Analyzing the TFP Performance of Chinese Industrial Enterprises

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21 November 2015

Singapore Economic Review (forthcoming)

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Abstract

After nearly four decades of rapid growth, the China economy is faced with various challenges. The 2008 crisis would have served as the last straw as China experienced falls and volatilities in industrial output, export and foreign direct investment. The new policy focuses on expansion of domestic consumption and rebalancing. Given the unreliability of Chinese products, there is a need to rebuild product acceptability and market confidence. The structure of industrial enterprises, especially the small- and medium-sized enterprises, will play a crucial role in the next phase of development in the China economy. This paper uses the data on Chinese industrial enterprises to estimate the productivity performance of enterprises across region and industries. The discussion is placed on the impact of the 2008 financial crisis on the China economy and industries enterprises. By using a simple methodology and OLS regression analysis on the estimation of total factor productivity, the empirical results show that SMEs and non-SMEs do perform differently in different industries and across regions, but SMEs suffered more than non-SMEs since the 2008 crisis.

Keywords: China regions, small- and medium-sized enterprises, total factor productivity, industrial enterprises

JEL classification: O3, O53

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Acknowledgement: The author is grateful to the comments on the earlier draft from Euston Quah, the Editor, and the two anomalous referees, and from participants in the 2014 China Economic Conference and seminar presentation in Zhongshan (Lingnan) University. The author is thankful to the research funding donation from Mr. David Zhang through the City University of Hong Kong and Siyang Ye and Angela Jin Yao for their research assistance. The author is responsible for the remaining errors.

I Introduction

After nearly four decades of rapid growth since 1978, the China economy is faced with challenges especially after the 2008 international financial crisis, as the subsequent periodic falls in industrial output and export and foreign direct investment posed the question whether China can still keep to a high growth rate. Although the China economy since 2013 has focused on expansion of domestic consumption and economic restructuring, the problem of mismatch between export and domestic demand may arise when export goods are diverted back to the domestic market. Taken together, one implication suggests that China's growth could have reached a turning point, which can be examined using productivity analysis in the industry sector.

Solow (1957) analysis on total factor productivity (TFP) has extensively been applied to analyze the China economy at the national, provincial and industrial levels (Chen *et al*., 2011; Wu, 2011; He, 2014). The estimation of the capital stock has been the key concern in TFP estimations, especially in China when the question of data reliability arises (Kim and Lau, 1994; Rawski. 2001). Other studies on China's industrial development have been based on some form of adjusted data. For example, Bai *et al*. (2004) employed post-tax profit margins in examining the regional specialization of Chinese industries. Brandt (2012) attempted to examine China's TFP analysis using firm-level data, but admitted that the analysis did face a number of measurement errors and bias. The reliability of firm-level data has also been questioned due probably to the agency problem between the management and shareholders (Agrawal and Knoeber, 1996). In the case of China, the agency problem may arise between the management of the enterprise and the interests of the various stake holders.

By using trend analysis and aggregate output figures to estimate the capital stock, studies in Chow and Li (2002) and Li (2003) constructed China's post-reform TFP figures at the national, regional and provincial levels. The study in Li (2009) extended the TFP estimates by using ownership data, and following the endogenous growth models the human capital variable has been incorporated to examine China's post-reform performance of TFP and its relative variance. The aggregate nature of TFP has further been decomposed into the three components of productivity, technical efficiency and scale economy in post-reform China (Li and Liu, 2011). The decomposition analysis was then extended to study the TFP of different manufacturing industries in post-reform China (Liu and Li, 2012).

The impact of the 2008 crisis on the China economy can be examined by using the TFP analysis based on the performance of industrial enterprises, especially the performance between large and small- and medium-sized enterprises (SMEs). In market economies, the existence of SMEs form an important business fabric because they minimize cost, react flexibly to market opportunities and promote entrepreneurship, though financing and innovation could be their constraining factors (European Commission, 2005). Recent studies on SMEs have concentrated on the issue of internationalization and business-related analyses using economy-wide, industry or firm data (Acs and Preston, 1997; Lin, 1998; O'Gorman, 2001; Storey, 2003; OECD, 2005; Klapper, 2006; Beck and Bemirguc-Kunt, 2006; Ayyagari *et al*., 2007; Harvie *et al*., 2010; Yohei, 2011; Lasagni, 2012; Foreman-Peck, 2013; Hohneck, 2013).

China's industries were organized mainly in the form of state-owned enterprises (SOEs) in the pre-reform period. Since 1978, however, local production communes were gradually reorganized into township and village enterprises (TVEs) under the family responsibility system in which rural households could sell their surplus in the market after the state quota was fulfilled. By 1983, 97 of all production teams had adopted the system.[1] It was not until the 1997 state-owned enterprise (SOEs) reform that China adopted the "keep the large, release the small" policy by retaining key strategic national enterprises, while all others were dismantled into shareholding enterprises, joint ventures with overseas buyers or formation of SMEs by displaced skilled workers (Wu, 2005; Naughton, 2007; Atherton and Smallbone, 2013). With a rather short period of development, studies in China's SMEs have concentrated mainly in business areas, barriers to innovation, management models and financing difficulties (Biggeri *et al*., 1999; Atherton and Fairbanks, 2006; Zhao *et al*., 2006; Liu, 2007; Liu, 2009; Shen *et al*., 2009; Li, 2011; Tang and Hull, 2011; Tang and Tang, 2012a, 2012b; Zhu *et al*., 2012; Chong *et al*., 2013).

While the GDP figures are the direct indicators on economic performance, but the economy's capacity can alternatively examined through the TFP performance of industrial firms, as this can provide a conjecture on the impact on the China economy after the 2008 crisis, especially the different performance between the different sizes of industrial enterprises. This paper extends the previous TFP studies using China's data on industrial enterprises. In particular, the discussion focuses on the performance between large enterprises and SMEs. Although there is data on a large number of industries, the comprehensive data on the size of enterprises began

[1] "Household responsibility system", *Wikipedia*.

since 2006. Nonetheless, the analysis can show the TFP performance between the different sizes of industrial enterprises. The empirical results also concentrate on the impact of the 2008 international financial crisis on China's industrial performance. These findings can shed new lights on the next phrase of China's industrial development and economic rebalancing.

Section II summarizes and discusses the Chinese data based on regional, industrial and ownership classifications. Section III applies existing methodology to first construct a benchmark TFP to allow consistency in the estimates, then uses proxy variables to estimate the TFP performance of different industrial enterprises. Section IV shows the empirical findings on the TFP performance of large and small industrial enterprises, making a reference to the impact of the 2008 crisis. Section V concludes the paper and discusses the role of SMEs in China.

II Data on Chinese Industrial Enterprises

The *Yearbook of Chinese Small- and Medium-Sized Enterprises* (YCSME) can provide the data on different kinds of industrial enterprises in China, but variations exist as most data variables began in 2005 or 2006. The definitions of enterprise sizes have also varied over the years. Since 2011, industrial SMEs have been based on two criteria of annual total sales revenue and number of employees. Similarly, through the popular use of preferential tax policy, the government over the years has been aiding enterprises and SMEs. In the empirical analysis, the data on the different types of enterprises would be used. The 31 provinces are classified into three regions of East (Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan), Central (Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan) and West (Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang).

Table 1 summarizes the data on the industrial enterprises. The first column shows the ten regional and economic variables for the period of 2006-2011 that are used for the analysis. The second column shows the 39 industries classified into seven categories for the period 2006-2011. Although the lack of data would prevent the empirical study on ownership, the 2010-2011 data on the 25 types of ownership in the third column are grouped into five categories. The YCSME also provide other data on services enterprises and data at the city-level, but they are incomplete and fragmented. Table 2 shows the number of enterprises, employment and the average annual growth between the beginning and end years in the sample period. The data on the number of

enterprises show that SMEs comprise of at least 94 percent of all industrial enterprises, with the remaining percentage representing the large enterprise. Among the three regions, eastern provinces have the largest number of SMEs, though its growth rate has slackened, while SMEs in central and west provinces are growing. The coastal provinces in eastern China have been the focus of development since economic reform. However, since 1994, explicit plans were made to improve the central and western provinces, and their larger percentage change shown in Table 2 reflects the result of the state policy on regional balance.

Table 1 Data on Chinese Enterprises

Aggregate (2006-2011)	Categories (codes) (2006-2011)	Ownership (codes) (2010-2011)
(1) All enterprises and SMEs (2) Nation and provinces (3) Number of enterprises (4) Employment (5) Assets (6) Main source of income (7) Profit (8) Tax payment (9) Output value (10) Value of export	(1) Mining (06-11): coal, petroleum and gas, black and color metal mining, non-metal and other mining. (2) Light manufacturing (13-19 and 42): food processing and production, beverages, tobacco, textile, clothing, shoes, caps, leather, fur, feather production and cultural artifacts. (3) Timber and wood (20–24): timber, bamboo, rattan, furniture, paper, paper product, printing and media, education and sporting product. (4) Chemicals (25–30): oil and chemical processing, chemical material and product, medicine, synthetic fiber, rubber and plastic. (5) Metal (31-35): non-metal mineral product, black and color metal refinery and processing, gold and metal production. (6) Machinery (36-41 and 43): machinery production, transport equipment and product, electrical machinery, communication equipment and machinery, office equipment and recycling. (7) Utilities (44-46): electricity, gas and water.	(1) State-ownership (110, 141, 143 and 151): state, state-collective, state-joint, state-wholly. (2) Collective and share-holding (120, 130, 142, 149, 159 and 160): collective, share-cooperative, collective-joint, joint enterprises, limited liability, share-holding. (3) Private (171, 172, 173, 174 and 190): individual, partnership, limited liability, share-holding, others. (4) HMT (210, 220, 230, 240 and 290): joint venture, cooperative, whole-owned, share-holding, others. (5) Foreign (310, 320, 330, 340 and 390): joint-venture, cooperative, wholly-owned, share-holding, others.

Note: HMT = Hong Kong, Macau and Chinese Taipei. Codes are the industry or ownership codes in the data source.
Source: *Yearbook of China Small and Medium Enterprises* (2012).

Table 2 Number of Industrial Enterprises and Employment

	2011		2006		Average growth (%)	
	All industrial enterprises	SMEs (%)	All industrial enterprises	SMEs (%)	All industrial enterprises	SMEs
			Number of enterprises			
Nation	325,609	97.20	301.961	99.11	1.52	1.13
East	213,863	97.31	218,278	99.24	-0.41	-0.80
Central	72,561	97.31	51,169	98.83	7.24	6.90
West	39,185	96.43	32,514	98.71	3.80	3.32
Mining	16,805	96.37	13,946	98.33	3.80	3.38
Light manufacturing	78,448	97.72	77,545	99.42	0.23	-0.11
Timber & wood	26,302	98.72	26,531	99.67	-0.17	-0.36
Chemical	48,930	97.44	46,502	99.13	1.02	0.68
Metal	82,487	98.00	73,276	99.31	2.40	2.13
Machinery	65,322	95.30	55,428	98.48	3.34	2.66
Utilities	7,315	94.40	8,733	98.06	-3.48	-4.22
	2011		2010		Annual growth (%)	
Nation	325,609	97.20	452,872	99.17	-28.10	-29.53
State-ownership	8,262	86.30	10,510	93.43	-21.39	-27.39
Collective ownership	73,920	95.72	92,207	98.53	-19.83	-22.12
Private ownership	186,211	99.13	276,110	99.84	-32.56	-33.04
HMT	25,952	94.87	34,069	98.63	-23.83	-26.73
Foreign	31,264	94.02	39,976	98.00	-21.79	-24.97
			Employment (10,000)			
	2011		2006		Average growth (%)	
Nation	9,167	64.75	7,358	76.60	4.49	1.04
East	5,799	66.96	4,936	80.58	3.27	-0.48
Central	2,070	60.83	1,491	67.37	6.78	4.62
West	1,299	61.16	931	70.25	6.88	3.96
Mining	804	39.82	692	42.49	3.06	1.73
Light manufacturing	2,959	75.30	1,853	87.55	2.04	-0.99
Timber & wood	563	85.03	494	92.21	2.67	1.02
Chemical	1,124	69.54	892	79.65	4.73	1.93
Metal	1,856	70.75	1,486	78.61	4.54	2.36
Machinery	2,462	53.85	1,623	72.48	8.70	2.43
Utilities	309	56.03	320	65.81	-0.67	-3.82
	2011		2010		Annual growth (%)	
Nation	9,167	64.75	9,545	75.82	-3.95	-17.98
State-ownership	908	29.75	987	36.17	-8.08	-24.39
Collective ownership	2,623	55.42	2,555	67.22	2.68	-15.35
Private ownership	3,063	88.63	3,357	95.19	-9.77	-15.05
HMT	1,205	61.58	1,235	79.47	-2.44	-24.40
Foreign	1,369	55.17	1,411	69.86	-2.93	-23.34

Note: HMT = Hong Kong SAR, Macau SAR and Chinese Taipei.
Source: *Yearbook of China Small and Medium Enterprises* (2012).

Among the seven industrial groups, light manufacturing is dominant in the number of enterprises, though there is a small percentage decrease in the sample period. Mining and machinery are the growing industries, as shown by the high percentage growth in the number of enterprises. In the ownership categories, private ownership has the largest number of SMEs, but the growth rates have slackened in all categories of ownership of industrial enterprises between 2010 and 2011, with the SMEs suffered a slightly higher percentage decline.

The employment data show that the eastern provinces have provided most jobs, though the percentage increase has remained low when compared to central and western provinces. Light manufacturing, machinery, metal and chemical industries are the four industries with largest level of employment. The employment growth rate for SMEs in the light manufacturing has marginally declined, and other than utilities, employment in all other industries had increased. The employment picture is different when it comes to the ownership categories, as employment has dropped by 15 percent between 2010 and 2011. Nonetheless, state-owned enterprises have become the smallest sector in the number employed. Although the data on the ownership of industrial enterprises that show a negative performance in most cases could reflect the difficulty of the China economy in the post-2008 years, the data covered only the two years and may not give a full picture.

However, despite the reported profit levels by all enterprises and SMEs, not all enterprises are profit-making. Data from the *China Industry Economy Statistical Yearbook* report the number of loss-making enterprises and the size of real debt at both the national and provincial levels.[2] For example, although the numbers of enterprises are rising rapidly between 2001 and 2011, the proportion of loss-making enterprises and SMEs has declined to about 10 percent in 2011. Among the three regions, western provinces experienced the highest percentage of loss-making enterprises, and the number of enterprises in the western region is much lower than the eastern region. When expressed as a percentage of total real assets, the real debt-to-asset ratios have remained high (over 50%) for all enterprises. Reduction in debt proportions improved slightly in 2008, but the percentages have risen to about 60 percent for all enterprises. The debt-to-asset ratio is highest in the western provinces. Since 2010, SMEs in the eastern provinces have deteriorated and showed a poorer performance than central provinces.

[2] Only a summary of the data is presented here.

To measure the variables in real terms, the price indices from the *Statistical Yearbook of China* (SYC) are used to derive the real variables. At the national level, the Production Price Index (PPI) is used to derive the real data for main source of income, profit, tax payment and output value. The Investment Index is used to deflate the asset values, while the Export Index is used to deflate the export values. For the 31 provinces, the price index of the province's capital is used. In case the price index of a certain inner province is not available, the price index of a neighboring province is used. A total of five industrial PPI are used for the seven categories. The Mining Index is used for the mining category, while the Manufacturing Index is used for both light manufacturing and timber and wood industries. The Raw Material Index is used for the chemicals category. The Heavy Industry Index is used for both the metal and machinery categories. Lastly, the Aggregate Inflation Index is used to deflate the values of utilities.

Tables 3, 4 and 5 report the real total output, asset, main source of income, profit, total tax payment and value of export under regional, industrial and ownership classifications. Unlike the high occupation of SMEs in the number of enterprises (over 90%), the regional classification in Table 3 shows that the share of SMEs in total output, asset, main source of income and profit do not exceed 60 percent. In total tax payment and value of export, the share of SMEs is below 50 percent in 2011. As expected, the eastern provinces performed stronger than central provinces, and western provinces are weakest. The average growth rates remained strong with two digits in most cases, with the exception in the amount of export the average growth rate is less than 10 percent between 2006 and 2011. The low growth rates in export reflected the drop in export China experienced after the 2008 crisis.

In the industrial classification shown in Table 4, the SMEs in general occupy a much lower percentage share. In the 2011 total output, for example, the proportions of SMEs are large only in light manufacturing and timber and wood industries, with 72.7 percent and 83.25 percent, respectively. Indeed, it is the timber and wood industry that the SMEs hold a larger share in all items. The SMEs obviously show a weaker performance in such capital intensive industries as mining and machinery. Between 2006 and 2011, the shares of SMEs have dropped in many categories among the seven industrial groups. In asset and export, for example, the shares of SMEs have dropped in all seven industrial groups. In profit, the shares of SMEs have improved only in mining, timber and wood industry, and metal industries between 2006 and 2011. The SMEs in mining have shown improvements in main source of income, profit, tax payment, and

total output. In the case of average growth rates between 2006 and 2010, the SMEs in most industrial groups have shown a lower growth rates than the aggregate.

Table 3 The Real Variables: Regional Classification (Rmb 100 million)

	2011		2006		Average growth (%)	
	All industrial enterprises	Share of SMEs (%)	All industrial enterprises	Share of SMEs (%)	All industrial enterprises	SMEs
Asset						
Nation	634,194	49.25	286,770	60.93	18.34	13.40
East	383,551	51.51	186,670	65.91	16.61	11.00
Central	134,228	44.97	55,357	49.41	20.54	18.28
West	117,145	46.70	44,743	54.41	22.25	18.57
Main income source						
Nation	793,880	53.57	304,577	62.91	21.83	19.61
East	507,162	57.69	219,131	66.11	18.97	15.78
Central	178,235	58.12	51,679	54.72	28.85	30.42
West	108,484	54.62	33,767	54.73	27.04	26.99
Profit						
Nation	57,899	56.95	18,943	55.89	25.78	26.25
East	34,045	57.67	12,078	64.88	23.76	20.88
Central	13,783	59.33	4,024	41.21	28.68	38.41
West	10,071	51.24	2,843	38.45	29.55	37.21
Total tax payment						
Nation	37,162	45.35	14,038	54.87	22.21	17.65
East	20,411	48.10	8,249	62.49	20.57	14.43
Central	9,477	42.85	3,304	44.36	24.18	23.32
West	7,275	40.91	2,484	43.55	24.70	23.16
Total output						
Nation	775,433	58.37	307,487	64.52	21.67	19.26
East	506,222	58.49	220,735	67.40	19.72	15.40
Central	178,788	59.54	52,187	57.70	28.68	29.49
West	111,169	55.92	34,235	56.28	27.31	27.15
Amount of export						
Nation	90,532	41.58	59,152	60.38	10.47	2.52
East	80,926	42.15	54,710	60.83	9.71	1.96
Central	6,023	41.28	2,940	57.50	17.10	9.59
West	3,584	29.17	1,502	49.65	20.72	8.54

Sources: *Yearbook of China Small and Medium Enterprises* (2012); and *China Statistical Yearbook* (various years).

Table 4 The Real Variables: Industry Classification (Rmb 100 million)

		2011		2006		Average growth (%)	
		All industrial enterprises	Share of SMEs (%)	All industrial enterprises	Share of SMEs (%)	All industrial enterprises	SMEs
Asset	Mining	65,302	27.40	22,646	27.65	24.78	24.56
	Manufacture	74,752	64.28	37,277	74.95	16.04	12.53
	Timber & wood	21,228	70.91	11,234	81.96	14.67	11.40
	Chemical	90,797	55.92	41,694	67.13	17.97	13.74
	Metal	141,395	50.18	60,283	57.17	19.74	16.65
	Machinery	153,530	43.43	62,903	59.00	20.69	13.52
	Utilities	88,145	40.23	50.724	62.59	12.52	7.24
Main income	Mining	52,930	45.24	9,062	38.13	25.87	30.24
	Manufacture	131,546	72.13	51,197	80.68	21.59	18.89
	Timber & wood	31,045	93.21	12,329	86.70	21.10	20.11
	Chemical	129,099	59.43	48,889	64.11	22.03	20.19
	Metal	193,295	61.60	68,084	64.91	23.44	22.15
	Machinery	200,593	44.49	78,438	55.08	20.88	15.83
	Utilities	48,538	46.74	23,042	50.44	16.71	14.94
Profit	Mining	9,742	37.58	4,338	27.21	17.84	25.69
	Manufacture	9,800	63.24	2,713	69.51	30.17	27.73
	Timber & wood	2,171	82.88	632	81.84	28.86	29.19
	Chemical	7,579	70.99	1,551	97.44	38.00	20.53
	Metal	11,771	70.48	3,895	53.32	24.99	32.17
	Machinery	13,701	44.39	3,497	61.81	31.65	23.21
	Utilities	2,177	53.28	1,693	60.47	5.77	3.13
Tax payment	Mining	5,397	32.00	1,744	31.29	25.64	26.20
	Manufacture	8,393	40.01	3,327	53.62	21.14	14.25
	Timber & wood	1,051	84.58	448	87.45	19.40	18.61
	Chemical	7,119	43.42	1,891	62.05	31.01	22.20
	Metal	5,930	65.49	2,664	59.73	17.58	19.76
	Machinery	6,604	40.39	2,110	58.29	25.86	16.96
	Utilities	2,089	48.56	1,564	55.30	6.59	3.86
Total output	Mining	50,777	48.01	16,668	40.60	25.24	29.51
	Manufacture	132,991	72.70	52,362	71.73	21.31	18.50
	Timber & wood	31,780	83.25	12,669	87.45	21.01	19.82
	Chemical	130,173	60.04	49,644	65.12	21.86	19.89
	Metal	192,649	63.15	68,771	66.35	23.11	21.90
	Machinery	202,431	45.06	79,432	55.78	20.80	15.75
	Utilities	48,730	47.28	22,335	56.43	17.58	13.49
Value of export	Mining	163	43.25	541	51.18	-20.28	-22.92
	Manufacture	14,362	74.53	11,217	85.69	6.59	3.66
	Timber & wood	3,889	71.81	2,977	83.82	7.02	3.76
	Chemical	8,075	63.50	5,027	77.64	11.54	7.14
	Metal	10,922	59.22	8,188	68.09	7.47	4,51
	Machinery	52,976	23.33	31,071	44.22	12.88	-0.67
	Utilities	145	80.61	129	84.41	3.90	2.95

Sources: *Yearbook of China Small and Medium Enterprises* (2012); and *China Statistical Yearbook* (various years).

Table 5 The Real Variables: Ownership Classification (Rmb 100 million)

	2011		2010		Annual growth (%)	
	All industrial enterprises	Share of SMEs (%)	All industrial enterprises	Share of SMEs (%)	All industrial enterprises	SMEs
Asset						
State-ownership	128,911	23.76	120,238	35.10	7.21	-27.43
Collective ownership	226,786	42.61	194,065	52.52	16.86	-5.18
Private ownership	126,482	82.24	114,545	90.45	10.42	0.39
HMT	56,263	58.10	50,666	74.52	11.05	-13.42
Foreign	95,753	50.47	92,710	63.32	3.28	-17.67
Main income						
State-ownership	96,152	23.93	84,350	28.72	13.99	-5.03
Collective ownership	250,942	47.63	198,387	56.49	26.49	6.65
Private ownership	242,802	87.47	199,604	93.28	21.64	14.06
HMT	72,018	56.42	61,492	70.98	17.12	-6.91
Foreign	131,966	45.37	117,347	59.22	12.46	-13.84
Profit						
State-ownership	5,396	20.09	4,976	35.28	8.45	-38.25
Collective ownership	19,902	45.60	16,522	53.32	20.45	3.00
Private ownership	17,989	86.75	14,539	93.53	23.73	14.77
HMT	5,112	56.68	4,846	74.05	5.49	-17.76
Foreign	9,405	45.25	9,387	61.91	0.19	-26.76
Tax payment						
State-ownership	8,370	18.36	7,387	25.92	13.32	-19.71
Collective ownership	13,180	35.12	10,842	42.87	21.56	-0.41
Private ownership	8,511	87.54	7,399	93.41	15.03	7.81
HMT	2,304	56.43	1,893	72.14	21.68	-4.80
Foreign	4,797	40.39	4,371	54.55	9.74	-18.73
Total output						
State-ownership	92,278	25.22	80,730	30.21	14.31	-4.58
Collective ownership	250,133	48.96	196,403	57.95	27.36	7.60
Private ownership	247,792	87.43	204,885	93.31	20.94	13.33
HMT	73,113	56.84	61,933	71.64	18.05	-6.33
Foreign	132,863	45.72	118,033	59.60	12.56	-13.64
Value of export						
State-ownership	2,158	13.92	2,318	18.29	-6.90	-29.17
Collective ownership	13,396	33.10	12,140	43.89	10.35	-16.77
Private ownership	12,826	78.49	12,554	87.52	2.16	-8.37
HMT	22,007	43.56	20,894	61.56	5.33	-25.47
Foreign	40,145	33.02	39,940	46.23	0.51	-28.22

Note: HMT = Hong Kong, Macao and Taiwan.

Sources: *Yearbook of China Small and Medium Enterprises* (2012); and *China Statistical Yearbook* (various years).

In the ownership classification shown in Table 5, private ownership shows the strongest among all ownership groups, exceeding 78 percent in all items. Between 2010 and 2011 and seen from the average growth rates, the shares of SMEs have declined, suggesting that the economic role of SMEs was not as important as non-SMEs. While the growth rates of all enterprises has remained positive, with two-digit growth in most cases, the SMEs have experienced negative average growth rates between 2010 and 2011, especially in the value of export, and SMEs in all ownership categories experienced large negative growth rates. Privately owned SMEs show a positive growth rate in most items, with a two-digit growth rates in main source of income, profit and total output. On the whole, the economic performance of SMEs is weaker when compared to similar performance of all industrial enterprises, suggesting that the non-SMEs could have gained strength over the same period, due probably to the easier access to finance.

III Total Factor Productivity Analysis

To ensure data reliability and usability, the TFP analysis from existing studies would be updated and used as a benchmark so as to strengthen and ensure that the new TFP estimates are scientifically reliable and acceptable. Despite the various comparable methods in TFP estimates, especially in estimating the capital and human capital stock variables, we follow the steps in Chow and Li (2002), Li (2003, 2009), (Li and Liu, 2011) and (Liu and Li, 2012) to revise, extend and update China's capital and human capital stocks up to 2011.[3] The perpetual inventory approach that takes into account changes in prices and depreciation is employed in the construction. For physical capital, the foundation equations used in Chow and Li 2002) and Li (2003, 2009) are:

$$K_t = K_{t-1} + RNI_t \text{ and } RNI_t = RGI_t \left(\frac{NI_t}{GI_t}\right),$$

where in year *t*, *K* is the capital stock, *RNI* and *RGI* are real net investment and real gross investment, respectively. *NI* and *GI* are net investment and nominal investment, respectively. The human capital variable is based on the average schooling years per capita, and the foundation equation used in Li (2009) and Li and Liu (2011) is:

$$H_{j,t} = (5H_{1,j,t} + 8H_{2,j,t} + 11H_{3,j,t} + 14.5H_{4,j,t}) / Pop_{j,t},$$

[3] In updating the construction of the human capital variable, the relevant data has been forecasted to 2015 by using the two average growth rates from 2009 to 2011 and the same growth rates till 2015 were assumed.

where $H_{j,t}$ is the level of human capital stock for province j at time t, and $Pop_{j,t}$ is the population aged 15-64 of province j at time t. The original length of schooling cycles for primary and junior middle secondary are 5 and 8 years, respectively. Senior middle secondary that included the previous categories of specialized secondary and vocational secondary have a similar schooling cycle of 11 years, while higher education requires 14.5 years. Provincial migration and the death rates are taken into account in the construction of the human capital. The original data have been adjusted according to the latest changes in the sample period. This exercise produces the physical capital and human capital series for the China economy up to 2011.

By adopting the Cobb Douglas production function (Douglas, 1976) used in Liu and Li (2012), the growth attributes of output can be divided into input growth and total factor productivity growth, $\dot{TFP}_{\iota t}$, as:

$$y_i = f(x_i), \tag{1}$$

where y_i is the observed scalar output and x_i is a vector of inputs for i^{th} province, industry and enterprise. We define the TFP for a production function with multiple inputs at time t as:

$$TFP_i = \frac{y_i}{\Phi_i}, \tag{2}$$

where Φ_i is the aggregate input. The lagged inputs will be used in the regression so as to avoid simultaneous bias in the OLS estimates. Rewriting the equation in growth form, it becomes

$$\dot{Y}_{\iota t} = \dot{\Phi_{\iota t-1}} + \dot{TFP}_{\iota t}, \tag{3}$$

where

$$\dot{\Phi_{\iota t-1}} = \frac{e_{K_{it-1}}}{e_{it-1}} \dot{K_{\iota t-1}} + \frac{e_{L_{it-1}}}{e_{it-1}} \dot{L_{\iota t-1}} + \frac{e_{H_{it-1}}}{e_{it-1}} \dot{H_{\iota t-1}}. \tag{4}$$

$\dot{Y}_{\iota t} = ((\partial y_{it})/(\partial t))(1/y_{it})$ is growth of output, while $\dot{K} = ((\partial K_{it-1})/(\partial(t-1)))(1/K_{it-1})$, $\dot{L} = ((\partial L_{it-1})/(\partial(t-1)))(1/L_{it-1})$ and $\dot{H} = ((\partial H_{it-1})/(\partial(t-1)))(1/H_{it-1})$ are growth of physical capital, labor and human capital inputs in time $t-1$, respectively. It follows that $e_K = ((\partial y_{it-1})/(\partial t-1))(K_{it-1}/y_{it-1})$, $e_L = ((\partial y_{it-1})/(\partial L_{it-1}))(L_{it-1}/y_{it-1})$, and $e_H = ((\partial y_{it-1})/(\partial H_{it-1}))(H_{it-1}/y_{it-1})$ is the output elasticities for physical capital, labor and human capital in $t-1$, respectively, and e is the sum of the three output elasticities to input.

The following parametric form is used to estimate the TFP growth:

$$\text{Ln } Y_{it} =$$

$$\beta_0 + \beta_K \text{In } K_{it-1} + \beta_L \text{In } L_{it-1} + \beta_H \text{In } H_{it-1} + \beta_{KK}(\text{In } K_{it-1})^2 + \beta_{LL}(\text{In } L_{it-1})^2 + \beta_{HH}(\text{In } H_{it-1})^2 + \beta_{KL} \text{In } K_{it-1} \text{In } L_{it-1} + \beta_{KH} \text{In } K_{it-1} \text{In } H_{it-1} + \beta_{LH} \text{In } L_{it-1} \text{In } H_{it-1} + d_1 + d_2 + d_{YEAR}, \quad (5)$$

where $d_1 = 1, d_2 = 0$ for provinces in eastern region; $d_1 = 0, d_2 = 1$ for provinces in central region; $d_1 = 0, d_2 = 0$ for provinces in western region, and d_{YEAR} is the dummy for different years. The inclusion of the second order terms of log inputs allows for a nonlinear production function and the year dummies can be regarded as a measure of technical progress. Following the model shown in Equation (3), we can get the estimation of the three output elasticities to input, namely, e_K, e_L, and e_H, as follows:

$$\begin{aligned} e_{K_{it-1}} &= \beta_K + 2\beta_{KK} \text{In } K_{it-1} + \beta_{KL} \text{In } L_{it-1} + \beta_{KH} \text{In } H_{it-1}, \\ e_{L_{it-1}} &= \beta_L + 2\beta_{LL} \text{In } L_{it-1} + \beta_{KL} \text{In } K_{it-1} + \beta_{LH} \text{In } H_{it-1}, \\ e_{H_{it-1}} &= \beta_H + 2\beta_{HH} \text{In } H_{it-1} + \beta_{KH} \text{In } K_{it-1} + \beta_{LH} \text{In } L_{it-1}. \end{aligned} \quad (6)$$

Substituting the estimated coefficients of β's into these three equations gives $\hat{e}_{K_{it-1}}$, $\hat{e}_{L_{it-1}}$ and $\hat{e}_{H_{it-1}}$. The averages of these elasticities and the averages of the input growth rates are used to calculate the average of the TFP growth rates.

The estimates of the full model in Equation (3) shown in Table 6 are revised to exclude some of the insignificant second order terms and year dummies. The selected model shall include only the significant variables, indicated as follows:

$$\text{In } Y_{it} = \beta_0 + \beta_K \text{In } K_{it-1} + \beta_L \text{In } L_{it-1} + \beta_{KK}(\text{In } K_{it-1})^2 + \beta_{KL} \text{In } K_{it-1} \text{In } L_{it-1} + \beta_{KH} \text{In } K_{it-1} \text{In } H_{it-1} + d_1 + d_2 + d_{YEAR}. \quad (7)$$

The calculations of $\hat{e}_{K_{it-1}}$, $\hat{e}_{L_{it-1}}$ and $\hat{e}_{H_{it-1}}$ are revised accordingly as:

$$\begin{aligned} e_{K_{it-1}} &= \beta_K + 2\beta_{KK} \text{In } K_{it-1} + \beta_{KL} \text{In } L_{it-1} + \beta_{KH} \text{In } H_{it-1}, \\ e_{L_{it-1}} &= \beta_L + \beta_{KL} \text{In } K_{it-1}, \\ e_{H_{it-1}} &= \beta_{KH} \text{In } K_{it-1}. \end{aligned} \quad (8)$$

Table 7 shows the growth rates of TFP for both the full model and selected model. The selected model is further divided into two sub-periods (1984-2005, 2006-2011), as the data for Chinese SMEs covers only 2006-2011. The average TFP growth rates between the full model and the selected model are quite similar, though there is a big drop in the sub-sample period of 2006-2011, suggesting that the TFP growth rate has slowed down probably due to economic saturation and the need for further economic restructuring. The fall in TFP growth in 2006-2011

could also be the impact resulting from the 2008 financial crisis in 2008 that led to fall in exports and GDP growth.

Table 6 Parametric Estimation Results for Full Model and Selected Model

	Full Model		Selected Model	
	Estimation	P value	Estimation	P value
In K	-0.37930	0.2953	-0.8053	0.0012
In L	3.42921	0.0001	2.44964	<.0001
In H	-1.23899	0.1756		
In K × In K	0.03074	0.0154	0.05356	<.0001
In L × In L	-0.02281	0.7794		
In H × In H	-0.05083	0.4448		
In K × In L	-0.13276	0.0012	-0.08309	<.0001
In K × In H	0.08905	0.0617	0.00441	<.0001
In L × In H	0.05693	0.6992		
Eastern	0.33097	<.0001	0.32721	<.0001
Central	0.11596	<.0001	0.11463	<.0001
Year 85	-0.59105	<.0001	-0.57941	<.0001
Year 86	-0.58333	<.0001	-0.57056	<.0001
Year 87	-0.54684	<.0001	-0.53353	<.0001
Year 88	-0.51159	<.0001	-0.4981	<.0001
Year 89	-0.53612	<.0001	-0.52227	<.0001
Year 90	-0.53853	<.0001	-0.52456	<.0001
Year 91	-0.51221	<.0001	-0.49777	<.0001
Year 92	-0.44018	<.0001	-0.4256	<.0001
Year 93	-0.37265	<.0001	-0.35779	<.0001
Year 94	-0.3372	<.0001	-0.32178	<.0001
Year 95	-0.30752	<.0001	-0.29188	<.0001
Year 96	-0.27875	<.0001	-0.26306	<.0001
Year 97	-0.25298	<.0001	-0.23739	<.0001
Year 98	-0.23588	<.0001	-0.22029	<.0001
Year 99	-0.22908	<.0001	-0.21165	<.0001
Year 00	-0.19947	<.0001	-0.18188	<.0001
Year 01	-0.17695	0.0002	-0.15949	<.0001
Year 02	-0.14575	0.0017	-0.12833	<.0001
Year 03	-0.10921	0.0171	-0.09237	0.0038
Year 04	-0.06704	0.1376		
Year 05	-0.03766	0.3972		
Year 06	-0.01287	0.7687		
Year 07	0.01619	0.7072		
Year 08	0.02236	0.5985		
Year 09	0.00584	0.8891		
Year 10	0.00885	0.8308		
Constant	0.76272	0.8173	2.80976	0.3262
Nobs	788		788	
R-Square	0.9849		0.9846	
Adj. R-Square	0.9841		0.9841	

Table 7 The TFP Estimates

	Full Model	Selected Model		
	1986-2011	1986-2011	1986-2005	2006-2011
Nation	3.11	3.10	3.56	1.28
Eastern	3.32	3.29	3.99	0.83
Central	2.91	2.98	3.36	1.29
Western	3.02	3.00	3.26	1.83

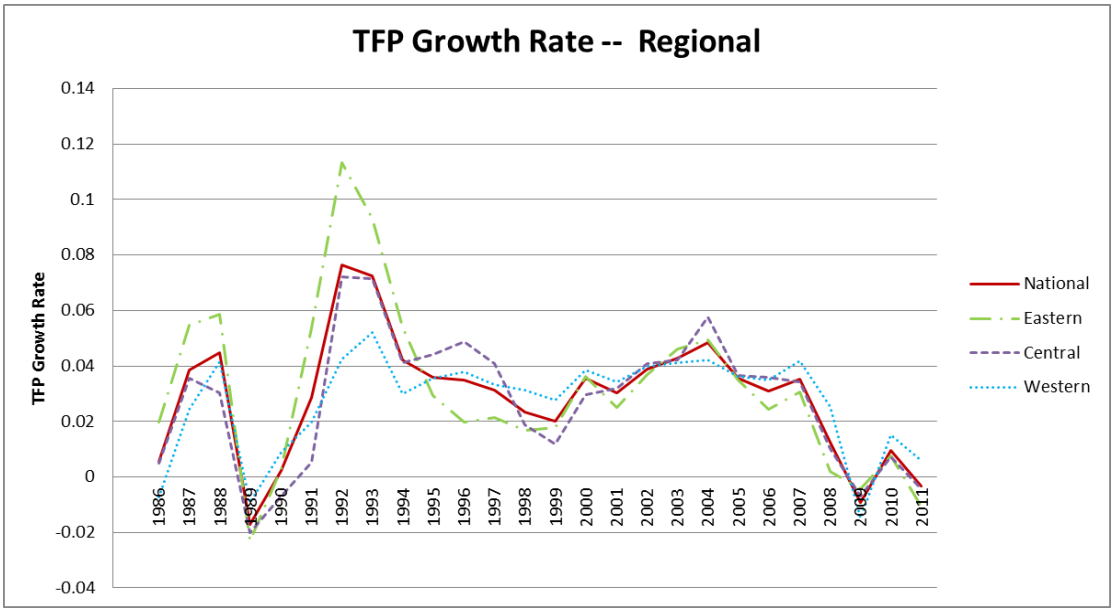


Figure 2 TFP Growth Rates: 1986-2011

Among the three regions, the eastern provinces show a highest TFP growth rate in the whole sample period (1986-2011) as well as the earlier sub-sample period (1986-2005). In the second sub-sample period (2006-2011), the TFP growth rates for all regions have dropped considerably. However, it is the western region that achieved the highest TFP growth rate of 1.83 percent in the later sub-sample period (2006-2011).[4] Figure 2 shows the trend growth rate of TFP in the 198-2011 sample period, and that the growth rates have drop significantly since 2007.

The empirical findings in Table 7 are compared to other findings summarized in Table 8. There are several observations in the comparison. China's TFP growth rates based on output data tend to be around 3 to 4 percent, while the similar estimation based using other data sources tend

[4] These TFP estimates in Table 7 are similar to other recent studies, e.g. Chow and Li (2002), He (2014).

to be higher (ranges from 4 to 7 percent). The TFP growth trend shown in Figure 2 is similar to those found in He (2014). China's TFP growth rates experienced a golden time period between the early 1990s and 2007, but began to fall after 2008, probably triggered by the 2008 financial crisis that, on the one hand, exposed China's production ceiling and, on the other hand, reflected the need for economic restructuring.

Table 8 Comparison of TFP Growth Rates (Percentages)

Chow and Li (2002)	1952-1998, nationwide average: 3.028		
Li (2009)	Sources of Funds 1984-2006		Ownership of Funds 1994-2006
	Nation	3.86	4.38
	East	4.52	4.56
	West	3.12	3.71
	Northeast	4.02	5.15
	Central	4.04	5.04
Li and Liu (2011)	1987-2006, nationwide average: 3.744		
He (2014)	Nationwide average:		1997-2000: 1.0
	1978-1985: 3.5		2000-2007: 3.0
	1985-1990: 0.2		2007-2010: 1.0
	1990-1997: 4.0		2012-2013: 1.5
Chen *et al*. (2011)	1981-2008, Chinese industries aggregate: 6.7		

IV The TFP of Industrial Enterprises

The TFP calibrated in the last section serves as the benchmark for comparison with the TFP estimates of industrial enterprises, as the available data differ considerably and proxy variables will have to be used as second best. Typically, the data for both the capital stock (K) and human capital (H) will not be available for the industrial enterprises. We make use of other available data and assume that In Y_{it} is the log of real industrial output for the i^{th} industry at time t, In K_{it} is the log of total real fixed asset investment used as a proxy for physical capital, In L_{it} is the log of total number of employed workers, and In H_{it} is the log of operating expense used as a proxy for the human capital variable.

The data for the two proxies of K and H for all industrial enterprises need to be verified to see if they are reliable and suitable and can be used for empirical estimation. We first calculate and show that the cross correlation in the capital stock used in the benchmark and the total real fixed asset investment of all enterprises is 0.9603. The linear regression between the capital stock used in the benchmark and the total fixed asset for all industrial enterprises shows:

$$\ln \text{ Benchmark\_K}_t = 1.51358 + 0.886287 \ln \text{Rfixasset}_t. \quad (9)$$

The R^2 of this estimated equation is 0.8854, and the estimated coefficient (0.88629) is considered to be high and acceptable. The human capital variable for industrial enterprises is more complicated since the data on the years of schooling per capita are definitely not available for industrial enterprises. Mincer (1974) pointed out that earnings or wage of workers can be used as an alternative to measure human capital. The data from Datastream on the salary of employed workers in each province in China are collected. We make use of the available data in Table 1 and define, as in Li and Liu (2006), an operating expense variable, which is the main source of income less profit and tax payment. The operating expense should then include the wage payment, which can be used as a second best proxy for human capital, though operating expense could include other costs of production. The cross correlation between the wage data and the constructed operating expense is 0.7958, while the linear regression is:

$$\ln \text{ Wage}_t = 1.249171 + 0.560362 \ln \text{Operating Cost}_t. \quad (10)$$

The R^2 of this estimated equation is 0.8473, and the estimated coefficient (0.5604) is thought to be considerably high and acceptable.

Hence, the total real fixed assets and the operating expense are used as proxies for physical capital and human capital, respectively, in the parametric estimation. For the regional classification, the selected model that contains only the significant variables is:

$$\begin{aligned} \text{In } Y_{it} = \beta_0 + \beta_K \text{In } K_{it-1} + \beta_L \text{In } L_{it-1} + \beta_{KK} (\text{In } K_{it-1})^2 \\ + \beta_{KH} \text{In } K_{it-1} \text{In } H_{it-1} + d_1 + d_2, \end{aligned} \quad (11)$$

where $d_1 = 1, d_2 = 0$ for provinces in eastern region; $d_1 = 0, d_2 = 1$ for provinces in central region; $d_1 = 0, d_2 = 0$ for provinces in western region. The calculation of $\hat{e}_{K_{it-1}}$, $\hat{e}_{L_{it-1}}$ and $\hat{e}_{H_{it-1}}$ is revised according to the variables used in the selected model in the three regional and industrial classifications. The selected model for the seven industrial groups is:

$$\begin{aligned} \text{In } Y_{it} = \beta_0 + \beta_K \text{In } K_{it-1} + \beta_L \text{In } L_{it-1} + \beta_H \text{In } H_{it-1} + \beta_{KK} (\text{In } K_{it-1})^2 + \beta_{LL} (\text{In } L_{it-1})^2 + \\ \beta_{HH} (\text{In } H_{it-1})^2 + \beta_{KL} \text{In } K_{it-1} \text{In } L_{it-1} + d_1 + d_2 + d_3 + d_4 + d_5 + d_6, \end{aligned} \quad (12)$$

where d_1, d_2, d_3, d_4, d_5 and d_6 are the dummies for industrial category 1 to 6.

Table 9 shows the parametric estimations based on the selected models for the sample period. One observation is the contribution to output by the three inputs of capital, labor and human capital. In the regional classifications, physical capital shows the highest estimate (2.02) while the contribution from labor is low, reconfirming earlier studies that physical capital and

investment are the most important contributor to growth. In the industrial classification, human capital is the most important contributor (1.86), followed by labor (0.82). One clear implication could be that output in China had already reached a high level, and further increase in output required industrial restructuring, as labor would be constrained in the coming years and the need to promote human capital in the labor force is more eminent.

Table 9 Estimation Results for SMEs: Regional, Industrial

	Regional		Industrial	
	Parameter Estimate	P value	Parameter Estimate	P value
In K	2.02028	<.0001	-1.86242	0.0034
In L	0.08126	0.0005	0.82635	0.1864
In H			1.86985	<.0001
In $K \times$ In K	-0.04888	<.0001	0.07269	0.0008
In $L \times$ In L			0.09068	<.0001
In $H \times$ In H			-0.03302	0.0004
In $K \times$ In L			-0.12531	0.0033
In $K \times$ In H	0.03427	<.0001		
In $L \times$ In H				
Eastern	-0.08640	0.0002		
Central	-0.00498	0.7962		
Mining			0.49810	<.0001
Light manufacturing			0.60914	<.0001
Timber and wood			0.48719	<.0001
Chemicals			0.45996	<.0001
Metal			0.51168	<.0001
Machinery			0.51116	<.0001
State-ownership				
Private				
Constant	-9.09028	0.0005	19.32686	<.0001
Nobs	155		384	
R-Square	0.9969		0.9733	
Adj. R-Square	0.9968		0.9723	

The results in Table 9 are then used to calculate the average growth rates of TFP based on regional and industrial classifications. The 2006 and 2007 data are used for the time lag and the calculation of growth rates, the results in Table 10 provides only the results for 2008-2011, which is divided into 2008 and 2009-2011 so as to examine the impact of the 2008 financial crisis. As shown in Table 10, the TFP growth rates on all enterprises, large enterprises and SMEs are calibrated based on regional and industrial classification for the entire sample period and the two sub-periods. The empirical results for the all enterprises at the national and regional levels

are similar to the selected model results shown in Table 7, suggesting that the use of the proxy data are acceptable. Among the regions, the western provinces showed the highest TFP growth rates (2.08), while eastern provinces scored the lowest (0.64), suggesting that the western provinces are catching up due probably to favorable government's "go west" policy.

Table 10 TFP Growth Rates of Manufacturing Enterprises

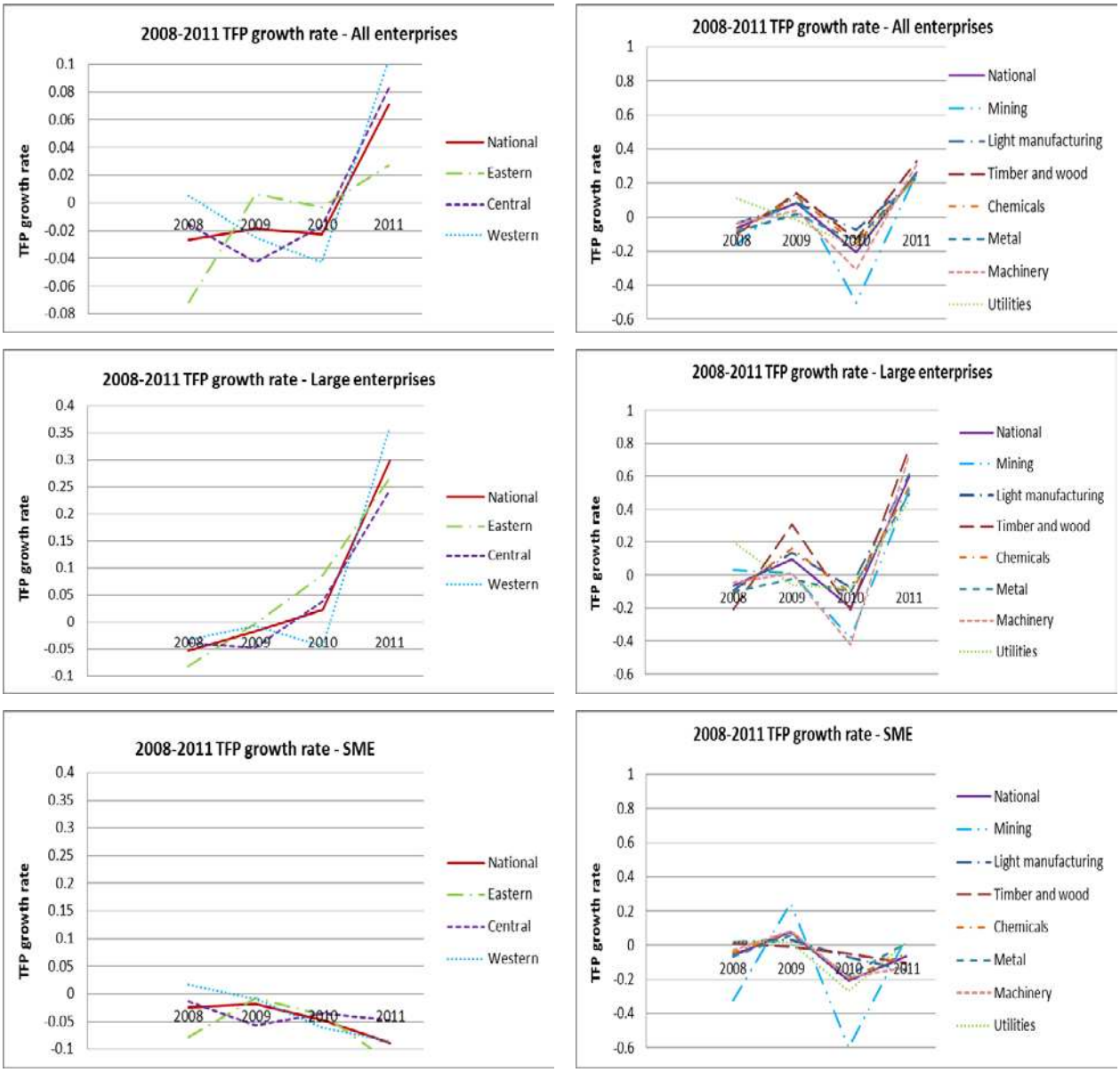
	All Enterprises			Large Enterprises			SMEs		
	2008-2011	2008	2009-2011	2008-2011	2008	2009-2011	2008-2011	2008	2009-2011
				Regional Classification					
National	1.41	0.25	0.99	6.00	-1.66	10.10	-2.16	0.10	-5.19
Eastern	0.64	-3.07	0.98	6.53	-3.48	11.70	-3.48	-4.05	-5.69
Central	1.40	0.61	0.76	5.06	-0.56	7.75	-1.73	0.38	-4.65
Western	2.08	2.83	1.15	6.21	-0.58	10.27	-1.30	3.68	-5.18
				Industrial Classification					
National	2.90	-1.82	4.83	9.75	-1.47	16.56	-3.49	-1.75	-6.38
Mining	-3.60	-7.33	-3.19	3.05	3.06	4.98	-9.25	-16.06	-10.16
Light Manufacturing	4.93	-0.73	8.05	12.95	-2.31	22.41	-2.91	1.10	-6.15
Timber and wood	6.26	-3.58	11.39	15.17	-8.49	29.18	-1.60	2.24	-5.31
Chemicals	4.18	-2.15	7.09	11.15	-2.89	19.69	-2.40	-0.90	-5.15
Metal	2.80	-2.64	4.29	6.63	-4.58	12.19	-0.81	-0.46	-3.39
Machinery	1.51	-0.58	1.39	7.18	-1.45	10.58	-3.73	0.41	-7.52
Utilities	2.89	7.68	1.27	10.27	13.67	10.47	-4.29	2.20	-7.81

Note: HMT = Hong Kong SAR, Macau SAR and Chinese Taipei.

However, the performance of TFP growth rates between large enterprises and SMEs differed a lot, with TFP growth rates exceeding 5 percent for the large enterprises while SMEs in all regions experienced a negative TFP growth rate. But, the situation in 2008 hurt the large enterprises more as they experienced a negative growth in TFP, especially in the eastern region. On the contrary, the large enterprises recovered much quicker than SMEs in the period 2009-2011 as the TFP growth rates of the two groups of industrial enterprises showed opposing trends, with large enterprises having large TFP growth rates while all SMEs showed negative TFP growth rates. One possible explanation would be the subsidy given to large enterprises through bank loans and stock market manipulation, while the SMEs are being left to their own.

The TFP growth rates classified under the various industries are higher but varied substantially across industries, with timber and wood showing the best performance (6.26), followed by light manufacturing (4.93) and chemical industries (4.18). The performance between the two types of enterprises is similar to the regional findings. Again, the large industrial

enterprises suffered negative TFP growth rates in 2008, but recovered quickly in 2009-2011, while the SMEs show a contrary performance with a negative TFP growth rates in 2009-2011. Figure 3 shows the trend performance of the TFP growth rates in both regional and industrial classifications. One observation is that large enterprises performed weakly in 2008 and 2010, but recovered quickly in 2011, while the SMEs maintained a low performance.



(a) Regional (b) Industries

Figure 3 TFP Growth Rates: 2008-2011

V Conclusion

In the National Congress meeting held in March 2014, the new Chinese Premier emphasized the importance and need for economic restructuring. This is seen in the light of slower economic growth and the challenge to export after the 2008 financial crisis. China will need to look more to its indigenous economy for growth and development. After the SOEs reform in 1997, SMEs could become the natural and convenient form of enterprise structure. The increase in the number of SMEs will provide further flexibility in conducting businesses in China, as entrepreneurs will be more flexible and efficient in exploring market opportunities.

The empirical findings on TFP provide various suggestions. The remote western provinces are catching up with the coastal provinces. Industries that rely on raw materials, such as timber and wood and metals, would provide suitable grounds for the growth of SMEs as their TFP growth rates remained high. Such capital intensive industries as chemical and machinery industries would be more suitable to non-SMEs, and the TFP performance of SMEs in these industries would probably be weaker. Light manufacturing is the traditional industry that depended considerably on foreign direct investment. With the fall in export demand by the post-2008 recessed world economy and a lower level of inward foreign direct investment, light manufacturing will face restructuring needs either through redirecting production to domestic demand or though technological upgrading. In general, the TFP of SMEs performed worse than the large enterprise mainly because large enterprises are state-controlled, while SMEs are more vulnerable when they are faced with economic shocks.

While SMEs should form the major form of enterprises in the market economy, the pace of development of SMEs in China would receive less support as compared to the non-SMEs. One possibility for the development of SMEs would be the advantage of financial liberalization where SMEs can have easier access to banks and the financial market. Secondly, Chinese products have been notorious in terms of quality, poor standard and violation of intellectual property right, but given the new policy focus on the expansion of the domestic market, Chinese SMEs can take advantage of the policy by improving their production to ensure product quality and gradually build up reputation and regain consumer loyalty. One can conclude that Chinese SMEs will play a growing role in the business community in the years ahead. With the emphasis on economic rebalancing, the non-state sector will certainly grow, and that shall open opportunities for the SMEs

This paper provides interesting findings on the TFP performance of Chinese enterprises, especially the discussion in relation to the 2008 crisis and the response of Chinese industrial enterprises. However, though the empirical study relies on a simple but useful methodology, there can be various improvements to the findings in this paper in terms of sample period and data adequacy and accuracy. Nonetheless, the economic coverage this paper provides can have further implications on the business development and government policy in China. For example, lending policy to enterprises across provinces and the re-distributing of resources to different industries would lead to new area of industrial and business development in China.

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