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14. Marketisation in China from 1997 to 2014: Achievements and contribution to growth

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China has persevered in its market-oriented economic reform for 40 years. Guided by a reform strategy of ‘crossing the river by feeling the stones’, China managed to avoid the major economic decline and crisis that occurred in other transitional economies such as Russia and others in Eastern Europe, and successfully transformed its centrally planned economy into a largely market-oriented economy. In the past 40 years, China has achieved average annual gross domestic product (GDP) growth of 9.5 percentage points, and overtook the United States to become the world’s largest economy, measured by purchasing power parity (PPP), in 2014. Rapid economic growth has lifted millions of Chinese people out of poverty and improved their living standards.

To date, there is still a lack of quantitative studies of the contribution of marketisation to economic growth and the progress of productivity, due to the lack of a general indicator with which to measure the achievements of market-oriented reform.¹ Such reform is a systematic transformation of the country’s overall economic, social and legal systems. This chapter employs the provincial level National Economic Research Institute (NERI) Index of Marketisation, developed by the NERI Reform Foundation, to account for the contribution to economic growth of market-oriented reform. The average marketisation score for China’s 31 provinces increased substantially, from 4 to 8.4 in the period 1997–2014. However, during the period 2008–11, the marketisation process stagnated, probably because government intervention increased to cope with the Global Financial Crisis (GFC). Our findings indicate that, between 1997 and 2014, market-oriented reform contributed an average of 1.3 percentage points to the annual economic growth rate. The process of marketisation significantly improved resource allocation, which contributed to 35 per cent of the growth of total factor productivity (TFP).

The impact of market-oriented reforms on economic growth has been of great interest in transitional economics since the early 1990s (Roland 2000). Starting with the economic transitions in Eastern Europe and the former Soviet Union, economists began to study the impact of reform on economic growth in transitional

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¹ An exception is Fan et al. (2011), in which we examine the period 1997–2007. In this chapter, we extend the period to 1997–2014 by using the newly constructed marketisation index.

economies. The key to such research is to identify systematic indicators with which to measure the transition process. The annual *Transition Report* from the European Bank for Reconstruction and Development (EBRD) provides representative indices for various aspects of reform, such as price liberalisation, corporate reform, privatisation, foreign exchange and trade liberalisation, competition policy and reform of financial institutions, in 27 transitional economies. However, because of assessment difficulties, measurement problems, differences in research approaches, as well as the differences in countries' transition paths, previous studies have failed to reach consistent conclusions (Babetskii and Campos 2007). Some earlier studies, such as Havrylyshyn et al. (1998), using EBRD transition indices, and De Melo et al. (2001), using their own transition indices, concluded that market-oriented reform significantly contributed to economic development. However, these were not corroborated by subsequent studies. According to the results of empirical research by Falccetti et al. (2002), the effect of reform on economic growth is not robust and depends on the selection of sample countries and periods. Fidrmuc (2001) also found that, although economic transition had a positive effect on economic growth before 1995, the impact was insignificant for the period between 1996 and 2000.

As for the sample choice, all of the above studies were conducted on Eastern European and former Soviet countries. For a long time, mainstream international economists gave insufficient attention to China's different transitional path. Only in the past decade have China's economic achievements and transition experiences started to catch the attention of the international economics community. Nevertheless, research on the effect of China's marketisation on economic growth has been limited. In the NERI Index of Marketisation, we see marketisation as a systematic, and gradual, process of institutional development. We therefore measure the progress of marketisation from five aspects: the relationship between government and the market, development of the nonstate (private) sector, development of product markets, development of factor markets and the development of market intermediaries as well as a market-friendly legal environment. This system is constructed on the basis of objective statistics or survey data. We believe such a system can provide rich information on the process of marketisation. Furthermore, the NERI index provides panel datasets to catch regional differences over time, thus making cross-provincial comparison possible.

Part two of this chapter reviews the major achievements of marketisation in China between 1997 and 2014. Part three explains the econometric models and data we employed in our study. Part four presents the regression results and analysis, and calculates the contribution of marketisation to economic growth via growth accounting, while part five provides the conclusion.

China's achievements in marketisation

The NERI index is an assessment system for relative progress in marketisation for China's provinces using a comparative method. Marketisation is assessed in five fields by 23 basic indicators. Data are from both statistics and enterprise surveys. The NERI index is now available for the period 1997–2014. Five reports have been published (Fan and Wang 2001; Fan et al. 2003b, 2004, 2007, 2016).

In this index system, each of the 23 indicators is normalised into a basic index with a 0–10 relative score system for the base year. The best- and worst-performing provinces for a particular indicator are given scores of 10 and 0, respectively. Other provinces are rated in between, according to their performance in this indicator relative to the best and worst performed provinces. For a positively related indicator, for instance, the basic index score, j , for province i , noted as S_{ij} , is calculated with Equation 14.1.

Equation 14.1

$$S_{ij} = \frac{V_i - V_{\min}}{V_{\max} - V_{\min}} \times 10$$

After positive or negative variations over years, a basic index allows a province to have scores above 10 or below 0, so that its progress over time can be measured. For a certain field—for instance, development of the nonstate enterprise sector—a field index is constituted using a few basic indices. A total of five field indices constitutes the overall marketisation index. All field indices are weighted equally in the overall index, as are the basic indices in each field index.

The NERI marketisation index indicates the relative process of marketisation, but does not denote how far a province is from a pure market economy. So far, no economic theory can depict a full market economy—nor does such a thing exist in reality. However, the relative progress of marketisation is observable. The index is designed to compare the relative achievement of marketisation across provinces and measure their temporal changes. The multi-angle analysis and the horizontal and vertical comparability and measurement using objective indicators constitute the distinctive features of the NERI index. Another advantage of the index is that it avoids the subjective judgement that exists in other studies. A few of the indicators used in the NERI index are assessments collected from corporate executives, but the survey includes extensive samples, thus minimising the impact of random errors.

As indicated by the index, China has made significant achievements in marketisation. The average marketisation score for China's 31 provinces (including five autonomous minority ethnic regions and three municipalities directly under central administration) increased from 4 to 8.4 in the period 1997–2014 (see Figure 14.1).

However, the growth of the marketisation index is not steady. The marketisation process was slow between 1997 and 2000, during which time the average score increased by only 0.1 point each year. The marketisation pace accelerated between 2001 and 2008, with an average annual increase of 0.37 point, suggesting China's accession to the World Trade Organization (WTO) in 2001 might have played a positive role in promoting its marketisation. However, the marketisation process again slowed substantially, in the period 2008–11, probably because government intervention increased to cope with the GFC. In the period 2012–14, the process began to grow again.

Figure 14.1 Average marketisation index score, 1997–2014

Source: Fan et al. (2016).

In terms of regional development, although all 31 provinces have made positive progress, the process of marketisation is uneven (see Figure 14.2). While the eastern coastal areas are more marketised, the level in some central and western provinces is relatively low. The standard deviation of provincial scores continued to widen after 1997, which indicates growing disparities in the interprovincial marketisation process (see Figure 14.3). Nevertheless, provinces with both high and low levels of marketisation all experienced appreciable progress in this period.

Figure 14.2 NERI index for progress in marketisation in Chinese provinces

Note: Due to limited data, we do not include Tibet, Taiwan, Hong Kong and Macau.

Source: Fan et al. (2016).

The five aspects of marketisation all improved between 1997 and 2014 (Figure 14.4). Rapid progress has been made in development of the private sector, market intermediaries and the legal environment, and the development of product markets. However, in terms of the government–market relationship, progress has stalled over the past few years. This indicates there is still too much unnecessary government intervention. The development of factor markets was slow between 2003 and 2010, but accelerated after 2011.

There are also bottlenecks in market-oriented transformation. Most importantly, institutional and legal frameworks are incomplete and, to some extent, conflict with the market mechanism. There are still unnecessary government interventions, unregulated financial collections and low administrative transparency. The size of government is increasing and the legal environment for the market is still undesirable, which indicates the need for further institutional change and public sector reform. At the sectoral level, the manufacturing sector is now nearly fully market-oriented, whereas marketisation in the financial sector is lagging. A few service sectors are still low in efficiency and lack market competition. Market intermediaries are underdeveloped.

Figure 14.3 Standard deviation of marketisation index, 1997–2014

Source: Fan et al. (2016).

Figure 14.4. Scores for the five aspects of marketisation, 1997–2014

Source: Fan et al. (2016).

Model and data

A growth model for empirical study

For empirical study of economic growth, the Cobb–Douglas production function remains a commonly used functional form because of its analytical convenience. In Lucas's (1998) model, human capital, as an important production factor, is defined as effective labour determined by both the quantity and the educational level of the labour force—that is, the quality of labour. To distinguish the two effects, our study divides the Lucas-defined human capital into two variables—the size of the labour force and its educational level—in a Cobb–Douglas production function (Equation 14.2).

Equation 14.2

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta} E_{it}^{\gamma}$$

In Equation 14.2, Y_{it} denotes GDP; K_{it} is fixed capital stock; L_{it} is the labour force; and E_{it} is the average number of years of schooling for the labour force of province i in year t ; α , β and γ are the output elasticities of physical capital, the labour force and years of schooling, respectively. A_{it} represents TFP, which comes from two main sources: technological progress and efficiency gains from both improvement in resource allocation and changes in the incentive mechanism at the firm level as a result of market-oriented reforms. Factors that have significant effects on TFP growth at the provincial level are technological progress, marketisation and improvements in infrastructure. Thus, TFP in this study is defined as Equation 14.3.

Equation 14.3

$$A_{it} = A e^{(\rho MI_{it} + \delta \ln Tech_{it} + \theta Tran_{it} + \lambda_i + u_{it})}$$

In Equation 14.3, MI_{it} is the marketisation index of province i in year t ; $\ln Tech_{it}$ is the stock of research capital in logarithmic form, which is an accumulation of research and development (R&D) inputs calculated using the perpetual inventory method; $Tran_{it}$ is the infrastructure condition in province i and is measured by the ratio of standard transport route length to the provincial population. Standard route length is converted from the length of railways and highways of different grades based on their transportation capacity. Meanwhile, λ_i denotes the fixed effect of provinces and is intended to capture province-specific productivity factors that do not change over time; and ε_i is the random disturbance term.

Substituting A_{it} in Equation 14.2 in Equation 14.3 and taking the logarithm on both sides, we arrive at the following econometric model (Equation 14.4).

Equation 14.4

$$\ln Y_{it} = \ln A + \alpha \ln K_{it} + \beta \ln L_{it} + \gamma \ln E_{it} + \rho M_{it} + \delta \ln Tech_{it} + \theta Tran_{it} + \lambda_i + \varepsilon_{it}$$

Description of variables and data

GDP

GDP statistics come from the *China Statistics Yearbook* (NBS various years [a]). They are adjusted to the 2000 constant price. The average annual GDP growth rate was 11.3 per cent in the period 1997–2014.

Years of schooling of labour force

This is calculated from the annual numbers of graduates from primary, secondary and tertiary educational institutions in the past 56 years and national census data. The numbers of years of schooling for graduates from the tertiary, senior secondary, junior secondary and primary levels were taken as 16 years, 12 years, nine years and six years, respectively.

Workers' years of schooling increased from 7.1 years in 1997 to 9.1 years in 2014.

Capital stock

Using the perpetual inventory method and taking 1952 as the base year, we calculated capital stock using fixed asset investment data for the past 56 years (data from the National Bureau of Statistics, NBS). The initial capital stock is assumed to be 10 times the value of fixed asset investment in 1952. The depreciation rate is set at 5 per cent for the period 1952–77 and is assumed to be under stable acceleration during the reform period (1978–2014) to ultimately reach 8 per cent. Because no statistics are available on the price deflator for fixed asset investment before 1991, this is replaced with the commodity retail price index. Between 1997 and 2014, China's fixed capital stock experienced an annual growth rate of 15.5 per cent—much higher than the GDP growth rate.

Research capital

We use the provincial stock of research capital to measure technological progress. This stock is an accumulated aggregation of spending on R&D, on imports of foreign technology and on domestic technology acquisition, using the perpetual inventory method. All statistics are taken from the *China Statistical Yearbook on Science and Technology* (NBS various years [b]). Due to incomplete statistics for years before 1996, we use 1996 as the base period. In keeping with the existing literature, we set the rate of research capital depreciation at 15 per cent. Between 1997 and 2014, provincial research capital stock increased, on average, by 14.7 times, indicating relatively rapid technological progress.

Infrastructure

Even though many types of infrastructure are involved, only limited statistics are available for some of them. The most important, and measurable, type of infrastructure is the length of highways and railways. To make the statistics comparable, we convert the route length of different grades of highways into a standard length, which is equivalent to grade-two highways according to their transportation capacity. We then combine railway length and standard highway length into standard route length using a conversion factor of 14.7. Between 1997 and 2014, China's standard route length per 10,000 people increased from 12.7 km to 31.7 km.

Results

Effects of marketisation on economic growth

Table 14.1 demonstrates the regression results of Equation 14.4. The first and second columns of Table 14.1 show the regression results for the fixed effect model. The third column shows the results from the random effects model. The Hausman test rejects the null hypothesis (random effect) and thus the fixed effect results are accepted. Based on results in column 2, the output elasticities of physical capital, labour and years of schooling are 0.39, 0.11 and 0.51, respectively. The coefficient of the marketisation index (MI) is 0.046, which shows that, with other conditions unchanged, an increase in the marketisation index score of 1 point leads to 4.6 per cent of GDP growth.

Table 14.1 Baseline results

	(1)	(2)	(3)
	ln (GDP)		
LnK	0.528*** (0.011)	0.387*** (0.015)	0.422*** (0.015)
LnL	0.330*** (0.044)	0.108** (0.044)	0.349*** (0.029)
LnE	0.737*** (0.088)	0.512*** (0.079)	0.470*** (0.082)
MI	0.057*** (0.004)	0.046*** (0.004)	0.042*** (0.004)
Ln tech		0.152*** (0.013)	0.118*** (0.013)
Transport		0.006*** (0.001)	0.004*** (0.001)

	(1)	(2)	(3)
	ln (GDP)		
Model	Fixed effect	Fixed effect	Random effect
Observations	540	540	540
R ²	0.996	0.997	

* significance level of 10 per cent

** significance level of 5 per cent

*** significance level of 1 per cent

Based on the regression results in the first column of Table 14.1, derived from growth accounting, Table 14.2 shows the decomposition of provincial economic growth between 1997 and 2014. It indicates that physical capital, labour quantity, educational level and TFP contributed 6.83, 0.37, 0.64 and 3.7 percentage points, respectively, to economic growth. Evidently, capital still plays an important role in economic growth. Among the factors that determine TFP, marketisation contributes 1.45 percentage points, technological progress contributes 1.08 percentage points and infrastructure contributes 0.4 percentage points to economic growth; the remaining unobservable factor contributes 0.77 percentage points. Market-oriented reform remains the most important factor in TFP growth.

Table 14.2 Growth accounting, 1997–2014

Factor	Contribution
GDP growth rate	100%
Factor contribution	61.3%
Material capital	52.3%
Quantity of labour	1.8%
Educational level	7.2%
TFP contribution	38.7%
Marketisation process	11.3%
Technology	19.9%
Infrastructure	6.2%
Nonobservable factor	1.3%

Effects of five aspects of marketisation on growth

To examine whether the various aspects of marketisation have different effects on economic growth, we replaced the general marketisation index in Equation 14.4 with five separate marketisation indices. Table 14.3 shows the regression results. All five aspect indices have a significant impact on economic growth. In terms of the magnitude of the coefficient, improvement of the government–market relationship has the strongest impact on economic growth.

Table 14.3 Five aspects of marketisation and economic growth

	(1)	(2)	(3)	(4)	(5)
	ln (GDP)				
LnK	0.435*** (0.015)	0.394*** (0.017)	0.412*** (0.016)	0.392*** (0.017)	0.413*** (0.016)
LnL	0.246*** (0.045)	0.114** (0.048)	0.188*** (0.049)	0.117** (0.048)	0.102** (0.050)
LnE	0.508*** (0.078)	0.530*** (0.087)	0.489*** (0.086)	0.551*** (0.087)	0.504*** (0.087)
Lntech	0.157*** (0.013)	0.197*** (0.014)	0.195*** (0.014)	0.206*** (0.013)	0.199*** (0.014)
Transport	0.005*** (0.001)	0.005*** (0.001)	0.004*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
MI_1	0.029***				
Government–market relationship	(0.003)				
MI_2		0.008***			
Development of private sector		(0.003)			
MI_3			0.014***		
Development of product markets			(0.003)		
MI_4				0.009***	
Development of factor markets				(0.003)	
MI_5					0.004**
Development of market intermediaries and legal environment					(0.002)
Observations	540	539	540	540	540
R ²	0.997	0.996	0.996	0.996	0.996

* significance level of 10 per cent

** significance level of 5 per cent

*** significance level of 1 per cent

Note: All regressions use the fixed effect model.

Conclusions

Using the NERI Index of Marketisation, this chapter presents a quantitative analysis of the role of market-oriented reform in China's economic growth and TFP changes. Our results indicate that, for the period between 1997 and 2014, market-oriented reforms contributed an average of 1.3 percentage points to China's economic growth rate, accounting for 35 per cent of TFP growth. The contribution of marketisation may have been even greater because the acceleration of factor input growth, technology and infrastructure changes is also related to reform. This implies

that China has embarked on the right path for transition from a planned to a market economy. Marketisation has been the primary cause of the acceleration of China's economic growth and TFP changes during the reform period.

Although there have been remarkable achievements, China's marketisation is not complete. Marketisation has made crucial progress in some parts of China—particularly in the eastern coastal areas—but in some less-developed areas, the market mechanism is still underdeveloped. In terms of the reform process in different fields, development of the product market has had major successes, but factor markets remain underdeveloped. The government–market relationship has seen limited improvement over the past few years and has even regressed in certain areas. Government sector reform has been lagging, and the size of government continues to expand. These problems may negatively affect future economic growth.

With consideration of the above, future reforms are recommended to focus on the following areas.

First, reform of the factor markets should be carried out to improve the institutional framework for capital and land markets. A market-based pricing mechanism should be established and transactions should be made transparent. The urban household registration system should also be reformed to promote rural–urban labour mobility and population migration.

Second, entry barriers to monopolistic sectors should be reduced, and both market competition and public monitoring mechanisms should be enhanced in those sectors. Resource taxes and SOE dividend distribution systems should be reformed to make better use of monopolistic profits.

Third, excessive government intervention should be further reduced and discriminatory policy treatment in terms of bank credit, interest rates and market access should be eliminated.

Last, government sector reform should be carried out to promote a transparent, noncorrupt and efficient government.

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