanisation rate is the share of urban residents in the total population. The trade dependency ratio is the ratio of the sum of import and export values to GDP. Foreign capital share is the ratio of foreign capital stock in total fixed capital stock. Foreign capital is calculated with the perpetual inventory method, using foreign investment data from total investment in fixed assets statistics.

The government administrative cost refers to the share of administrative expenditure (a component in budgetary expenditure) in GDP. Due to changes in budgetary accounting, the item 'expenditure for general public services' is used with adjustment from 2007 onwards. The leverage ratio is the ratio of total debt to GDP, data for which are from the PBC's social financing statistics (PBC n.d.). These do not offer full coverage of debt for firms, government and residents, but are an approximate substitute. The consumption ratio is the ratio of final consumption to GDP.

Table 4.1 presents the model estimation results. The adjusted R^2 and t-statistics show that the model has strong explanatory power.

Table 4.1 Modelling results (dependent variable: log GDP)

Regressor	Symbol	Estimates	t-statistics
Log capital	$\ln K_{(t)}$	0.3882	2.65*
Log human capital	$\ln H_{(t)}$	0.4717	3.87**
Log R&D capital in first difference	$D\ln K_{r(t)}$	0.7205	8.97**
Urbanisation rate	$u_{(t)}$	3.5321	3.08**
Non-state share in the economy	$m_{(t)}$	0.4422	4.89**
Foreign share in capital stock	$k_{f(t)}$	3.2299	4.01**
Trade dependency ratio	$d_{(t)}$	0.2734	1.71'
Government administrative cost	$g_{(t)}$	–13.4858	–4.67**
Leverage ratio	$l_{(t)}$	–0.2978	–2.91**
Consumption rate	$c_{(t-1)}$	3.8383	1.97'
Squared consumption rate	$c^2_{(t-1)}$	–2.8982	–2.07*
Constant	C	–2.8279	–3.85**
Adjusted R^2	Adj. R^2	0.997	
Observations: 64			

** statistically significant at 1 per cent
* statistically significant at 5 per cent
' statistically significant at 10 per cent
Source: Authors' estimations.

Based on the estimates in Table 4.1, we carry out a growth-accounting exercise to calculate the factor contribution and impact of institutional and structural elements on GDP growth. Total factor contribution is the sum of the contribution from capital and human capital. The contribution from TFP is the sum of contributions from all remaining variables. Table 4.2 therefore contains a comprehensive decomposition of TFP.

It is observed from the modelling result that the signs and magnitudes of the residual term change irregularly. Together with the insignificant *T*, it suggests that there is no systematic omission of variables and the residuals are likely to reflect statistical errors in the raw data. Taking this into account, we exclude the residual term from the TFP calculation.

Table 4.2 Growth accounting results for different periods (annual growth rate, per cent)

	1953–78	1979–90	1991–2000	2001–10	2011–14
GDP growth rate	6.1	9.0	10.4	10.5	8.1
Total factor contribution	6.0	5.8	5.5	6.3	6.5
Capital	2.9	3.4	4.0	5.1	5.4
Human capital	3.1	2.5	1.5	1.2	1.1
Total TFP	0.3	2.4	5.3	2.3	0.7
R&D capital	0.0	–0.4	0.9	0.1	–0.7
Urbanisation	0.7	2.5	3.5	4.9	4.3
Non-state share	–0.6	0.8	0.5	0.9	0.5
Foreign share in capital	0.0	1.0	1.2	–1.1	–1.3
Trade dependency	0.0	0.5	0.3	0.3	–0.6
Government cost	0.4	–0.9	–0.8	–0.4	0.5
Consumption rate	0.2	0.0	0.0	–0.9	0.5
Leverage ratio	–0.4	–1.0	–0.2	–1.5	–2.4
Residual	–0.1	0.8	–0.4	1.9	0.8

Notes: The contribution of foreign share in capital is negative because a fall in the share lowers economic growth. The contribution from government costs is positive because a fall in this enhances economic growth. A similar situation applies to the other variables. In some periods, the sum of individual terms differs slightly from the GDP growth rate due to the rounding of numbers.

Source: Calculated based on the estimates in Table 4.1 and data from NBS (n.d.).

The main findings of our growth accounting are as follows.

First, capital is still playing the most important role in driving economic growth. Its contribution to growth has been on the rise, reaching over 5 percentage points in recent years. However, compared with earlier findings by Wang (2000) and Wang et al. (2009), it can be seen that the productivity of capital has fallen significantly as capital elasticity has dropped from around 0.50 to 0.39. The sum of the output elasticity of capital and human capital is significantly below one, indicating that the economy has changed from constant returns to scale to decreasing returns to scale. The fall in the productivity of capital is due mainly to overcapacity, indicating overinvestment that weakens the contribution of capital to economic growth.

Second, the contribution of human capital to economic growth decreases significantly over different periods. This is caused by the slowdown in labour force growth. In this study, human capital is measured as total effective labour that is enhanced by education. Slowing labour force growth reduces the rate of human capital accumulation. In recent years, despite the increases in workers' years of education, this has not fully compensated for the deceleration in labour force growth.

Third, R&D capital, *lnR*, lacks statistical significance and is substituted by its first difference term, *DlnR*, which is positive and significant at the 5 per cent level. This implies that R&D capital has a positive impact on economic growth only when R&D capital grows at an accelerated rate. The results indicate that this occurred only in the 1990s. Since growth in R&D capital proxies for technological progress, the result implies that technological progress has not yet become one of the main drivers of TFP and economic growth.

Fourth, urbanisation plays a major role in TFP growth, and has contributed more than 4 percentage points to the GDP growth rate in recent years. The large contribution comes from the allocative effect of factors moving from the low-productivity agricultural sector to high-productivity urban non-agricultural sectors, which improves the overall efficiency of resource allocation and contributes to economic growth. This can be considered on the basis of the Lewis (1954) model. This effect is also a result of increased market orientation, as the market is an effective mechanism by which to facilitate resource reallocation between urban and rural areas and thus to expedite urbanisation during the reform period.

Fifth, the efficiency of the non-state (private) sector was higher than the state sector throughout the reform period from 1978. With a 1 percentage point increase in the share of the non-state sector, TFP rises by 0.44 percentage point. Rapid growth of the non-state sector has been contributing more than 0.5 percentage point to TFP and economic growth every year since reforms began. Like urbanisation, this can also be attributed to market-oriented reforms that enhance economic efficiency through improving resource allocation and incentive mechanisms.

Sixth, the combined contribution of foreign capital and foreign trade to TFP reached 1.5 percentage points in the 1980s and 1990s, which shows that productivity of foreign capital is higher than that of domestic capital and trade enhancement improves resource allocation. In recent years, however, their combined contribution became negative, due mainly to falls in the share of foreign investment and the trade dependency ratio. Furthermore, as the technological gap between domestic firms and frontier firms narrows, the growth effects of foreign investment and foreign trade tend to weaken.

Seventh, during the reform period until 2010, government administrative costs, measured as the ratio of the administrative expenses in the government budget to GDP, have been on the rise, lowering TFP by 0.4 to 0.9 percentage point each year. This shows that low efficiency of government administration, as well as inappropriate government intervention in the market, negatively affects the efficiency of resource allocation. Examples of inappropriate intervention include providing favourable policies for certain industries, causing excess firm entry and consequently excess supply in industries in which it has occurred. For instance, government encouragement in earlier periods and stimulus policies during 2008–10 are chiefly responsible for the serious overcapacity in the iron, steel and cement industries. Preferential government policies during the Twelfth Five-Year Plan caused more serious overcapacity in photovoltaic and wind power industries. Since 2012, a strong anticorruption campaign has reduced government administrative costs to some extent. This is found to contribute 0.5 percentage point to TFP growth in recent years. Whether government reform can be effectively implemented in the future will determine the future contribution of this factor.

Eighth, based on the regression results, the contribution of the consumption rate (share of total consumption in GDP) to TFP growth and economic growth is characterised by an inverted-U curve (Figure 4.1). In this figure, the horizontal axis is the consumption rate and the vertical axis indicates its growth effect on logarithm GDP. The consumption rate that maximises the growth effect is at 66 per cent, corresponding to a savings rate of 34 per cent. This implies that a consumption rate either higher or lower than 66 per cent will cause losses in efficiency, lowering economic growth. This empirical finding supports the theoretical extrapolation of the 'golden rule saving rate' in the growth literature (Barro and Sala-i-Martin 1995). Barro and Sala-i-Martin (1995: 21) clearly state that 'an economy that oversaves is said to be dynamically inefficient'.

During the period 2001–10, the consumption rate fell by more than 10 percentage points while the saving rate rose by a corresponding amount. This change cut TFP by 0.9 percentage point per annum (Table 4.2). During the period 2011–14, the consumption rate picked up slightly and contributed to TFP by 0.5 percentage point per annum. However, the consumption rate was still a mere 51 per cent in 2014, significantly below the optimal value of 66 per cent (Figure 4.1). This indicates that economic growth will benefit from reform and structural adjustment measures that help boost the consumption rate and lower the saving and investment rates towards their respective optimal values (note that too much government investment increases rates of both savings and investment).

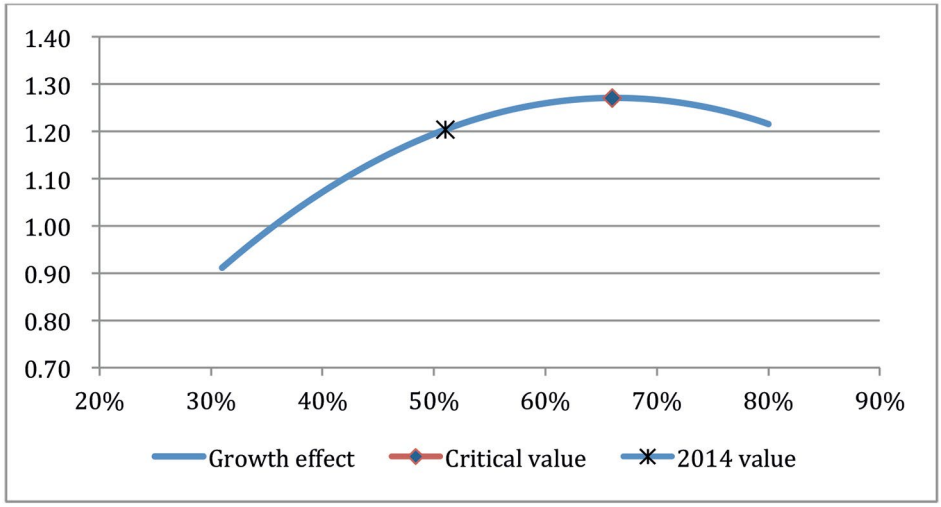

Figure 4.1 Simulating the growth effect of the consumption rate

Source: Authors' simulation based on model estimates.

Ninth, the hike in the leverage ratio has had negative impacts on efficiency and growth in all subperiods. In recent years, the leverage ratio has shot up dramatically, reducing TFP growth by more than 2 percentage points per annum. A high leverage ratio has become the major unfavourable and risky condition in the economy. Monetary easing and excess credit supply for long periods have led to overinvestment and lower efficiency in the economy. It is critical to maintain neutral monetary policies and a lower leverage ratio in the future, both to enhance efficiency and to prevent a financial crisis.

To summarise the above findings, the contribution from TFP was significantly higher in the reform period than in the pre-reform era. Since 2000, however, the TFP contribution has been dipping continuously, reaching a low of 0.7 percentage point per annum in recent years. The main causes, besides the subdued effects of slower foreign investment and trade growth, include the following: rising government administrative costs and increasing government intervention; excessive falls in the consumption rate (or excessive rises in saving and investment rates); and a significant rise in the leverage ratio. These factors act as a drag on economic efficiency and greatly offset the positive contribution of urbanisation and market oriented reforms to TFP. The fall in government administrative costs and the rise in the consumption rate in recent years have had some positive effects, although these are largely offset by the negative impacts from the rising leverage ratio.

The demand-side effect

The growth effect of the consumption rate found in the previous section can be thought of as a supply-side effect as it changes TFP. Nevertheless, this phenomenon can also be analysed from the demand side and, in fact, only via demand-side analysis can we disentangle the mechanisms through which this variable impacts on TFP.

Keynesian economics shows that when total investment is lower than total savings in an economy and when trade is in balance, aggregate demand is lower than aggregate supply and therefore the economy is in disequilibrium. In this situation, either government investment or an expansion of money supply to stimulate investment can increase aggregate demand and revitalise economic growth. This theory, however, does not take into account how the effectiveness of such demand management policies depends on the initial investment rate. It implicitly assumes that investment demand and consumption demand are perfectly substitutable with each other. In fact, this assumption only holds approximately in the short run and loses efficacy in the medium and long runs.

Suppose an economy like China has had high rates of savings and investment before the monetary authority implements expansionary policy to further stimulate investment. In the short run, new investment projects, such as new production lines and new factories, will increase the demand for investment goods and labour input, and thus lift economic growth. However, when these investment projects are complete, production capacity will expand, increasing aggregate supply. If consumption and net export shares in GDP remain unchanged, a new imbalance between aggregate supply and aggregate demand will arise, requiring further demand expansion to balance the supply increases. The government may fear that growth could stall without these expansionary measures.

Continued expansionary policies raise the savings rate and ever-rising rate of investment and production capacity through various mechanisms. Expansionary policies enjoy only conditional success. They can have the desired positive early expansionary effects and negative longer-term consequences.

To be more specific, for high-saving and high-investment economies, the longer-term cost of expansionary monetary policy is an increasing mismatch between rapid expansion of production capacity and insufficient increase in consumption demand.

Expansionary fiscal policies that are not used for investment in industrial sectors may not have these costs. More effective directions for expansion of government-connected expenditure include investment in infrastructure and environmental protection, payments for public services and social security, transfer payments

to populations in poverty and reduction of firms' fiscal burdens. Expansionary policies through these mechanisms can help to rebalance the economic structure, especially between consumption and investment.

China has had high rates of savings and investment for a long period. However, between 2000 and 2010, the savings rate as a share of GDP further rose by about 15 percentage points, to 51 per cent in 2010. The investment rate rose by about 13 per cent to 47 per cent. The consumption rate dropped from 64 per cent to 49 per cent during the same period (Figure 4.2). By 2010, China's saving rate was higher than the world average by about 30 percentage points, and the consumption rate was below the world average by 30 percentage points. The high investment and low consumption rates aggravate industrial overcapacity and lead to a fall in productivity.

The rapid fall in the utilisation rate of industrial capacity in China has been identified by several studies in the literature (Figure 4.3).

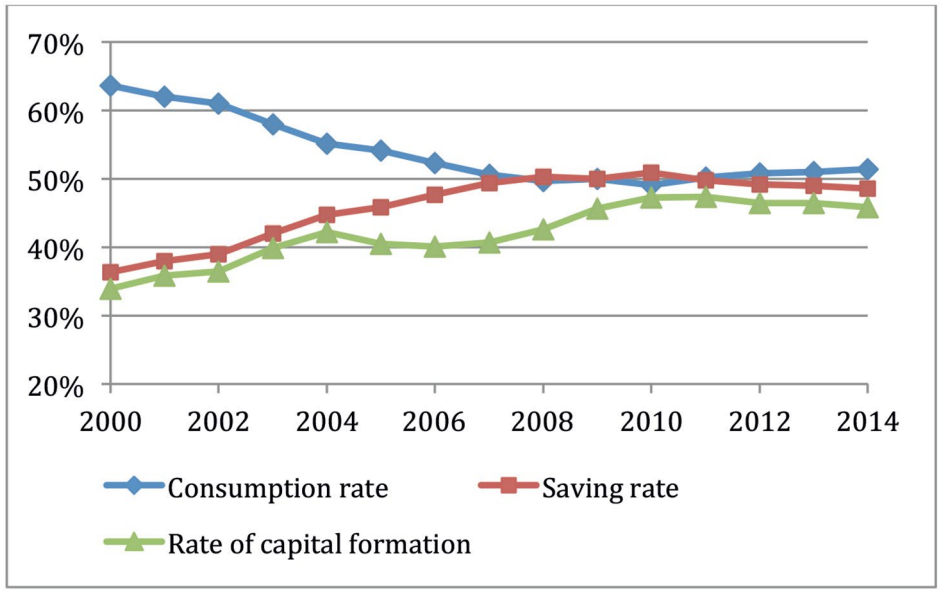

Figure 4.2 Trends of the savings rate, investment rate and consumption rate, 2000–14 (per cent)

Source: GDP accounts by expenditure approach, NBS (n.d.).

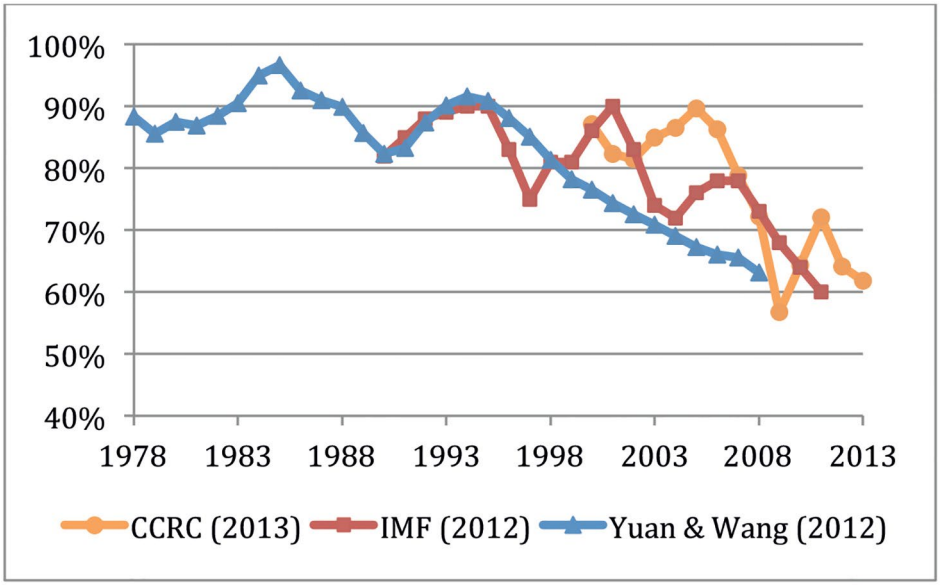

Figure 4.3 The downward trend of the utilisation rate of industrial capacity, 1978–2013 (per cent)

Source: Reproduced from China Credit Rating Co. Ltd (2013).

The excessive investment and inadequate consumption demand provide the main reasons for the significant drop in TFP and the slowdown of economic growth in China. What causes the structural imbalance between consumption, saving and investment? The answer is unequal income distribution and resource misallocation. Continuous widening of income gaps, inflation of real estate prices and massive turbulence in capital markets all tend to dampen the public's consumption demand. Irrational government expenditure at various administrative levels—excessive government investment, insufficient provision of public services and incomplete coverage of social security networks—cause excessive savings and investment and inadequate consumption.

In current circumstances, continued monetary easing to stimulate investment can worsen the structural imbalance and not be conducive to economic growth. During the GFC, the dramatic expansion of government investment and great easing of money supply in China boosted growth only in the short run. Economic growth weakened shortly afterwards, showing the decreasing effectiveness of stimulus policies.

In 2015, Money and Quasi-Money (M2) grew by 13.3 per cent—twice the nominal GDP growth (6.4 per cent). Monetary policy is still too loose. Excess money supply will further lift the leverage ratio, expand the size of non-performing loans for the commercial banks and threaten the stability of the macroeconomy.

Given the excessively high current savings and investment rates, the emphases of macroeconomic policy should be redirected from stimulating investment to improving public services, social security systems and income distribution. This would support rather than counteract the necessary rebalancing of the demand structure between investment and consumption.

Growth forecasts for 2020 and projections for 2030

The growth accounting and demand-side analysis in the previous two sections enable us to forecast growth to 2020 and to project growth to 2030 by considering the important influences on growth in factor supplies and TFP.

There are uncertainties about the influences on economic growth, especially those related to policy options. We consider three different scenarios.

Baseline scenario

The baseline scenario assumes that most growth determinants (including factor inputs, institutions and policies) generally continue past trends. One exception is made: to prevent a financial crisis, the monetary authority slows the injection of liquidity and places a modest constraint on the rise of the leverage ratio. However, the possibility of financial crisis in the future cannot be totally ruled out. Here we simply assume that there will be no financial crisis in the periods under consideration.

The paths of changes in some other factors are also adjusted moderately to reflect our conjectures about the most likely developments. It is assumed that:

1. The savings and capital formation rates continue to fall slowly. The government continues to invest in infrastructure but the scale of such investment is restricted by the government budget and the availability of effective investment opportunities. Changes in the growth rate of capital stock lag behind changes in the growth rate of investment. The growth rate of capital stock was 14 per cent, on average, between 2011 and 2015, and is presumed to slow to 10 per cent between 2016 and 2020 and 7.3 per cent between 2021 and 2030.

2. The education level of the labour force continues to increase at a constant speed, but the growth rate of the labour force turns negative in the next five years. The annual growth rate of human capital stock therefore drops from 2.4 per cent, which has been the level for the past five years, to 2 per cent between 2016 and 2020 and 1.5 per cent between 2021 and 2030.
3. With the slowdown of the economy, the increase of the urbanisation rate slowed in the past five years, decreasing from 1.4 percentage points to 1.2 percentage points per annum. It is assumed to be 0.8 percentage point per annum between 2016 and 2020 and 0.6 percentage point per annum between 2021 and 2030.
4. The degree of market orientation continues to rise but its pace slows. It is assumed that the share of the non-state economy in industrial value added increases by 4 percentage points from 2014, reaching 83 per cent in 2020 and 88 per cent in 2030.
5. Growth accounting results in previous sections show that the net growth rate of R&D investment slowed in recent years, exerting a negative impact on economic growth. This, however, might be a short-term phenomenon. It is assumed that the growth rate of R&D investment does not fall in the next few years and accelerates after 2020, thus contributing 0.5 percentage point to TFP in the later period.
6. It is expected that, along with expansion in the size of the economy, the trade dependency ratio continues to fall at the same rate as the past several years. It drops by 13 percentage points between 2014 and 2020 and by another 10 percentage points between 2021 and 2030, bottoming out at 19 per cent. The share of foreign capital in total capital drops by 1 percentage point in the next five years and plateaus after 2020.
7. Government administrative costs as a share of GDP have fallen in the past two years thanks to the anticorruption campaign. This change makes a positive contribution to TFP. The trend is expected to continue in the next two or three years. Whether it will continue in the longer term depends on the extent to which further institutional reforms take place. We assume that the share will be stable after 2018.
8. The consumption rate has picked up slightly in recent years, making a positive contribution to economic growth. However, due to the current growth slowdown and the associated deceleration of increases in real wages, the consumption rate is assumed to increase by only 0.2 percentage point per annum in the next five years and then by 0.3 percentage point per annum after 2020.
9. In the past several years, the leverage ratio rose rapidly, by 10 percentage points per annum, enlarging financial risks in the economy. We assume that monetary policy will be adjusted to some extent, limiting the rise of the

leverage ratio to 6 percentage points per annum to reach 230 per cent in 2020. It is assumed to increase by 3 percentage points per annum after 2020, to reach 260 per cent in 2030. We assume no financial crisis occurs during these periods, and only consider the negative impact of a high leverage ratio on economic efficiency.

Our simulation indicates that, in the above circumstances, future economic growth weakens to 5.3 per cent per annum in 2016–20—so missing the government's target of doubling GDP in 2020 from the level of 2010. Between 2021 and 2030, structural adjustment and technological progress raise the growth rate to 5.5 per cent per annum.

Crisis scenario

In the crisis scenario, it is assumed that the trends of various factors after 2015 are similar to those in scenario one, but with no adjustment to monetary policy. The leverage ratio shoots up quickly and exceeds 260 per cent in 2020. During this period, a financial crisis is a high probability.

With a rapid rise in the leverage ratio, commercial banks' non-performing loans accumulate, and may eventually exceed the limit that banks and the government can handle. A financial crisis then erupts. It is assumed that the following situation emerges in 2018:

1. A large portion of bank funds is taken up by the increasing amounts of non-performing loans, leading to an overall repayment failure in the banking system. Debt crisis occurs.
2. Banks cannot continue to finance the real economy, forcing enterprises into increased reliance on informal credit sources. This causes a dramatic increase in interest rates in the market, raises firms' operation costs and leads to more and more losses and bankruptcy of firms. The chain reaction drives the economy into recession. Investment decreases and foreign capital flies out of the economy. Both manufacturing production and employment shrink. The urbanisation process and growth in household incomes stagnate.
3. Government fiscal revenue is seriously affected and huge budgetary deficits arise, turning fiscal policy from expansionary to contractionary, further lowering aggregate demand and causing social crisis due to the shortfall in public spending.
4. Government may pursue even looser monetary policy to stimulate the economy. However, due to overcapacity and lack of effective investment opportunities, monetary easing is less and less effective in promoting growth. Instead, such policies bring forward the bursting of financial bubbles.

5. Since previous overinvestment has already squeezed out effective space for further investment, the effect of fiscal and monetary expansion is limited. The economy could be stuck in depression for several years. The rapid recovery that occurred after 2009 will not be repeated.
6. Because of the importance of China in the world economy, the crisis has a significant impact on the world economy. This feeds back negatively on China's export prospects and economic activity.
7. The blow to the real economy during the crisis reduces aggregate activity while monetary supply keeps expanding, probably leading to stagflation and aggravating social instability and conflict.

The crisis scenario could lead to an overall stagnation for the economy between 2019 and 2021. With some time lag, the investment slowdown during the crisis reduces growth of the stocks of capital and human capital over the longer term. Urbanisation slows and household consumption is seriously affected.

The crisis has long-lasting negative impacts on economic growth after the crisis, changing the growth trajectory during the period 2021–30. During 2020–30, the following would seem to be a plausible combination of outcomes. The average growth rate of capital stock falls to 5.8 per cent, 1.5 percentage points lower than in the base scenario. The growth rate of human capital stock decreases to 1.2 per cent, 0.3 percentage points lower than in the baseline scenario. R&D investment is retarded, making no significant contribution to TFP. Urbanisation slows, progressing at an annual increase of 0.5 percentage point. The consumption rate recovers even more slowly, increasing by 0.2 percentage point per annum.

In the past in China, rising levels of non-performing loans have exerted a negative impact on economic conditions but have not caused a full-blown financial crisis. There are several reasons, however, why crisis could take place in the circumstances that we are considering. First, the leverage ratio has reached an unprecedentedly high level. Second, there was much greater leeway to deal with debt crisis in the past than today. Before the 1998 East Asian Financial Crisis, the leverage ratio had been falling for several consecutive years. Furthermore, plenty of effective investment opportunities in infrastructure were available at that time, leaving much room for expansionary fiscal policy to work. During the GFC, there was still room for implementing both fiscal and monetary stimulus, but these conditions no longer exist.

The simulation result indicates that, in the crisis scenario, GDP grows at 2.9 per cent on average between 2016 and 2020 and there could be two to three years of stagnation or negative growth during this period. From 2021 to 2030,

the GDP growth rate recovers to 4.4 per cent per annum, which is a short-term recovery and will not be sustained. In 2030, the growth rate is expected to fall back to around 3 per cent.

Reform and rebalancing scenario

In the reform and rebalancing scenario, we assume that the government pushes through reform and structural rebalancing in three key areas to bring the economy on to a healthy development path. Other conditions in this scenario are the same as those in the baseline scenario.

Deleveraging

It is assumed that through good government policies and the efforts of firms, the trend of a rising leverage ratio ceases within the next two or three years. The leverage ratio does not surpass 210 per cent in 2020 (starting from 200 per cent at the end of 2015) and falls to 180 per cent or less—a relatively safe level—by 2030. To achieve this, the following outcomes are necessary:

- Monetary policy becomes neutral, bringing liquidity growth in line with GDP growth.
- Non-performing loans are stripped and cleared.
- 'Zombie firms' are purged or reset and the 'soft budget constraint' problems of local governments are solved. Firms are given equal opportunities for market competition and governments behave in line with the legal framework.
- Financial and capital markets are better regulated and channels for the financing of small and medium-sized firms are widened.

Rebalancing the consumption-saving structure through institutional reforms

Income distribution is improved through fiscal reform and public policy adjustment, so the consumption rate rebounds by 13–14 percentage points in the next 15 years to reach about 65 per cent in 2030, and the saving rate falls to around 35 per cent.

To achieve this, the following reforms and policy adjustments are required:

- The fiscal system is reformed, transforming the focus of government expenditure on public services and reducing inefficient government investment and excessive administrative expenditure. The household registration system is reformed and full coverage of social security systems is provided. Public expenditure is increased on education, medical services

and public housing for rural–urban migrants and in less-developed regions. The education system is reformed to improve effectiveness and quality.

- State assets are partly mobilised to complement the shortage in social insurance funds and to lower the social security contribution burden for firms.
- Income inequality is reduced through reform of resource and income taxes and the fiscal transfer payment system and by levying property tax. The income gap between competitive and monopolistic industries is reduced through reform of business income tax and the promotion of market competition.

Reforming the government administrative system and lowering administrative costs

Overstaffed government organisations and high government administrative costs breed corruption and exert negative impacts on market competition and economic growth. The anticorruption campaign in the past two or three years has played a positive role in reducing administrative costs. To maintain this positive impact, it is critical to implement reform of the administrative system, raise transparency and legalisation of policies, streamline government institutions and reduce government intervention in the market.

It is assumed that, through government reforms, administrative costs as a share of GDP fall at the same rate as in the past few years until 2020, and then at half that rate from 2020 onwards.

Simulation results show that reforms and adjustment in the above three areas have a positive impact on medium- and long-term economic growth. However, deleveraging and shedding 'zombie firms' have some negative impact on growth performance in the short and medium runs. The latter effect is assumed to lower the growth rate by 0.5 percentage point during the period 2016–20 and continues in the first few years of the period 2021–30 to lower the average growth rate by 0.2 percentage point.

The combined result of the above positive and negative factors is that the growth rate between 2016 and 2020 increases from 5.3 per cent (the rate in the baseline scenario) to 6.2 per cent. Growth accelerates to 7.5 per cent from 2021 to 2030 after the downward pressure on economic growth is overcome. This growth rate is higher than commonly expected. This could be achieved not by stimulus policy, but rather by efforts to implement reforms and structural rebalancing.

Table 4.3 and Figure 4.4 present the forecasts for economic growth under the three scenarios.

The three scenarios differ significantly from each other. In the reform and rebalancing scenario, in 2030, GDP will be greater than that in the baseline scenario by 26 per cent, and greater than that in the crisis scenario by 58 per cent. GDP can reach RMB188 trillion (2014 constant price) or US$29 trillion based on the exchange rate of RMB6.5 per US dollar. Per capita GDP reaches US$20,000 (considering real renminbi appreciation, per capita GDP would be higher). China will become a high-income country by 2030.

Table 4.3 Forecast of future economic growth: Three scenarios (growth rate and ratio changes per annum, per cent)

	Baseline scenario		Crisis scenario		Reform and rebalancing scenario	
	2016–20	2021–30	2016–20	2021–30	2016–20	2021–30
Total factor contribution	4.7	3.5	4.1	2.8	4.7	3.5
Capital	3.8	2.8	3.2	2.2	3.8	2.8
Human capital	0.9	0.7	0.9	0.6	0.9	0.7
Total TFP	0.6	2.0	–1.3	1.6	1.5	4.0
R&D capital	0.0	0.5	0.0	0.0	0.0	0.5
Urbanisation rate	2.8	2.1	1.8	1.8	2.8	2.1
Share of non-state economy	0.3	0.2	0.3	0.2	0.3	0.2
Foreign capital share	–0.5	0.0	–0.7	0.0	–0.5	0.0
Trade dependency ratio	–0.6	–0.3	–0.6	–0.3	–0.6	–0.3
Consumption rate	0.2	0.3	0.1	0.2	0.5	0.5
Government administrative costs	0.2	0.0	0.2	0.0	0.4	0.2
Leverage ratio	–1.8	–0.9	–2.4	–0.3	–0.9	0.9
Adjustment	0	0	0	0	–0.5	–0.2
GDP growth rate	5.3	5.5	2.9	4.4	6.2	7.5

Note: The sum of the total contribution from TFP and from factor inputs may be slightly different from the forecast GDP growth rate due to the rounding of numbers.

Source: Authors' forecasts.

In the crisis scenario, in 2030, GDP would reach only RMB119 trillion and GDP per capita would be about US$12,700. Based on the criterion at that time, China would still be a middle-income country, which implies that China will fall into the middle-income trap in the next 15 years.

The baseline scenario lies between the above two scenarios. In this scenario, in 2030, GDP reaches RMB149 trillion or US$15,900 per capita. It is very likely that China will still not be a high-income country in 2030.

The main differences between the reform and rebalancing scenario and the other two scenarios relate to whether or not there is: 1) deleveraging and lowering of financial risks; 2) improved income distribution through reforms to lift the consumption rate and lower the savings and investment rates; and 3) government reform to lower administrative costs and promote market competition.

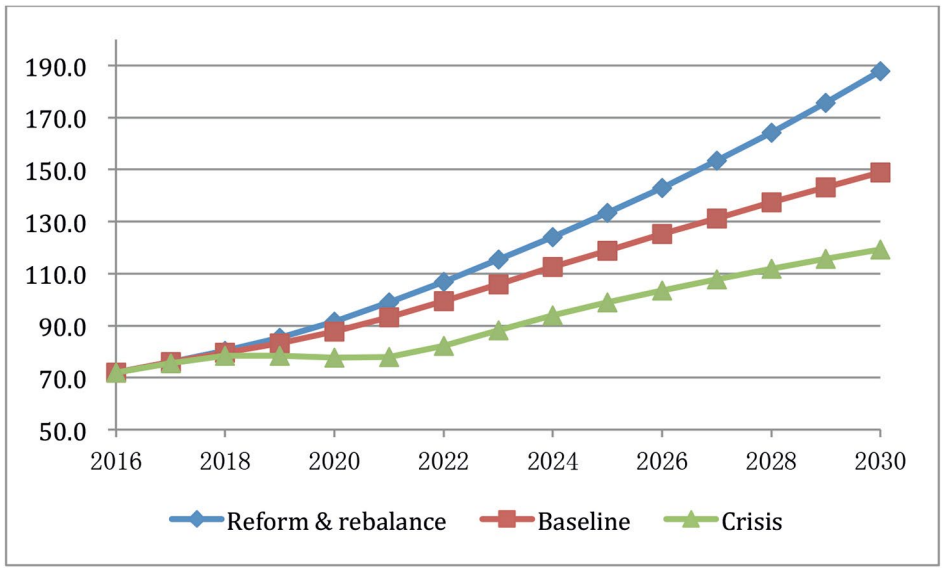

Figure 4.4 Future economic growth: Three scenarios (RMB trillion, 2014 constant price)

Source: Simulation results from Table 4.3.

Conclusion

This study quantitatively analyses the contribution to economic growth of factor inputs and the positive and negative impacts on TFP of institutional and structural factors.

Our growth accounting exercise finds that the contribution of capital to economic growth has been rising throughout various periods, but the productivity of capital has fallen significantly in the past decade, changing the overall economy from constant returns to scale to decreasing returns to scale.

Growth accounting also shows that TFP is significantly higher during the reform period than the pre-reform period. The main driver of TFP growth is not technological progress, but improvement in resource allocation resulting from institutional and structural changes, including development of the non-state economy, openness to trade and investment and rapid urbanisation. In recent

decades, however, TFP has dropped significantly, for three main reasons: first, rising government administrative costs; second, the drop in the consumption rate and excessive investment; and third, the rapid rise in the leverage ratio, which reduces financial efficiency. Easing these three constraints is the key to putting China on a path to emerge from the middle-income trap and become a high-income country by 2030.

Demand-side analysis clarifies that the fall in TFP is closely linked to insufficient domestic consumption demand. Consumption demand and investment demand are not perfect substitutes for each other, especially in the medium and long runs. In particular, when the initial investment rate is very high, continued monetary easing to stimulate investment causes an increasing imbalance between investment and consumption, resulting in insufficient domestic consumption demand, overcapacity and falling productivity of capital. Monetary policy needs to be restored to neutrality and fiscal policy should shift from focusing on government investment to improving public services, social security systems and income distribution to lift the low consumption demand.

Based on the results of growth accounting and simulation, we forecast future trajectories of economic growth in three scenarios subject to different policy options.

In the baseline scenario, as a natural extension of past trends, economic growth continues to slow and the government's goal of doubling GDP between 2010 and 2020 are not achieved. In 2030, China's GDP per capita is around US$15,900, which means that China is unlikely to be a high-income country at that time.

The crisis scenario emerges if monetary policy is not adjusted and the leverage ratio continues to increase rapidly. In this case, financial crisis is likely to occur, pushing the economy into stagnation for years, with negative impacts lasting for a long period. In 2030, China is not a high-income country and has fallen into the middle-income trap.

The third scenario considers that reform speeds up and economic structure is rebalanced through measures including deleveraging, improving income distribution to revitalise consumption, lowering government administrative costs and enhancing market mechanisms via government reforms. It is forecast that the GDP growth rate could be maintained at 6.2 per cent per annum between 2016 and 2020 and lift to 7.5 per cent between 2021 and 2030. China becomes a high-income country before 2030. This indicates that the economy is on a development path that is sustainable and more beneficial to public welfare.

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