

On reform measures to strengthen the foundations for future economic growth in China^{*}

Duan Bingde, Gao Shiji^{**}

After three decades of rapid economic growth, China has become an upper-middle income country, although there are still hundreds of millions of people living below the UN defined, two-dollar-a-day, poverty line. Further economic growth at a reasonably high speed is required for China to become a high-income society within the next two decades. Achieving and maintaining a decent level of economic growth has become increasingly difficult because of various types of constraints, including a tight supply of labor, an inefficient financial sector, the tightening of environment regulations, rising social unrest, and growing international economic friction. To unleash China's growth potential, China needs and plans to deepen economic reform. This paper analyzes China's comprehensive reform program to be implemented during the "12th Five-year Plan" and beyond. This paper discusses some, but not all, of the reforms aimed at improving the supply side of the economy, that is fiscal and taxation reform, SOE reform, further opening market for competition, investment in R&D and human capital development, and further opening-up to the world. A simple VAR model is employed to analyze the impact of those reform measures on China's future growth. It is hoped that these reforms, carried out in a coordinated way, will significantly improve efficiency on the supply side of China's economic growth.

Keywords: economic growth, reform, Chinese economy

1. Introduction

It may no longer be necessary to display numbers and figures so as to explain China's economic performance over the past three decades—which can be regarded as yet another East Asian Miracle. Indeed, due to market-oriented reform and opening up to the global market since 1978, China has experienced three decades of solid economic growth, making the Chinese economy the second largest in the world, right after the United States. China is also the world's largest manufacturer and exporter. Should this trend of growth continue, China will overtake the US to become the largest economy in the world in 10 to 20 years according to various forecasts (DRC and World Bank, 2012; Subramanian, 2011).

^{*} The views expressed in this paper are those of the authors and do not necessarily reflect the views of nor imply an official endorsement by the Development Research Center of the State Council of China.

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1.1. Headwinds faced by the future Chinese economy

However, achieving and maintaining a decent rate of economic growth in the coming decades has become increasingly difficult because of various types of constraints, including a tight supply of labor, an inefficient financial sector, tightening environmental regulations, rising social unrest, and growing international economic friction. These constraints have resulted in the Chinese economy becoming unbalanced, uncoordinated, and unsustainable. Overcoming these constraints is a necessity for China to achieve sustained high economic growth and maintain social harmony in the coming decades, so as to become a high-income society. China needs to change from mostly investment-driven economic growth to growth based on increased productivity, and this has long been recognized by China's decision makers. Over the past decade, especially since the 11th five-year plan, the Chinese government has been vehemently promoting a new growth model that is guided by the so-called Scientific Outlook on Development and delivers "good and fast development" (Wen, 2012). There is a sense of urgency among the Chinese leadership to speed up the process of development mode transformation, but the change has been slow coming. It is not easy to change the way that governments at all levels have been familiar with in order to promote economic development; temporary measures were taken by the central government to stimulate economic growth with the onset of the international economic crisis triggered by the subprime mortgage crisis of the USA in 2007, which has made change more difficult. In the end, China has to get its economy's fundamental factors right to sustain long run economic growth.

1.2. What determines economic growth in the long run

Although growth accounting has become a booming and complicated business, we can still employ some simple terms or frameworks to illustrate the essential factors contributing to long run economic growth (Bosworth and Collins, 2007; Porter, 2003). Half a century ago, Nicholas Kaldor listed six "stylized facts" for explaining economic growth: labor productivity, capital per worker, the real interest rate, the ratio of capital to output, capital, and labor share (Kaldor, 1961). Obviously, these factors are all centered on physical capital as the key for economic growth. In contrast to that, Jones and Romer (2009) bring forth some new variables in modern growth theory, i.e. ideas, institutions, population, and human capital, and argue that in the long run, intangible assets and human capital are more important to economic growth and the prosperity of a nation. Among other discussions on economic growth analysis, George Petrakos et al. further decompose physical capital, human capital, and institutional factors in a more intuitive way and list the most important top ten elements in growth as a new consensus amongst economists: (1) high quality of human capital, (2) high technology, innovation, R&D, and Stable political environment, (3) high degree of openness (networks, links), (4) secure formal institutions (legal system, property rights, tax system, finance system), (5) good infrastructure, (6) capacity for adjustment (flexibility), (7) specialization in knowledge and capital intensive sectors, (8) significant Foreign Investment, (9) direct Investment, and (10) free market economy with low state intervention (Petrakos et al., 2007).

As for China, it is generally believed, as articulated in *China 2030*, that market-oriented reforms and opening-up policy lie behind the Chinese economic success since late 1970s (The

World Bank and DRC, 2012). To explore a bit further, we may find that, apart from a high savings rate, the rich supply of a low cost and skilled labor force, continued investment in infrastructure, as well as rules and knowledge coming together with FDI, all play an important role in China's fast economic growth. The report also argues that the future of China's economic growth eventually lies in betting on TFP growth increasingly from innovation. However, China is still a middle-income country and the drivers of economic growth in the next two decades will come from sources other than innovations at the frontier.

In this paper, we shall look at factors relevant to China's long term economic growth from an angle different from what has been discussed in *China 2030*. In the next section, we discuss how six key elements are important to China's economic growth and how policy reforms in related areas will strengthen the foundation of the Chinese economy for a prosperous society. These policies are mainly regarding how to improve the supply side of the economic growth. For each of the six policies proposed, we cite some theoretic analysis on how certain factors contribute to economic growth before we discuss relevant Chinese experiences. In the third section, we provide a preliminary quantitative examination of the effectiveness of the new paradigm in promoting Chinese economy's long term growth. The conclusion section will summarize how this exercise will shed some light on future reforms that can bring China's growth potential into reality.

2. Some reforms on the supply-side planned for the coming decades

The Chinese government has developed an outline for China's comprehensive reform program to be implemented during the "12th Five-year Plan" and beyond, as first promulgated in the report of the Fifth Plenary Session of CPC Central Committee in 2010. The program is very ambitious and areas of reform include the financial sector, the fiscal system, SOE, entry barriers in all sectors, the innovation system, social policies, environmental protection, and the integration of the Chinese economy with the global economy. At the very heart of the reform lies the key as well as the most difficult reform; that is, to re-define the role of the state in spurring economic growth and promoting social harmony.

The readers of the *China 2030* will find in the report a six-pillar strategy of development for China in the next two decades, i.e., (1) redefining the role of government and the private sector to strengthen the market-based economy, (2) encouraging system-wide "open" innovation, (3) protecting the environment and growing "green" practices across industries, (4) promoting equality of opportunity and basic social protection for all, (5) building a strong fiscal system aligned with the evolving role of government, and (6) developing win-win relations with the rest of the world. These six pillars involve both supply side and demand side elements, and cover social as well as economic issues. This report certainly provides another perspective on how China should proceed with reforms. In this paper, we further elaborate on some of the reform measures that are aimed at improving supply side conditions for quality and sustained growth. We argue that reform of the fiscal system to maintain a reasonable government size and increase the efficiency and equality of government spending is essential and eminent. Reforming the SOEs and reducing barriers to entry are fundamental institutional improvements for delivering quality growth and spurring innovation. Developing human capital will play an increasingly significant

role in the next phase of development in China.

The perspective offered in this paper is complementary to what has been proposed in *China 2030*. The theoretical arguments that we borrow to support our reasoning are not necessarily comprehensive. The quantitative work is a preliminary exercise because of the absence of a satisfactorily unified framework to include all those policies in analyzing one country's economic growth. Nevertheless, we hope that this simple exercise will suffice to explain how the new strategy will impact the Chinese economy in the short and long run.

2.1. Fiscal and taxation system reform

China's reform strategies and government policies have achieved reasonable results in terms of economic transition and growth performance over the last three decades. It is widely believed that the role of the state should be redefined in the next stage of China's social and economic development. On the one hand, the "invisible hand" of the market should be given a more important role in resource allocation as market institutions develop, while the "visible hand" of the government should be more active in providing public services and social protection. Indeed, the Chinese government has been implementing comprehensive reforms in the social sectors, in terms of health care system reform, increasing input in compulsory education, and establishing social security systems for both urban and rural citizens. All these increases in social spending depend on an increase of government income.

Actually, measured on the government income's proportion to GDP, the size of the Chinese government has experienced a tumultuous journey: descending from 31.1% in 1978 to reach a trough of 10.3% in 1995, and climbing back to 22% in 2010.¹ As China strives to build a harmonious society, government revenues should continue to increase so as to keep up with an expansion in social spending.

The "12th Five-year Plan" pledges to accelerate fiscal and taxation system reform and actively establish a fiscal and taxation system that is beneficial to the transformation of the economic system.

Regarding fiscal system reform, the Chinese government has committed to continuing improvement of the budgetary management system, establishing a sound local government debt management system, and exploring the possibility of issuing local government bonds. As shown by the experiences of developed industrial countries, fiscal system reform has always gone beyond economic reform to define the role of a modern state. Likewise, the success of fiscal system reform is of crucial importance for China in regards to social harmony and economic progress.

Regarding the improvement of the tax system, China decided to change the tax system, as well as implement structural tax cuts. It is believed that structural tax cuts will help alleviate tax burdens for businesses and individuals. The expansion of a pilot program to replace business taxes with a value-added tax (VAT) in the tertiary sector is one such measure. Others include a policy that halves business income taxes for small firms with low profits by 2015, as well as cutting import tariffs for more than 730 products. It is believed that this type of tax reform serves

¹ The government incomes here do not include other out-of-budget income such as revenues from land sales.

the purpose of assisting the country's economic restructuring and promoting high-quality growth. Actually, Besley and Persson (2009) found that in less developed countries there appears to be a positive correlation between tax revenue and growth.

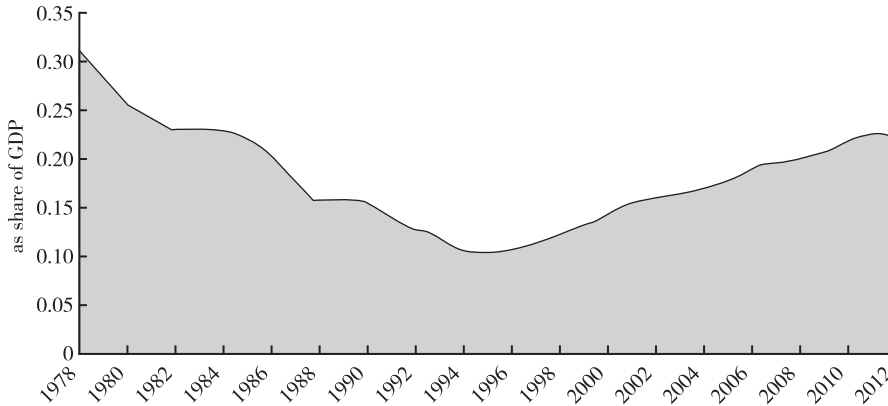


Figure 1. China government's revenue as percent of GDP(1978-2012)

Source: National Bureau of Statistics of China.

As an important component of the country's proactive fiscal policy, the structural tax cuts adopted since 2008 have played a crucial role in helping China to ward off the impact of the global financial crisis and achieve comparatively rapid and steady economic development in the context of the global economic slowdown.

2.2. State-owned enterprise (SOE) reform

Reforming SOEs has always been a long term mission of China since reform started a quarter century ago. With the introducing of the so called "modern corporate system" in the mid 1990s, most of China's large SOEs have been transformed into mixed ownership companies with different types of investors. Since 2000, the number of SOEs has dropped significantly, but the efficiency of most SOEs has been improved and their competitiveness enhanced. The output of China's state-owned enterprises dropped substantially from its peak of 78.5% of total industrial output value in 1979 to 26.2% in 2011. The number of SOEs and state-controlled companies decreased from 238,000 in 1998 to 150,000 in 2003, while in the same period, their total profits jumped from 21.4 billion yuan to 495.1 billion yuan, and total net assets grew from 5.2 trillion yuan to 8.4 trillion.

In the financial sector, China allowed foreign investment in the major commercial banks in 2001, after the government transferred non-performing loans to asset management companies (AMCs) and injected new capital into the four largest banks.¹ The total cost to the Chinese government clean up of the banks from 2003 to 2005 was 10%-18% of GDP.

¹ This type of reform is essentially not different from the measures that the US federal government took to rescue big banks in the Wall Street from bankruptcy in the high time of the financial crisis in 2008.

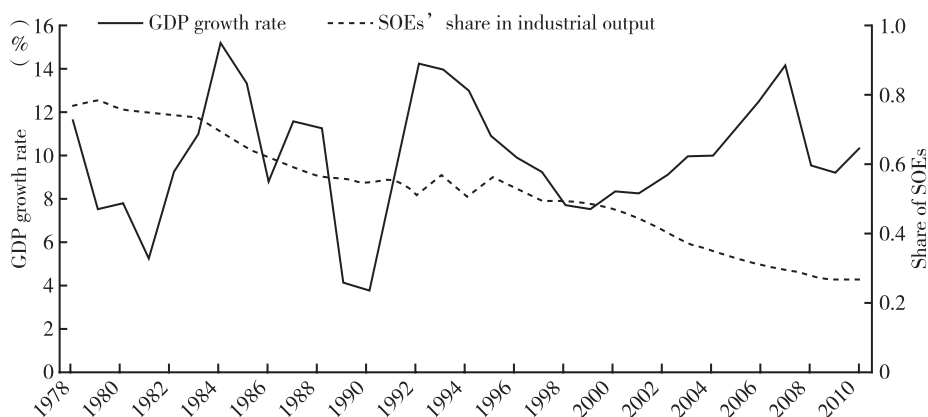


Figure 2. SOEs' share in industrial output and GDP growth in China

Source: National Bureau of Statistics of China.

In 2012, China's state-owned enterprises administered directly by the State-owned Assets Supervision and Administration Commission (SASAC) paid the government 1.8 trillion yuan in taxes and fees in the first seven months.

The Chinese government has pledged to deepen SOEs reform by turning them into investor-owned companies, improving corporate governance and optimizing the distribution and structure of the state sector of the economy. In the meantime, the government has also been committed to creating a business environment in which non-SOEs are encouraged to compete with SOEs on an equal footing.

2.3. Reducing market entry barriers

China's economic reform is a process through which the state-owned and collectively-owned companies' monopolies on economic activities are broken with the gradual introduction of non-state owned companies. The pace of opening the market by reducing or removing barriers to entry has sped up since the late 1990's. The State Council established a leading group headed by a vice premier to take away unnecessary market entry barriers and eliminate various disguised restrictions on non-SOEs, including both domestic private companies and foreign investment. As a result, non-SOEs boomed, and the competition brought about by these new entrants compelled SOEs to improve management and invest in R&D. The Chinese government has reduced red tape in trading across borders as well. In 2007, an Australian report listed China among the top reformers in the 21-member Asia-Pacific Economic Cooperation (APEC), in terms removing barriers to investment and boosting greater economic growth in the country.

In recent years, China put more emphasis on participation by domestic, non-state owned companies in a few industries, such as the power, telecom, oil, and railroad industries, which were previously dominated by state enterprises. The government attempted to break at least part of the state's monopolies in these industries and boost private investment. Some scholars have estimated that the efficiency losses caused by SOE's monopolies of the network industries runs into upward of RMB 5 trillion (Yu & Zhang, 2010).

Table 1

Industrial efficiency loss from administrate monopolies

(unit: 100 million)

		2001	2002	2003	2004	2005	2006	Total
Electric	E.L.	2713.9	3160.3	3913.7	5129.6	6009.2	7899.5	28826.2
	Share of GDP %	2.5	2.6	2.9	3.2	3.3	3.7	
Telecom	E.L.	1584.6	1822.5	2041.3	2297.1	2567.5	2871	13184
	Share of GDP %	1.4	1.5	1.5	1.4	1.4	1.4	
petrol	E.L.	3403.5	3865.3	5256	7424.7	9574.9	12094.6	41619
	Share of GDP %	3.1	3.2	3.9	4.6	5.2	5.7	
Rail	E.L.	614.2	648.3	677	818.9	921.5	1079.1	4759
	Share of GDP %	0.5	0.5	0.5	0.5	0.5	0.5	

Source: Yu etc. (2010) ; E.L.= Efficiency Loss.

Economic studies typically find that barriers to entry result in lower productivity growth (Poschke, 2010). In the case of China, Bai et al. (2008) set up a monopolistic competition model to explain how factor shares are determined by monopoly power, capital-output ratios, capital-augmenting technical progress, elasticity of substitution, and ownership. Their research shows that monopoly power and ownership restructure significantly influence factor shares in the industrial sector, while capital-augmenting technical progresses and capital-output ratio do not show significant influence.

The Chinese government made it very explicit in the “12th Five-year Plan” that they were striving to deepen reform of monopoly industries by introducing competition, and strengthening government regulation and public oversight of them.

2.4. Pursuing innovation-driven growth

Promoting innovation is at the core of China’s new development strategy; the Chinese State Council pinpoints science and technology as a key driving force for sustainable economic growth and the transformation of China into an innovation-oriented nation on the basis of the development of a national innovation system with strong indigenous innovation capacity.

In the “12th Five-year Plan,” the Chinese government plans to deepen science and technology system reform, strengthen scientific research in higher education, support enterprises to invest in R&D, an encourage international cooperation in science and technology. The chief program designed to facilitate technological development and innovation is the ‘National Medium and Long-term Program for Science and Technology Development (2006-2020)’ (the ‘2020 program’). This program was initiated by the central government and released in early 2006, aiming at making China an innovation-oriented society by 2020 and one of the world’s leading innovators in the long term. Key goals include improving the national intellectual property rights system and boosting China’s research and development expenditure to 2.5% of the country’s GDP

by 2020. R&D intensity will be enhanced from 1.86% in 2011 to 2.2% in 2015, and the patents per ten thousand people will reach 3.3.

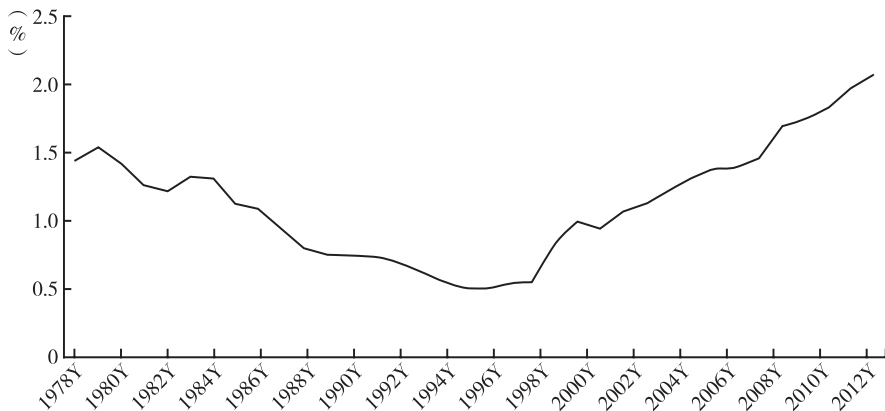


Figure 3. China's R&D expenditure as a proportion of GDP(1978-2013)

Source: National Bureau of Statistics of China.

China's R&D expenditures as a proportion of GDP have expanded from 0.71% in 1990 to 1.52% in 2008. In 2006, China spent a total of about 87 billion dollars on R&D, which was ranked No. 3 in the world. A major change is the increasing role of Chinese business enterprises in innovation. Of total R&D spending in 2006, the enterprise sector accounted for over 72% in spending while contributing 70% to total investment.

Zachariadis (2004) estimates that an increase of 0.1% in R&D intensity is estimated to lead to innovation growth of about 0.038% in OECD economies. Wu (2010) applied regional data to examine the impact of R&D efforts on innovation, and hence, economic growth in China in the most recent decade, and the estimates show that R&D investment in China has substantial impacts on innovation and economic growth. According to the varying GMM results, an increase in R&D intensity by 0.1% would lead to an increase in innovation of 0.89% and subsequently economic growth by 0.08%.

2.5. Enhancing the quality of human capital

Defined as “the knowledge, skills, competencies, and attributes embodied in individuals that facilitate the creation of personal, social, and economic well-being” by OECD countries, human capital accounts for more than 60% of the nation's wealth, which includes natural resources, physical capital, and human capital (OECD, 2001; World Bank, 1997).

China is the most populous country in the world, and to turn such a vast number of people into skilled laborers requires continuous education and training input. In the “12th five-year plan,” China has committed to improving human capital management, to implementing national personnel policies, and to promoting human capital development in an all-round way.

Studies show that human capital has an important effect on productivity growth and on

reducing regional inequality in China (Fleisher, Li & Zhao, 2009). Some researchers believe that human capital has played a significant role in the Chinese economic miracle (for example, Fleisher and Chen, 1997; Démurger, 2001). Heckman discusses human capital investment in China and argues that China's policies favor physical capital investment over schooling, and urban human capital investment over rural human capital investment (Heckman, 2004). The true rate of return to education in China may be as high as 30% or 40%. China's economic performance will be enhanced by producing an educated workforce. Whalley et al. (2010) develops a human capital measure in the sense of Schultz (1960) and then reevaluates the contribution of human capital to China's economic growth; this indicates that human capital plays an important role in China's economic growth, and the contribution of human capital to growth is 43% during 1978-1999-54% growth during 1999-2008. Human capital contributed to 59% of growth over 2003-2008.

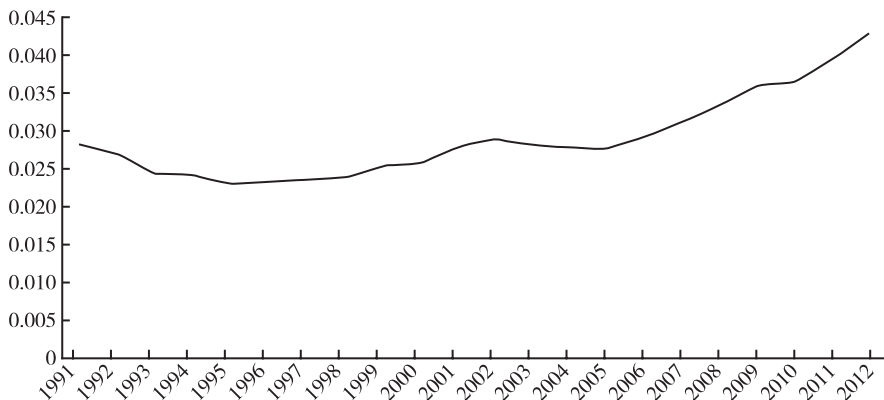


Figure 4. China's fiscal expenditure on education as a share of GDP(1991-2012)

Source: National Bureau of Statistics of China.

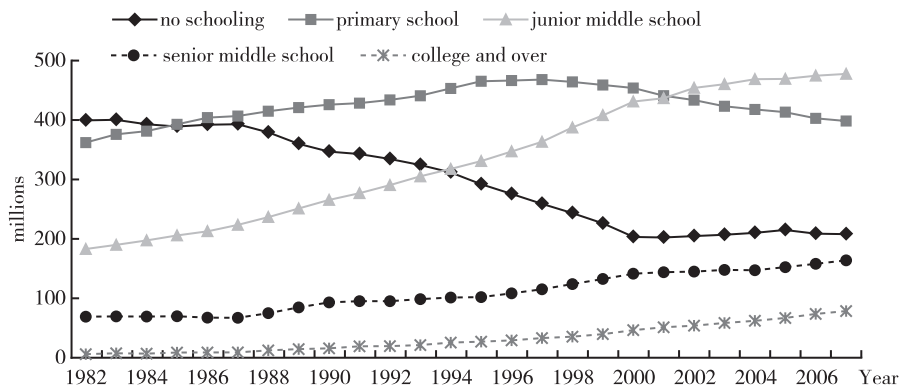


Figure 5. Population by educational attainment, 1982-2007

Source: Li (2009).

Haizheng Li et al. (2009) estimate China's human capital stock from 1985 to 2007 based on the Jorgenson-Fraumeni lifetime income approach. China's total real human capital increased from 26.98 billion yuan in 1985 (i.e., the base year) to 118.75 billion yuan in 2007, implying an average annual growth rate of 6.78%. The annual growth rate increased from 5.11% during 1985-1994 to 7.86% during 1995-2007.

2.6. Opening up to the world

China's policy of opening-up to the world has been one of the two wheels that drive China's great economic progress over the past 30 years. Reaching out for capital, technology, and markets, China has benefited from the trade liberalization and economic globalization that started in the early 1980s. There are a vast amount of studies analyzing how, in theory, international trade promotes domestic growth. For example, Dollar and Kraay (2003) found a strong and significant positive relationship between changes in trade and changes in growth. Although after the financial crisis that has brought the world economy into the current recession, people start to re-examine the true benefit of globalization and still believe that openness is associated with higher growth rates.

Researchers inside and outside of China have studied in great detail the role of exports in China's economic growth. Bao et al. (2008) used China's panel data of 30 provinces investigating the complementary effect between openness and other indicators in China. Their estimation results support a strong complementary effect among inflation, marketization, and openness. Li (2000) found that foreign direct investment is more efficient than China's domestic investments in positively affecting China's economic growth. Bao (2008) explored a nonlinear relation between China's economic growth and openness with Chinese provincial cross-sectional data.

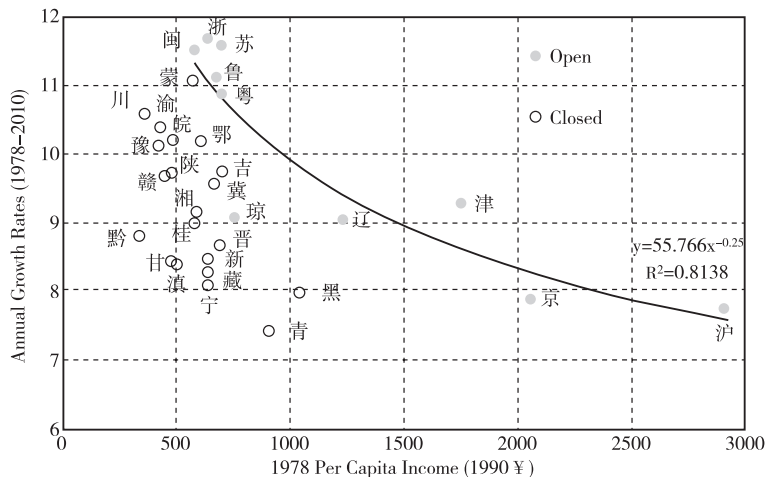


Figure 6. Income and growth rates of 31 provinces of China

Source: Xie (2012), http://blog.sina.com.cn/s/blog_829ee32301011rod.html

Note: 闽=Fujian, 浙=Zhejiang, 苏=Jiangsu, 蒙=Inner Mongolia, 鲁=Shandong, 川=Sichuan, 渝=Chongqing, 粤=Guangdong, 皖=Anhui, 豫=Henan, 鄂=Hubei, 赣=Jiangxi, 陕=Shaanxi, 吉=Jilin, 湘=Hunan, 冀=Hebei, 黔=Guizhou, 桂=Guangxi, 琼=Hainan, 辽=Liaoning, 津=Tianjin, 甘=Gansu, 滇=Yunnan, 晋=Shanxi, 新=Xinjiang, 藏=Tibet, 宁=Ningxia, 黑=Heilongjiang, 青=Qinghai, 京=Beijing, 沪=Shanghai.

In the next phase of the development, a more open China could still bring more opportunity in international trade with both developed industrial countries and developing countries. China is determined to enhance market quality and embolden the opening up policy, especially in the service and financial sectors. While it is predicted that trade conflicts will increase in the future, China should continue to promote open trade with other countries. There are also many other factors to be considered, such as climate change, internet governance, and the control of contagious disease. China can achieve a win-win solution in the world.

3. A preliminary quantitative examination of the impact of the new reforms

3.1. Descriptions of data and models

Based on a preliminary VAR model, we attempt to capture complicated and dynamic relations between these policy elements and economic growth via impulse response analysis and variance decomposition.

3.1.1. The data set

Our VAR model uses annual time-series data from the period of 1978–2011 to estimate the effect of the reforms if implemented. Unless stated otherwise, data is derived from the website of the National Bureau of Statistics of China. The data set consists of observation for growth rates of GDP (GDP), macro tax burdens (public revenue/GDP) (TAX), R&D and education intensity (R&D and education expenditure as share of GDP) (RED), SOEs as share of GDP (SOES), and trade volume (ENI). Here we take these 5 observables' growth rates as endogenous variables.

3.1.2. The basic model

The vector autoregression (VAR) model is one of the most successful, flexible, and easy to use models for the analysis of multivariate time series. For a set of n time series variables $y_t = (y_{1t}, y_{2t}, \dots, y_{nt})'$, a VAR model of order p (VAR (p)) can be written as:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + u_t$$

where the A_i 's are $(n \times n)$ coefficient matrices and $u_t = (u_{1t}, u_{2t}, \dots, u_{nt})'$ is an unobservable zero mean error term.

The optimal lag length in the one-regime VAR system is selected using the AIC and SC criterion. In this model we choose the lag length of the VAR as 4.

3.1.3. Unit root test

All variables are tested for stationary before estimating the VAR model. A stationary test of variables was established by employing an Augmented Dickey-Fuller (ADF) test. Mackinnon's critical values were utilized to test for the significance of the coefficient of the lagging variables.

ADF tests were first conducted on the levels of growth rates of GDP (GDP), trade volume (ENI), macro tax burden (public revenue/GDP) (TAX), SOEs as a share of GDP (SOES), and R&D and education intensity (R&D and education expenditure as share of GDP) (RED). The results of this test at the levels indicated show that GDP, ENI, and RED were stationary, and TAX and SOES

were non-stationary at the 5% level of significance, thus leading to first taxed differences, which indicate that all variables are stationary and integrated to an order of one or $I(1)$. The results of this ADF test at the levels and first differences are presented in the table above.

Table 2
Augmented Dickey-Fuller unit root test

Variable	Augmented Dickey-Fuller test statistic			
	Level		First Difference	
	t-Statistic	Probability	t-Statistic	Probability
GDP	-3.791367	0.0076	-5.40678	0.0001
ENI	-4.934904	0.0003	-6.71242	0.000
TAX	-2.146865	0.2287	-5.88998	0.000
SOES	-2.830279	0.0657	-7.32764	0.000
RED	-3.624425	0.0107	-7.33098	0.000

3.2. Empirical results and discussion

This paper uses the VAR model to investigate the causal relationships between the discussed reforms and economic growth. The results show that openness and investment for R&D and education have positive impact on the growth of GDP.

Table 3
Multivariate Granger Causality Test

INDEPENDVARIABLES	GDP	ENI	TAX	SOES	RED
GDP		2.635959 (0.6205)	2.669261 (0.6146)	3.292318 (0.5102)	1.136441 (0.88840)
ENI	15.85314 (0.0032)		9.167789 (0.0570)	8.835597 (0.0653)	4.999959 (0.2873)
TAX	10.95341 (0.0271)	9.786639 (0.0442)		7.833062 (0.0979)	6.848018 (0.1441)
SOES	6.994378 (0.1362)	29.71078 (0.0000)	4.406066 (0.3538)		16.82896 (0.0021)
RED	11.60396 (0.0206)	12.60829 (0.0134)	10.42556 (0.0338)	10.62866 (0.0311)	

Notes: above values are χ^2 statistics; numbers in parentheses are value of probability.

3.2.1. Causality result

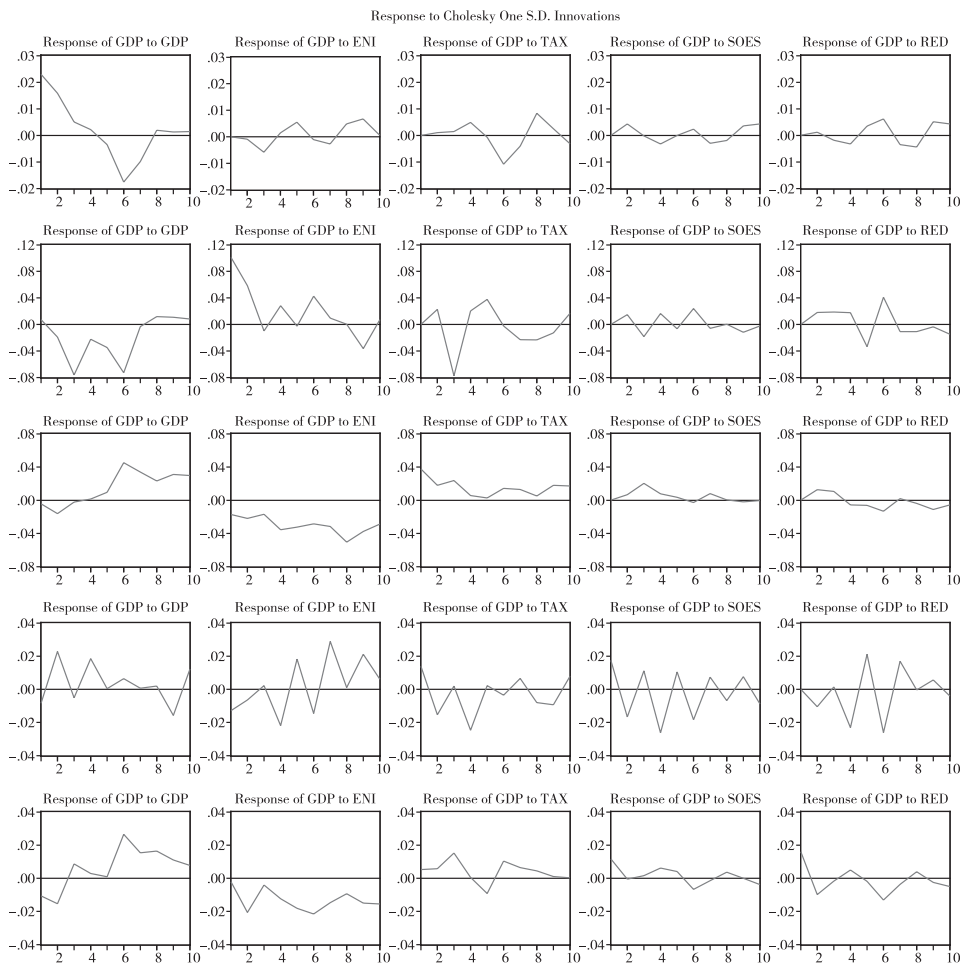
This result underlines the causality nexus among economic growth, trade volumes, SOE size, macro tax burden, SOEs as share of GDP, and R&D and education intensity. The results of causality test confirm that some variables have unidirectional relations. For example, ENI leads to GDP, which means the growth of the trade volume has a positive impact on GDP. Similarly, TAX

leads to GDP and ENI, which highlight the government's role in the Chinese economy. RED leading to GDP, which is in accordance with earlier theoretical analysis that investment in R&D and education promotes long term growth.

3.2.2. Impulse responsive function

An impulse response function traces the effect of a one-time shock to innovation on current and future values of endogenous variables.

The results indicate that the GDP variable gives a negative reaction to decreasing directions to the shock occurring in the trade volume in the second and third period, and in the increasing direction to the shock occurring in the fourth period. From the first moment, GDP responds positively to tax size, and moves in a decreasing direction from the fourth to fifth period. On the whole, these 5 variables have relatively complicated relations. As for the growth of GDP, in most of these periods, variables representing trade volume and investment for R&D and education have relatively positive impact on the growth of GDP, and variables representing government size and SOE size have a relatively negative impact on GDP. This result concurs with the conclusion of most theoretical works.



4. Conclusions

As revealed by the economic literature, there is plenty of evidence to confirm the strong relationship between reducing barriers of entry and productivity growth, sustainable and prudent fiscal policy vs. sustainable development, openness vs. growth, and human capital and innovation vs. long run growth. Studies on the Chinese economic data using the same framework demonstrate that these conclusions also apply to the Chinese economy. In this paper, we also build a VAR model to provide some empirical evidence to illustrate what happens if certain reforms on the supply side are implemented. The estimation results show that five key variables have the stable relations in China. Under certain conditions, tax-cuts, entry barrier reductions, innovations in investment, and increasing global openness can boost the long-term growth of China's economy.

This illustrates how some reforms on the supply side can strengthen the foundations for China's long term growth, which is important for China to realize its ambitions to become a prosperous society in the next two decades. Of those reforms needed for China's strive to a harmonious high-income society, the notable omission in the paper is financial sector reform, which is of vital importance for improving the quality and sustainability of the economic growth of China. This has been extensively discussed not only in *China 2030* during the "12th Five-Year Plan" drawn up by China's central bank and regulatory agencies.

It is worth mentioning that it has been repeatedly emphasized by China's decision-makers that being integrated into the global economy provides Chinese companies a worldwide market, state-of-the-art technologies, and advanced management experiences. It is also the general consensus in Chinese society that for China to develop its economy and modernize society, the core of all reforms must be to redefine the role of the state in spurring economic growth and promoting social harmony.

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