On Some Reform Measures to Strengthen the Foundations for Future Economic Growth in China

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Abstract

After three decades of fast economic growth, China has become an upper-middle income country, albeit still with hundreds of millions of people living below the UN defined two-dollar-a-day poverty line. Further economic growth at reasonably high speed is required for China to become a high-income society within next two decades. Achieving and maintaining a decent level of economic growth rate has become increasingly difficult because of various types of constraints, including tight supply of labors, an inefficient financial sector, 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. It discusses some, although 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 at the supply side of China's economic growth.

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1. Introduction

It may no longer be necessary to display many numbers and figures so as to explain to people that China's economic performance over the past three decades 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 solid economic growth, making 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; Eichengreen et. al, 2011).

Headwinds faced by the future Chinese economy

However, achieving and maintaining a decent speed of economic growth in the coming decades has become increasingly difficult because of various types of constraints which include tight supply of labors, inefficient financial sector, tightening of environment regulations, rising social unrest, and growing international economic frictions etc. These constraints have resulted in the Chinese economy being unbalanced, uncoordinated and unsustainable. To overcome these constraints is of necessity for China to achieve sustained high economic growth and maintain social harmony in the coming decades so as to move to a high-income society. China needs to change from a mostly investment-driven economic growth to growth based on increase of 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 of development and delivers "good and fast development" (Wen Jiabao, 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 promoting economic development, but the temporary measures taken by the central government to stimulate economy growth with the onset of international economic crisis triggered by the subprime crisis of USA in 2007 are also blamed for making the change more difficult. In the end, China has to get the fundamental factors right to sustain long run economic growth.

What determines economic growth in the long run

Although growth accounting has become a booming and complicated business, we could 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, i.e. labor productivity, capital per worker, the real interest rate, ratio of

capital to output, capital and labor share (Kaldor, 1961). Obviously, those Kaldor facts 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 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 in economist: 1) High quality human capital, 2) High technology, innovation, R&D, 3) Stable political environment, 4) High degree of openness (networks, links), 5) Secure formal institutions (legal system, property rights, tax system, finance system), 6) Good infrastructure, 7) Capacity for adjustment (flexibility), 8) Specialization in knowledge and capital intensive sectors, 9) Significant Foreign Direct Investment, 10) Free market economy (less state intervention) (Petrakos etc., 2007 see appendix A).

As to China, it is generally believed, as well articulated in the *China 2030*, that market-oriented reforms and opening-up policy are what 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 high savings rate, the rich supply of low cost and skilled labor force, continued investment in infrastructure, rules and knowledge coming together with FDI all played important role in China's fast economic growth. As also being argued in that report, 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 more 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 the China 2030 report. 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 about 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 factor contributes 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 party central committee congress in 2010. The program is very ambitious and areas of reform include financial sector reform, fiscal system reform, State-owned enterprises reform, reducing entry barriers to encourage competitions in all sectors, restructuring China's national system of innovation, developing social policies in a systematic way, strengthening environment protection, and pushing the Chinese economy be integrated into 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* may 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 environment and growing "green", 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 element, 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 mainly aimed at improving the 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 the entry barriers to market are fundamental institutional improvements for delivering quality growth and spurring innovations. Developing human capital will play an increasingly significant role in the next phase development of China.

This perspective offered in this paper is complementary to what has been proposed in the China 2030 report. 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 impact on the Chinese economy in the near term and in the long run.

2.1 Fiscal and taxation system reform

Even China's reform strategies and government policies have achieved reasonable results in terms of economic transition and growth performance most of the time of

the last three decades; it is widely believed that the role of the state should be redefined in the next stage of China 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, an on the other hand, the "visible hand" of the government should be more active in getting the institutions right as well as 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 increase of government income, that is to say, the increase in size of the government in fiscal terms.

Actually, measured on the government income's proportion to GDP, the size of the Chinese government experienced a tortuous journey: descending from the 31.1% in 1978 to reach the trough of 10.3% in 1995, and climbing back to 22% in 2010[2]. As China strives to build a harmonious society, government revenues should continue to increase so as to keep up with expansion in social spending.
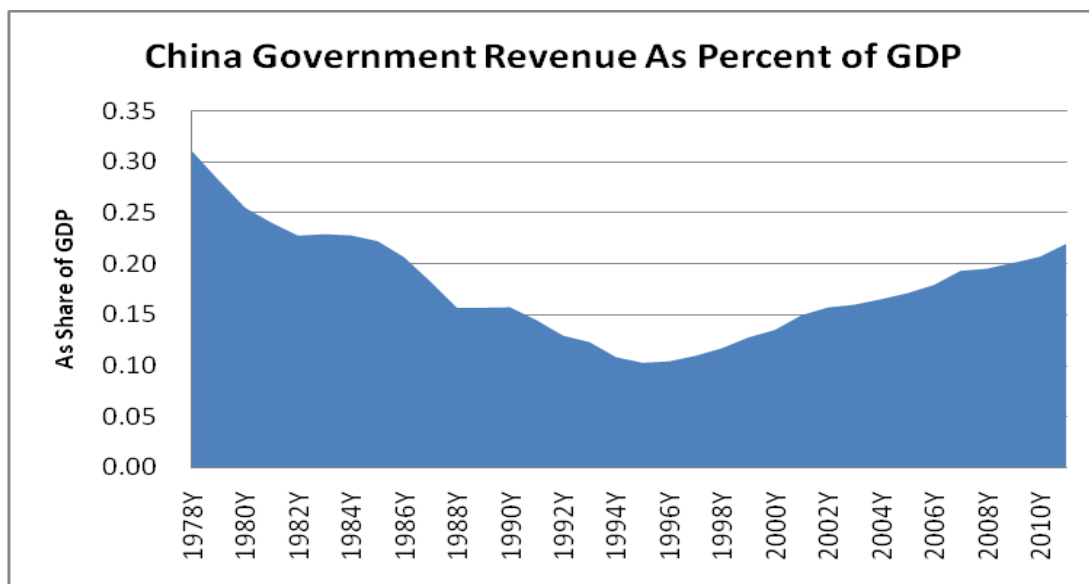
Source: National Bureau of Statistics of China.

The "12th Five-year Plan" commits 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.

On fiscal system reform, the Chinese government commits to continuing to improve the budgetary management system, establish a sound local government debt management system and explore 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.

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

Likewise, the success of fiscal system reform is of crucial importance for China to social harmony and economic progress.

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

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 ward off the impact of the global financial crisis and achieve a comparatively rapid and steady economic development in the context of the global economic slowdown.

2.2 SOE Reform

Reforming SOEs has always been a long term mission for China since the reform started a quarter of a century ago. With the introducing of the so called "modern corporate system" in middle 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 the 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 RMB￥21.4 billion Yuan to RMB￥495.1 billion, total net assets from RMB￥5.2 trillion to RMB￥8.4 trillion.

SOEs' Share in Industrial Output and GDP Growth in China
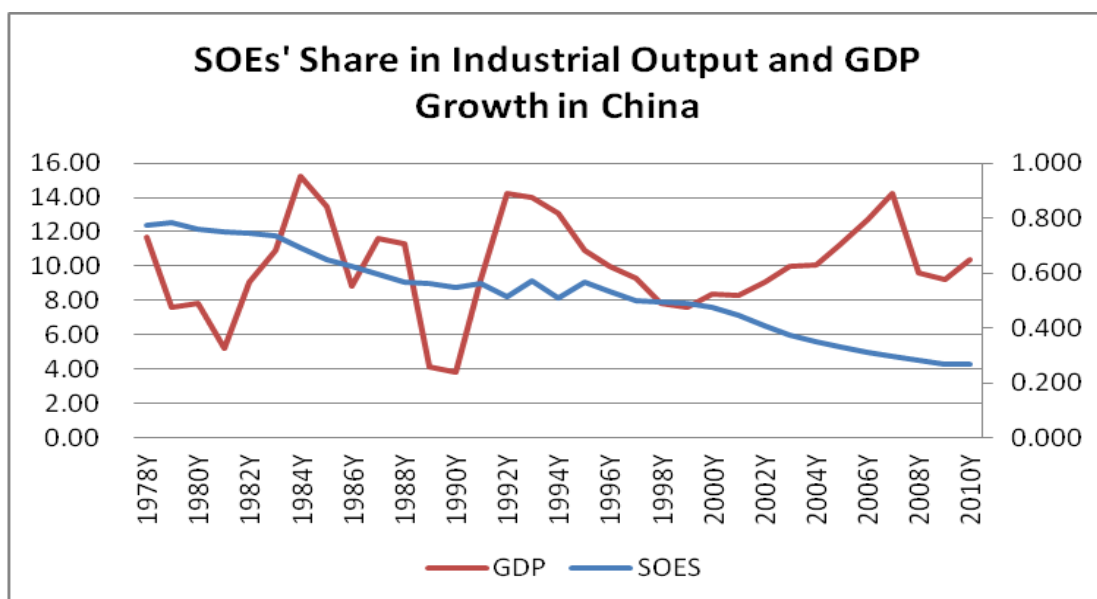
Source: National Bureau of Statistics of China.

In the financial sector, China allowed foreign investment in major commercial banks in 2001, after the government transferred on-performing loans to asset management companies (AMCs) and injected new capital into the four largest banks[3]. The total cost to the Chinese government of cleaning up the banks over 2003-2005 was 10-18% of GDP.

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

The Chinese government has pledged to deepen SOE reform by turning them into investor-owned companies, improving corporate governance and optimizing the distribution and structure of the state sector of the economy. At the mean time, 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 Reduce entry barriers to market

China's economic reform is a process through which the state-owned and collectively-owned companies' monopoly on economic activities is broken with the gradual introduction of non-state owned companies. The pace of opening the market by reducing or removing entry barriers has been speeded up in 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 limits on

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[3] 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.

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. In 2007, an Australian report listed China among the top reformers in the 21-member Asia-Pacific Economic Cooperation (APEC) in removing barriers to investment, boosting greater economic growth in the country.

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

Industry Efficiency Loss from Administrate Monopoly

(One hundred million)

		2001	2002	2003	2004	2005	2006	Total
Electricity	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	
Oil & Gas	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 etc. (2008) setup a monopolistic competition model to explain how factor shares are determined by monopoly power, capital-output ratio, capital-augmenting technical progress, elasticity of substitution, and ownership. Their research show that monopoly power and ownership restructure significantly influence factor shares in the industrial sector, while capital-augmenting technical progress and capital-output ratio do not show significant influence.

The Chinese government made it very explicit in the "12th Five-year Plan" to deepen

reform of monopoly industries by introducing competition, and strengthen 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 pinpoint 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.

As stated in the "12th Five-year Plan", the Chinese government plans to deepen science and technology system reform, strengthen the 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 longer term. Key goals include improving the national intellectual property rights system and boosting China's research and development expenditure to 2.5 per cent of the country's GDP by 2020. R&D intensity will be enhanced 0.45 percent from 1.86% in 2011 to 2.2% in 2015, and the patents per ten thousand people reach to 3.3.
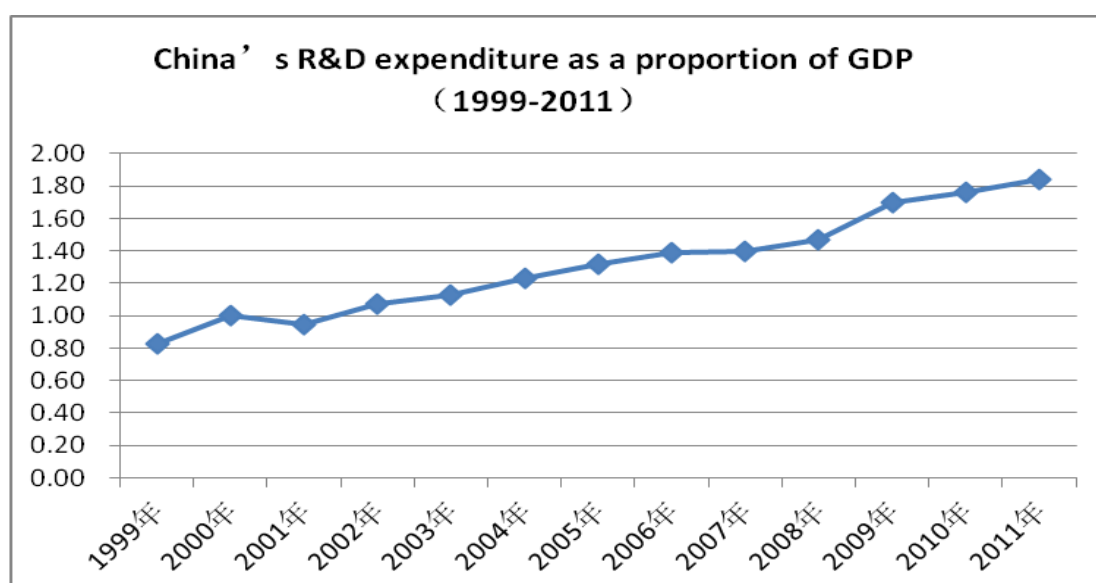
Source: National Bureau of Statistics of China.

China's R&D expenditure as a proportion of GDP has 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 the total R&D spending in 2006, the enterprise sector accounted for over 72% in spending while contributing to 70% of the total investment.

Zachariadis 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 (Zachariadis, 2004). Wu 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 estimation results show that R&D investment in China has substantial impacts on innovation and economic growth. According to the differencing GMM results, an increase in R&D intensity by 0.1% would lead to an increase in innovation by 0.89% and subsequently economic growth by 0.08% (Wu, 2010).

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, human capital accounts for more than 60% of the nation's wealth, which includes natural resources, physical capital and human capital (OECD, 2001, page 18; World Bank, 1997).

China is the most populous country in the world, but to turn the vast number of people into skilled labors requires continuous education and training input. In the "12th five-year plan", China has committed to improve human capital management, implement the national personnel policies, and promote 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 and Zhao, 2009). Some researchers believe that human capital has played a significant role in the Chinese economic miracle (for example, Fleisher and Chen, 1997, and 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, and indicate that human capital plays an important role in China's economic growth, the contribution of human capital to growth is 43% during 1978-1999, and accounts for 54% during 1999-2008. Human capital contributes 59% of growth over 2003-2008.

EDUCATION FUNDING AS A SHARE OF GDP
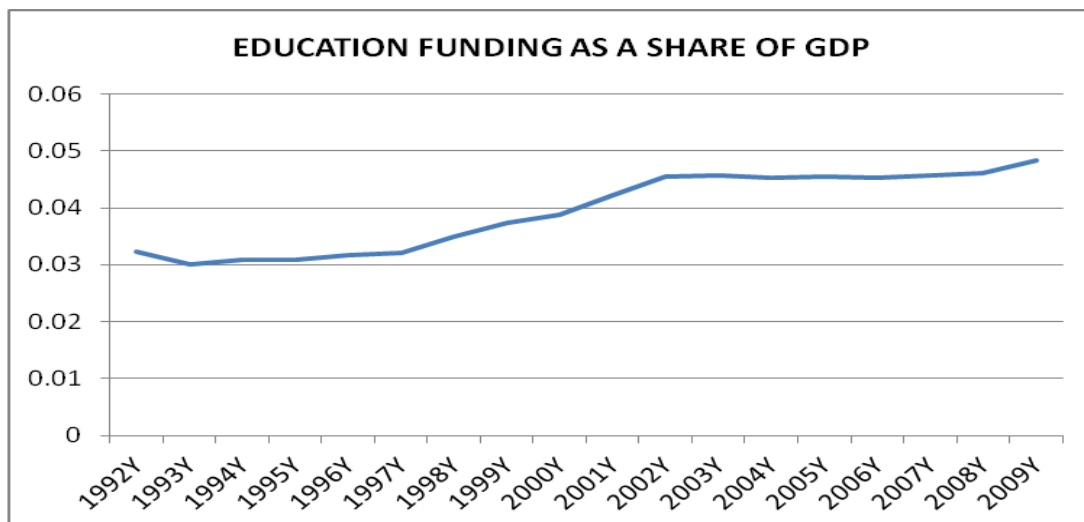
Source: National Bureau of Statistics of China

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 RMB￥ 26.98 billion in 1985 (i.e., the base year) to RMB ￥ 118.75 billion 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.

**Population by educational attainment, 1982-2007**
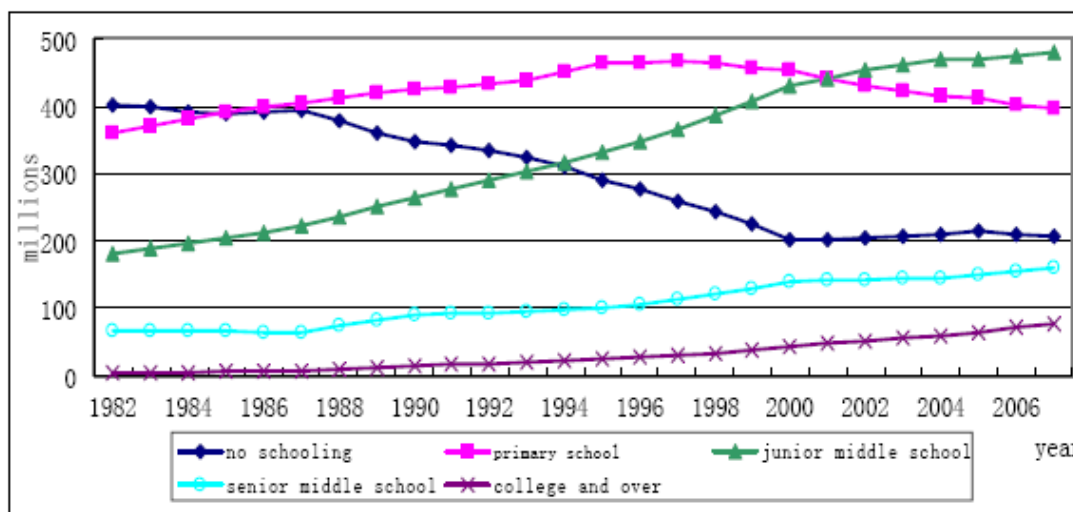
Source: Haizheng Li (2009)

2.6 Opening up to the world

The policy of opening-up to the world has been one of the two wheels that drive China's great economics progress in the past 30 years. Reaching out for capital, technology as well as market, China has benefited from trade liberalization and economic globalization starting early 1980s. There are a vast amount of studies analyzing how in theory international trade promotes domestic growth. For example Dollar and Kraay find a strong and significant positive relationship between changes in trade and changes in growth (Dollar and Kraay, 2003). 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 in and out China have studied in great detail the role of exports in China's economic growth. Bao et al. 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 (Bao et al., 2008). Li found that foreign direct investment is more efficient than China's domestic investment positively affect China's economic growth (Li, 2000). Bao explored a nonlinear relation between China's economic growth and openness with Chinese provincial cross-sectional data (Bao, 2008).

Income and Growth Rates, 31 provinces of China
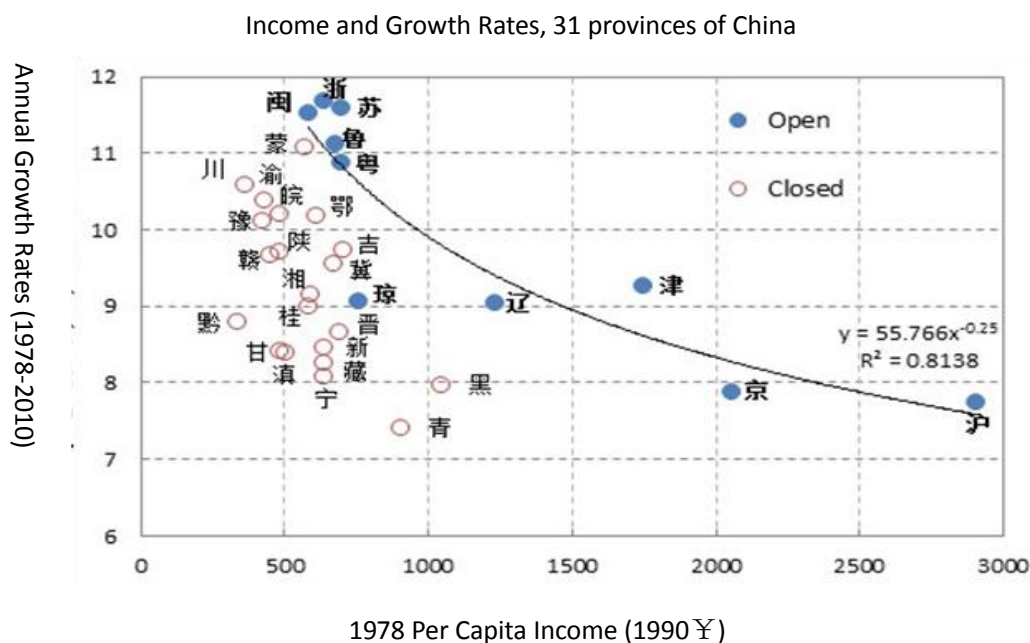
Source: Xie (2012) http://blog.sina.com.cn/s/blog_829ee32301011rod.html

In the next phase of ~~the~~ development, a more open China can still bring more opportunity on international trade with both the developed industrial countries as well as developing countries. China is determined to enhance the quality and embolden the opening up policy, especially in China's service sectors and financial sector. While it is predicated that trade conflict will increase in the future, China should continue to promote open trade with other countries. There are also many other factors to be taken seriously such as climate change, internet governance, contagious disease. China can achieve a win –win solution with the world.

3. A Preliminary Quantitative Examination of the Impact of the New Reforms

3.1 Description of the data and model

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

The data set

Our VAR model use annual time-series data for the period 1978–2011 to estimate the effect of the reforms if implemented. Unless stated otherwise, data are derived from the website of National Bureau of Statistics of China. The data set consists of observation for growth rates of GDP (GDP), macro tax burden (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 all of these 5 observables' growth rates as endogenous variables.

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 $y_t = (y_{1t}, y_{2t}, \ldots, y_{nt})'$, a VAR model of order p (VAR (p)) can be written as:

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

where the A_i's are (n x n) coefficient matrices and $u_t = (u_{1t}, u_{2t}, \ldots u_{nt})'$ is an unobservable i.i.d. 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.

Unit Root Test

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

Augmented Dickey-Fuller Unit Root Test

| Variable | Augmented Dickey-Fuller test statistic | | | |
| | level | | First Difference | |
	t-Statistic	Prob	t-Statistic	Prob
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

ADF test were first conducted on the levels of growth rates of GDP (GDP), trade volume (ENI), macro tax burden (public revenue/GDP) (TAX), SOEs as share of GDP (SOES), R&D and education intensity (R&D and education expenditure as share of GDP) (RED). The results of this test at the levels indicated that GDP, ENI, RED were stationary and TAX, SOES were non-stationary at the 5% level of significance, thus lead to test at first differences, which indicates that all variables are stationary and integrated of order one or I(1). The results of this ADF test at the levels and first differences are presented in the table above.

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.

Causality result

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

Multivariate Granger Causality Test

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

Notes: Values above are χ_2 statistics; Numbers in parentheses are value of probability

Impulse response function

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

The result indicates that the GDP variable gives a negative reaction in decreasing direction to the shock occurring in the trade volume in the second, third period, in the increasing direction to the shock occurring in the fourth period. From the first moment, GDP responses positively to tax size, and becomes in decreasing direction from fourth period to fifth period. GDP responses positively to shock of the SOEs' share change, and become decreasing from the second to the fourth period. The response of GDP to the shock of investment on research and education is trivial in the first and two stages, becomes increasing from the fourth stage. On the whole, these 5 variables have relatively complicate relations, and the results are not as satisfactory as expected.

Response to Cholesky One S.D. Innovations

Response of GDP to GDP

Response of GDP to ENI

Response of GDP to TAX

Response of GDP to SOES

Response of GDP to RED

Response of ENI to GDP

Response of ENI to ENI

Response of ENI to TAX

Response of ENI to SOES

Response of ENI to RED

Response of TAX to GDP

Response of TAX to ENI

Response of TAX to TAX

Response of TAX to SOES

Response of TAX to RED

Response of SOES to GDP

Response of SOES to ENI

Response of SOES to TAX

Response of SOES to SOES

Response of SOES to RED

Response of RED to GDP

Response of RED to ENI

Response of RED to TAX

Response of RED to SOES

Response of RED to RED

4. Conclusions

As revealed by the economic literature, plenty of evidences testify 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 evidences to show what happens if certain reforms on the supply side are implemented. The results of causality test confirm that the growth of the trade volume has positive impact on GDP, and the investment in R&D and education promotes long term growth. Similarly, the results highlight the government's role in Chinese economy. Relatively, the analysis from the impulse responsive function is more complicated.

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 her ambition to become a prosperous society in the next two decades. Of those reforms needed for China's strive to build a harmonious high-income society, a 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. However, financial reform has been extensively discussed not only in the *China 2030* report*,* but also in a roadmap for China's financial reform during the "12th Five-Year Plan" drawn up by China's central bank and key regulatory agencies.

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

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Appendix A:

Most significant factors in advancing economic dynamism

Rank	Factors	%
1	High quality human capital	53.67
2	High technology, innovation, R&D	50.16
3	Stable political environment	40.58
4	High degree of openness (networks, links)	38.98
5	Secure formal institutions (legal system, property rights, tax system, finance system)	36.74
6	Good infrastructure	32.91
7	Capacity for adjustment (flexibility)	31.63
8	Specialization in knowledge and capital intensive sectors	29.71
9	Significant Foreign Direct Investment	23.32
10	Free market economy (less state intervention)	22.36
11	Rich natural recourses	22.04
12	Robust macroeconomic management	21.73
13	Low levels of public bureaucracy	18.21
14	Favorable demographic conditions (population size, synthesis and growth)	18.21
15	Favorable geography (location, climate)	13.10
16	Strong informal institutions (culture, social relations, ethics, religion)	12.46
17	Significant urban agglomerations (population and economic activities)	11.82
18	Capacity for collective action (political pluralism and participation, decentralization)	8.31
19	Random factors (unpredictable shocks)	4.79
20	Other	2.56

Petrakos George, Paschalis Arvanitidis and Sotiris Pavleas, 2007
"Determinants of economic growth: the experts' view", Table 3

Appendix B: estimation results of the VAR model

The estimation output of the VAR model

R-squared	0.796403	0.823506	0.890769	0.915403	0.852859
Adj. R-squared	0.287412	0.382269	0.617693	0.703909	0.485006
Sum sq. resids	0.004215	0.081997	0.013778	0.005888	0.004320
S.E. equation	0.022953	0.101241	0.041500	0.027130	0.023237
F-statistic	1.564669	1.866360	3.261980	4.328276	2.318476
Log likelihood	86.97924	43.94210	69.80445	82.13126	86.62246
Akaike AIC	-4.550292	-1.582214	-3.365824	-4.215949	-4.525687
Schwarz SC	-3.560182	-0.592103	-2.375713	-3.225838	-3.535576
Mean dependent	0.102724	0.050270	0.000997	-0.034214	0.007943
S.D. dependent	0.027191	0.128812	0.067119	0.049858	0.032381

Determinant resid covariance (dof adj.)	5.96E-16	
Determinant resid covariance	9.52E-19	
Log likelihood	395.9354	
Akaike information criterion	-20.06451	
Schwarz criterion	-15.11395	

Response of GDP to Cholesky
One S.D. Innovations
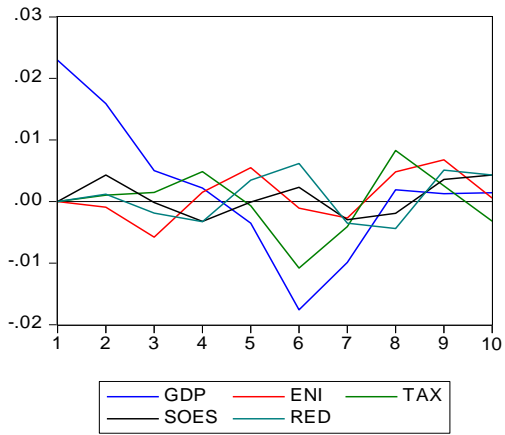
Response of ENI to Cholesky
One S.D. Innovations
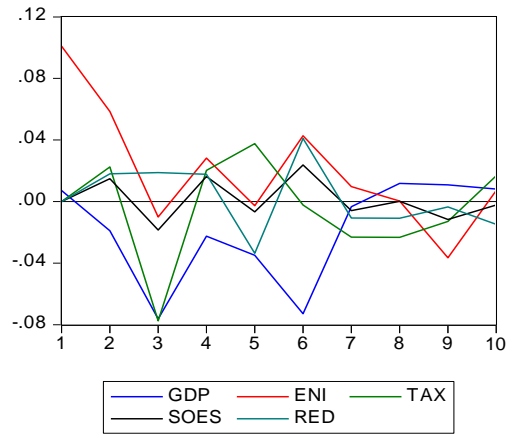
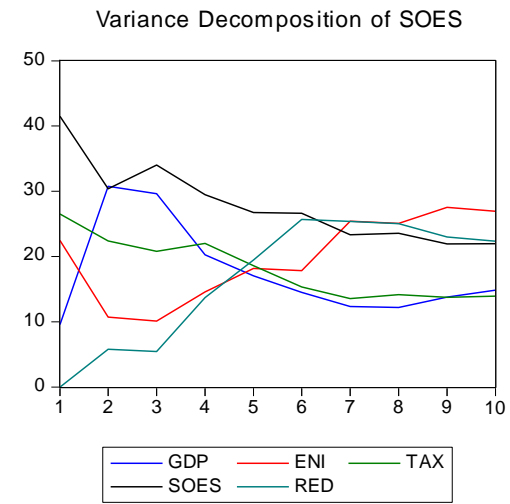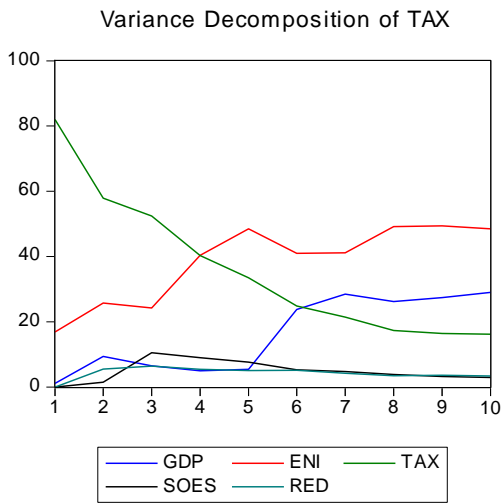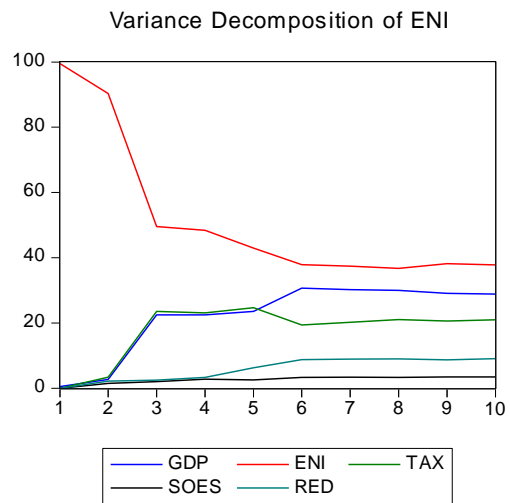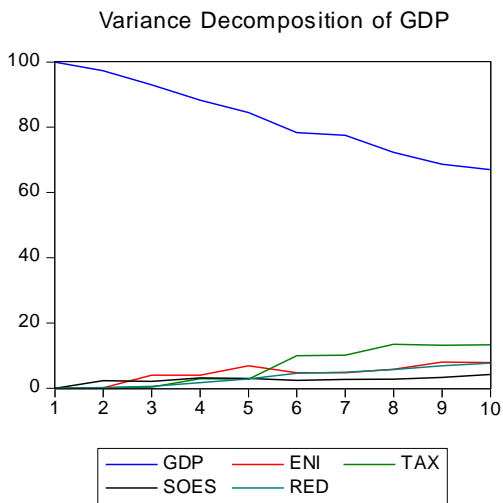## Response of TAX to Cholesky
One S.D. Innovations
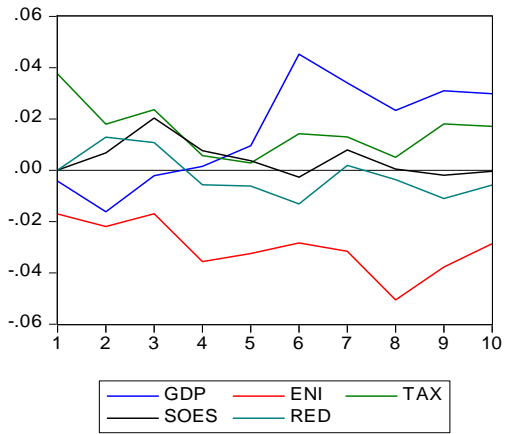
Response of SOES to Cholesky
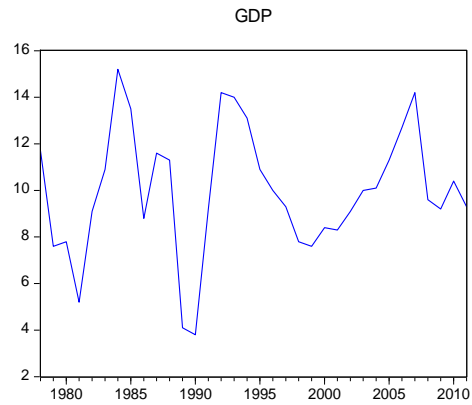### One S.D. Innovations
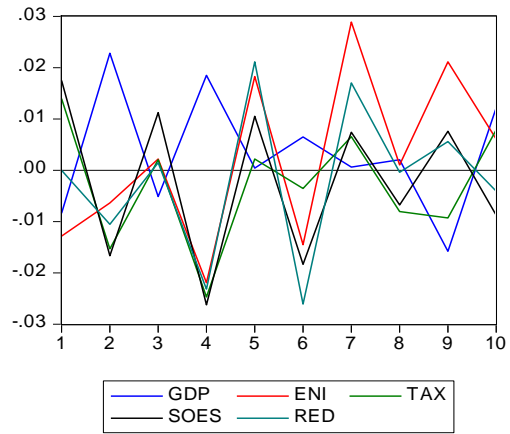
Response of RED to Cholesky
One S.D. Innovations
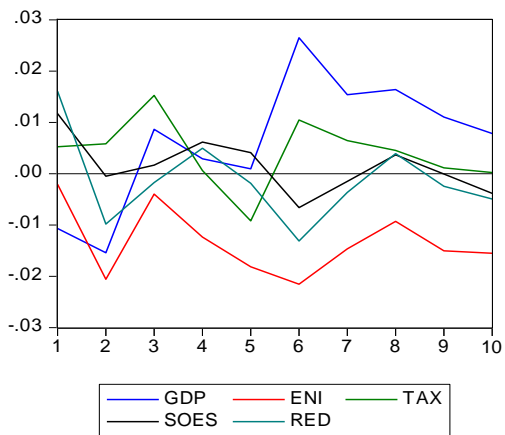
The impulse responsive function

Variance Decomposition of GDP

Variance Decomposition of ENI

Variance Decomposition of TAX

Variance Decomposition of SOES
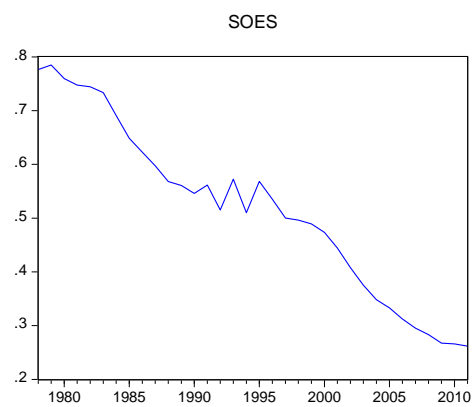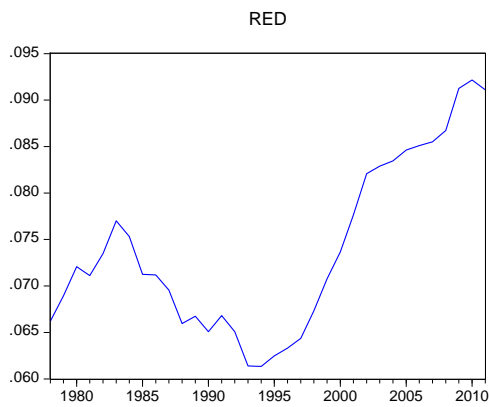
Variance Decomposition of RED
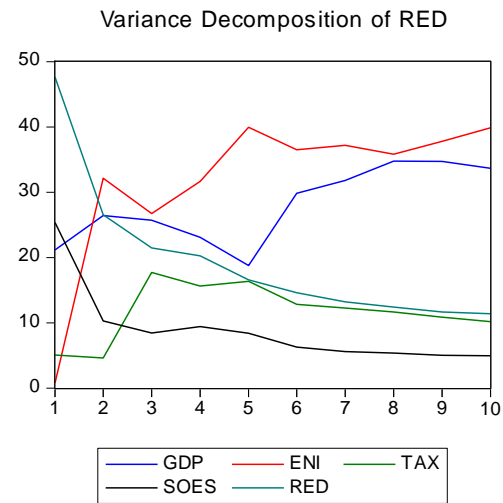
Variance decomposition

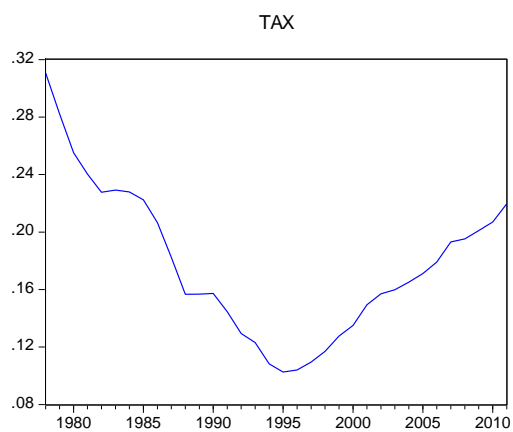Appendix C: the observables in Chinese economy

ENI
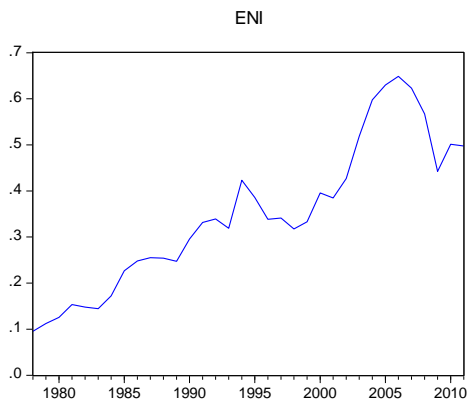
Trade volume(E&I/GDP)

GDP

growth rates of GDP

RED

(R&D and education fund)/GDP

SOES

SOEs' output to total industry output

TAX

Tax as share of GDP