

Ownership and Sector Performance in Current China — A Regional Study*

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This paper uses the latest provincial data to study the productivity implications of ownership diversification in China's industry. It investigates the different performance of different ownership sectors. It is found that there are significant differences in both production technology and the determinants of economic performance at provincial level between sectors of SOEs, collectives, domestic private enterprises, Hong Kong, Macau and Taiwan funded firms and foreign invested firms. While Cobb-Douglas production functions fit the production technologies of the state controlled, collective and overseas Chinese funded sector very well, the production technologies of the domestic private and foreign funded sector are better represented by Translog production function. The average total factor productivity across different sectors is ranked from the foreign funded sector, domestic private sector, collective sector, Hong Kong, Macau and Taiwan funded sector, to the state controlled sector in descending order. In addition, the determinants of economic performance change substantially from one ownership sector to another. © 2005 Peking University Press

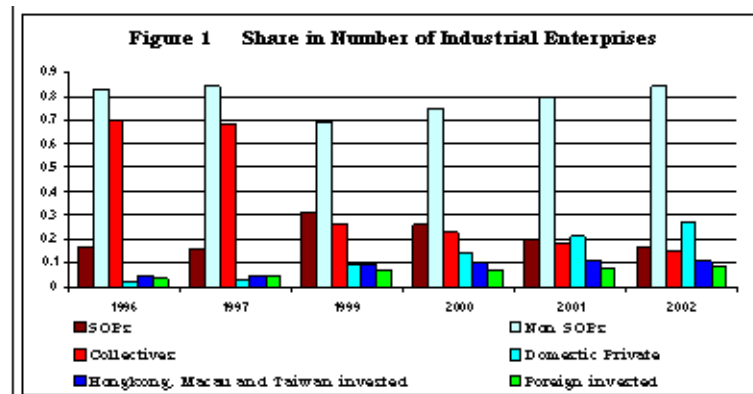
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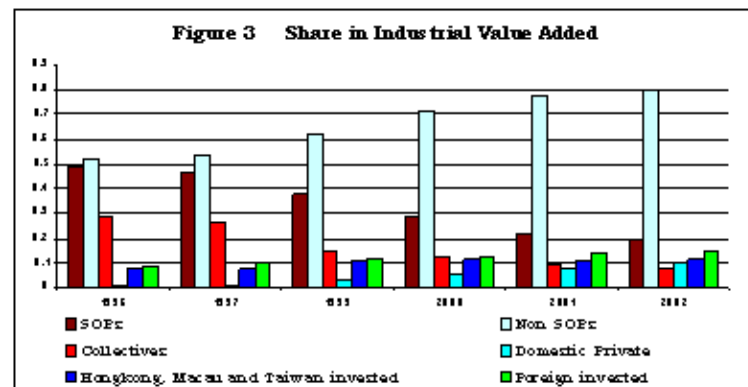
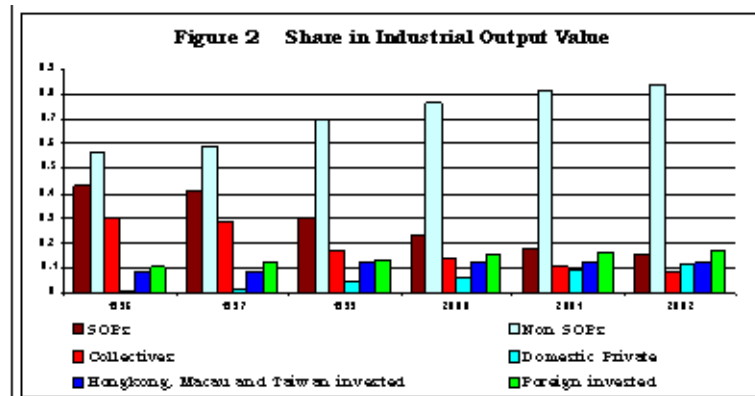
1. INTRODUCTION

China entered the 21st Century with an increasing significance in the world economy. As one of the world's manufacturing cores, industrial firms of different ownership types are competing in a gradually improving domestic market. Former studies reveal that there were significant differences in labor productivity, technical efficiency, and performance in the 1990s between firms with different ownership types.¹ These studies based on statistics of some medium and large sized enterprises in 1995 or 1996 reach a consensus that Sino-foreign and Sino-overseas Chinese joint ventures were more efficient than firms of other ownership types in terms of labour productivity, total factor productivity and technical efficiency, while SOEs were the least efficient among the different ownership types. However, as argued in Wen et al. (2002), market conditions and the enterprise operational environment play an important role in industrial competition in a transitional economy. Since 1997, there have been rapid changes in China's industry. On the one hand, WTO membership has speeded up institutional improvements in China's market mechanism. On the other hand, not only did many SOEs experience ownership transformation (*Gaizhi*) in one way or another, but many TVEs also got rid of their "red hats" following the legislation of TVE law which provides private TVEs with the same legal protection as collective TVEs. In addition, increasing FDI inflow is strengthening the foreign and overseas Chinese funded sector. All these changes may form a new picture of China's industry. This paper uses 2002 cross section data to provide an updated picture of different ownership sectors. More importantly, the determinants of different enterprises' performance will be investigated.



Data Source: SSBb.

¹See Jefferson et al. (1999), Wen et al. (2002), Zhang et al. (2001), for example.



As shown in the following Figures 1, 2 and 3, among the rapid growing non-state sectors, the domestic private sector in particular has been experiencing rapid development since 1997.² Its shares in the number of industrial firms, industrial output value and industrial value added have all increased significantly. The three shares of the Hong Kong, Macau and Taiwan funded sector and foreign invested sector have also been consecutively increasing from 1996 to 2002 although the increases from 1999 to 2002 were not as significant as those from 1996 to 1999. Meanwhile, although the share of SOEs in the total number of firms increased from 1996 to 1999, their share in industrial output value and industrial value added declined consecutively from 1996 to 2002. Although collectives once played a non-

²This study does not include all kinds of registration types partly because there is no consistent data on the economic indicators of the other registration types, and partly because some registration types can include many kinds of different ownership types. SOEs here are pure state owned enterprises and do not include enterprises in which the state has controlling shares.

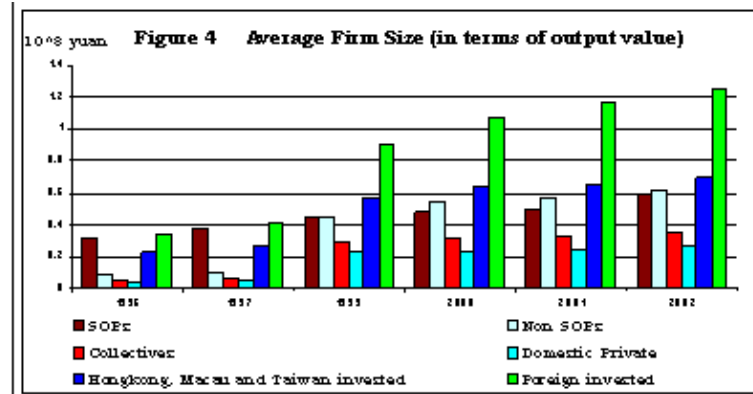
substitutably important role in China's industrial development during the 1980s and first half of the 1990s, their significance has been declining since 1996 as indicated by their falling shares. More importantly, the shares of collectives in industrial output value and industrial value added were even lower than the shares of the domestic private sector, overseas Chinese funded sector and foreign funded sector in 2002.

The above changes in the relative significance of different industrial ownership sectors can be the consequence of institutional improvements (see Tian, 2000) which call for fairer industrial competition. The changed business environment has provided new opportunities for more efficient firms to develop. Zhang et al. (2001) use firm level data to show that the development of industrial firms with more clearly defined ownership types and stronger industrial competition increases firms' productivity. Directly shown with industrial historical data in Wen (2002), ownership diversification and industrial competition based on improvement of the market mechanism has significantly contributed to China's industrial growth. After China became a WTO member, there have been continuing concerns over the development of market mechanisms, especially related to how China can implement the promised institutional changes for stronger international competition indicated in the WTO agreements. Increased international competition raises the issue of how China's domestic industrial sector can survive and what domestic ownership arrangements can assist in the strengthened international competition. Recent high voices calling for the development of domestic private enterprises may partly reflect both institutional and environmental change. While this paper does not provide a comprehensive discussion on the development process of China's market mechanism as in Wen (2002), the following sections are to bring some new insights on different performance between industrial sectors of different ownership types. It will also partially reveal the reasons why certain kinds of firms perform better than others.

2. CHARACTERISTICS AND PERFORMANCE OF INDUSTRIAL FIRMS WITH DIFFERENT OWNERSHIP TYPES

China began the comprehensive development for a sound market system in 1992. The dual-track prices of the state sector merged into market prices. Most intermediate goods were opened to market competition. Establishment and development of a housing market, insurance market and labour market have made it possible for SOEs to gradually get rid of most of their welfare functions. The establishment and development of domestic stock exchange markets provided a new financing channel and introduced a new enterprise form into China's economy. Development of a housing

sector brought new investment opportunities to overseas investors. Foreign investors were gradually allowed to enter into most industrial sectors, the banking sector and other service sectors.

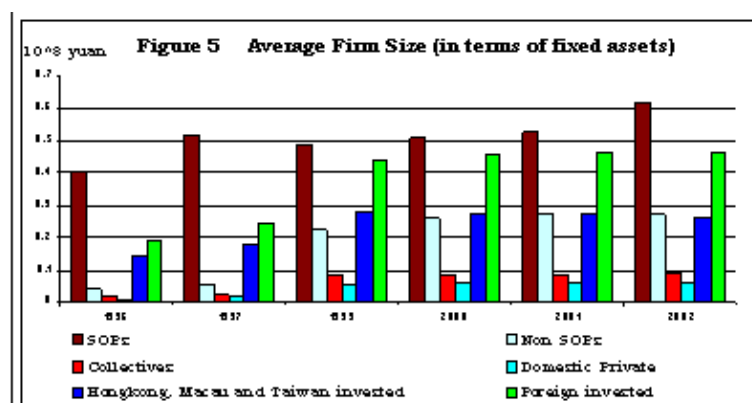


Data Source: SSBb.

Improvement of the market mechanism brought more rigorous industrial competition. In 1995, excess production capacity was widely observed in the manufacturing sector. Yet, due to historical reasons and the reform sequences in China's gradual piecemeal reform process, firms of different ownership types exhibited different characteristics. As shown in Figure 4, in terms of output value in 2002, the average firm size of the foreign funded sector was the largest among the ownership types under study. The second largest from 1999 to 2002 were firms in the Hong Kong, Macau, and Taiwan funded sector. Although, as shown in Figure 5, SOEs were of the largest average size in term of fixed assets from 1999 to 2002, their average output value was lower than for foreign funded firms and overseas Chinese funded firms. In terms of both output value and fixed assets, collectives were much smaller than the former three ownership types. Domestic private enterprises were the smallest on average. The historical reasons for forming such a picture can be many, which include preferential policies towards certain kinds of ownership types, difficulties in getting financial resources that collectives and domestic private enterprises ran into, and barriers to entry into different industries for different ownership types due to technology, security and reliability concerns, etc.

As in recent years industrial firms have paid close attention to reducing product stocks and having a proportion of product sold higher than 0.95,³ larger average firm size in terms of output value implies a higher average market share. In other words, foreign funded firms may have the highest

³See *SSBa* 2002 and 2003, or *SSBb* 2002 and 2003.



Data Source: SSB.

market share in many industries in current China, with overseas Chinese funded firms on average having the second highest share. This could be partly due to their larger production capacity shown in fixed assets. But the even higher average production capacity of SOEs was not accompanied by a larger average market share. Is this due to internal inefficiencies arising from poorly defined ownership rights in SOEs and the soft budget they faced, technology differences between SOEs and foreign funded firms, differences in product design or differences in marketing strategies? While the study in the following section provides partial answers to this question, it first takes a look at the contribution of firms with different ownership types to industrial new product value in 2001 and 2002. Shown in Figures 6 and 7, except for the grey sections of the pies which were not contributed by the enterprise types considered here, the foreign invested sector had the largest share in industrial new product value in both 2001 and 2002, followed by SOEs, Hong Kong, Macau and Taiwan funded firms, collectives, and domestic private firms in decreasing order.

The ownership ranking in shares in industrial new product among the five ownership sectors in 2001 and 2002 is consistent with the ownership ranking in shares in industrial output value in 2001, although the share in output value of domestic private firms increased faster than the share in industrial new output value in 2002. This may indicate that the ability to produce new industrial products (as R&D results) played an important role in determining the market share of different ownership sectors.

A closer look at Figure 8 reveals that the ranking of the average of firms' new product value across different ownership types is consistent with their ranking in average industrial output value. As discussed earlier, managers of industrial firms now pay close attention to reducing stocks and the proportion of product sold are higher than 0.95. This implies the ranking of

Figure 6 Share in Industrial New Product Value in 2001

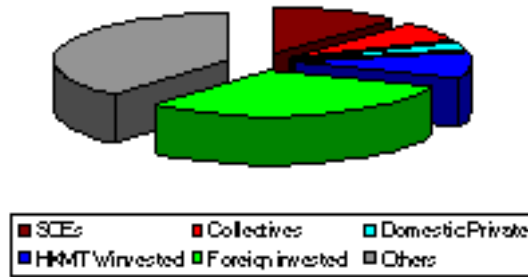
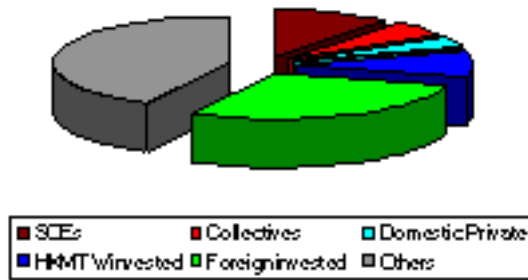
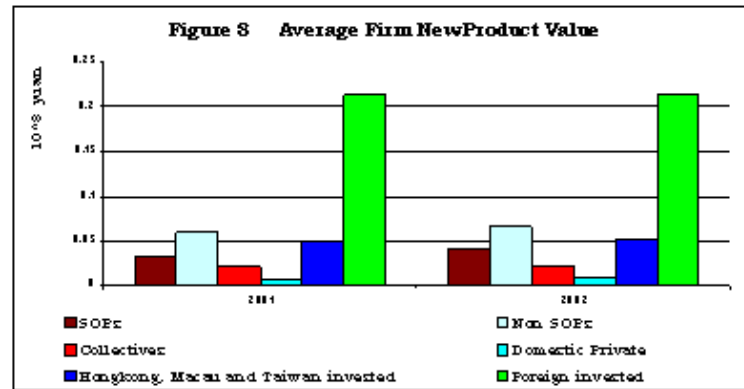


Figure 7 Share in Industrial New Product Value in 2002



Data Source: SSBb.

average firm new product value across different ownership types may also be consistent with the ranking of average market share. Therefore, the domestic industrial sector may need to carry more R&D activities to obtain more product innovation and to increase market share, as the differences between average firm new-product value of the foreign funded sector and the other ownership types are quite large. Industrial competition usually provides more incentive for firms to carry out R&D activities. However, note that the average new product value of SOEs was lower than the average new product value of foreign funded enterprises although their average production capacity was higher than for foreign funded firms. This could be a consequence of short-run behavior by SOEs' managers. In the short run, enterprises which did not conduct a substantial amount of R&D ac-



Data Source: SSBb.

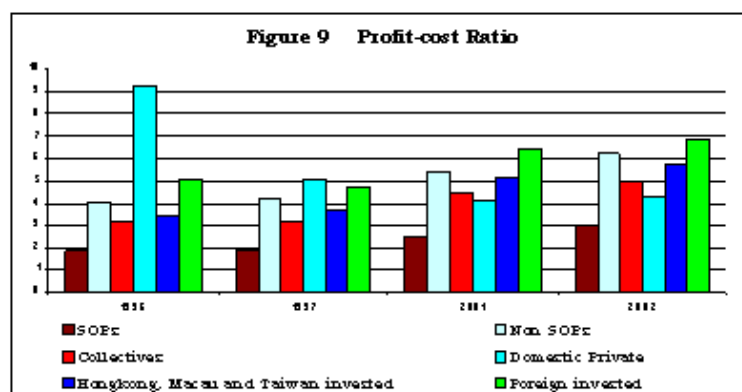
tivity might enjoy good performance as they incurred lower R&D costs. As shown in the following Figure 9, collectives and domestic private enterprises enjoyed a higher profit-cost ratio than SOEs. In 1996 and 1997, the performance of domestic private firms was the highest. The better performance of collectives and domestic private enterprises over SOEs could be explained in several aspects. First, property rights are more clearly defined within collectives and domestic private firms than in SOEs. Second, due to a lower proportion of new products, on average, they had lower total costs for producing new products. Third, the distribution of collectives and domestic private sectors among different industries and different sectors of each industry can be different.⁴ Although their average performance was not as good as the average firm's performance in the Hong Kong, Macau and Taiwan funded sector and foreign funded sector in 2001 and 2002, the difference in profit-cost ratio was not as large as the difference in average firm new product value between these firms. Therefore, cross sectional data at provincial level will be used in the next section to investigate what determined enterprise performance in addition to new product values.⁵

3. IMPLICATION OF MARKET CONDITION, OWNERSHIP AND FINANCE FOR INDUSTRIAL PERFORMANCE

Due to the limited availability of data, in this section, year 2002 cross sectional data by different ownership sector and by different provinces are used to investigate how market condition, ownership and industrial finance

⁴More disaggregate data of different ownership types in different industries are needed for verifying this.

⁵Because of a lack of provincial data on new product value, it is not included in the regressions in the following section.



Data Source: SSB.

affected enterprises' performance. Ownership sectors included are the pure state owned and state share-controlled sector, collective sector, domestic private sector, Hong Kong, Macau, and Taiwan funded sector and foreign funded sector. All 31 regions at provincial level are included for the above five different ownership types except for missing data for certain observations. All industrial data are either directly drawn from the *China Industrial Economy Statistical Yearbook* or calculated from the original data in the yearbook. In order to quantify regional market conditions, a regional marketization level is calculated as a weighted average of the regional proportion of the value of final consumption goods whose prices were determined by the market, the regional proportion of the procurement value of agricultural products whose prices were determined by the market and the regional proportion of the value of production inputs whose prices were determined by the market. The compiling approach of the regional marketization level index of 2001 is from the approach of calculating marketization index 3a in NERI (2002).

Former studies such as Jefferson et al. (1999), Wen et al. (2002) and Zhang et al. (2001) reveal there were significant differences in enterprises' internal efficiency across different ownership types. In the estimation of production function, industrial value added, net value of fixed assets and average number of annual employment are used as measures of output, capital input and labor input, respectively. F-tests show data from different ownership sectors should not be pooled together. Translog production function is used to estimate the industrial production function at ownership and regional level. When all second order items of Translog function are statistically insignificant, it is degenerated into the log form of Cobb-Douglas production function. The final estimation results of the production function are reported in Table 1.

TABLE 1.
Industrial Production Function at Regional Ownership Sector Level

Dependent variables	log(value added)				
	SOEs and state -controlled firms	collectives	domestic private enterprises	HKMTW funded firms	Foreign funded firms
Constant	-2.307*** (-6.626)	-0.490 (-1.519)	-3.559* (-1.699)		-7.359** (-4.319)
log(net value of fixed assets)	1.183*** (23.693)	0.736*** (5.593)	5.083*** (2.512)	0.743*** (28.963)	5.529*** (4.689)
log(employment)		0.328*** (2.478)	-3.433** (1.666)	0.311*** (7.007)	-3.976*** (-3.228)
(log(net value of fixed assets)) ²			-1.243*** (-2.473)		-0.766*** (-3.786)
logK*logL			2.093*** (2.454)		1.383*** (3.312)
(log(employment)) ²			-0.863*** (-2.313)		-0.627*** (-2.927)
coefficient of the effect of regional marketization level		0.066** (2.051)			
coefficient of the effect of regional marketization level in East China			0.027*** (2.444)		
coefficient of the effect of regional marketization level on in Central China			0.015 (1.330)	0.019* (1.683)	
Adjusted R^2	0.949	0.981	0.980	0.978	0.980
Calculated average total factor productivity across regions	-2.307	0.102	1.213	0.051	2.000

Note: (1) The numbers in brackets are t-values.

(2) *, ** and *** indicate significance higher than 0.10 0.05 and 0.01 levels, respectively.

It can be seen that Cobb-Douglas functions fit the production technologies of the state sector, collective sector and Hong Kong Macau and Taiwan funded sector very well. Note that the total factor productivity of the collective sectors varies with regional marketization levels across regions. Regions with a better market mechanism have higher total factor productivity.⁶ Meanwhile, the total factor productivity of Hong Kong, Macau, and Taiwan funded firms were higher in central China, and even higher in a region with a higher marketization level, than in East and West China, *Ceteris Paribus*. However, the production technologies of the domestic pri-

⁶The marketization effect can be due to the fact that in regions with a better market mechanism, a larger proportion of collectives are more economically located. In regions where market conditions are poor, a large proportion of collectives can be located in places where the infrastructure is relatively poor, e.g. rural areas.

vate sector and foreign funded sector are better represented by the Translog production functions. An interesting observation is that the pure employment effect is negative while the cross effect of labor and capital input is positive in both estimated production functions. According to the estimated production functions, total factor productivity of each ownership sector in each region can be calculated. The average total factor productivity of each ownership sector across regions is reported in the last row of Table 1. It can be seen that the average total factor productivity across different regions in 2002 are ranked from the foreign funded sector, domestic private sector, collective sector, and Hong Kong, Macau and Taiwan funded sector, to the state controlling sector in descending order.

These five sectors have exhibited different characteristics, different production technology and different performance (in terms of ratio of profit to industrial cost). In addition, as argued in Wen. et al. (2002), the operational environment of firms with different ownership types varies. For example, relatively well performed SOEs may gain more government support in policy and financing due to the taxes they paid. Meanwhile, due to the existence of a large amount of TVEs in collectives, the performance of the regional collective sector as a whole may be affected by the regional urbanization condition. Firms in China are now gaining profits from different channels. In order to investigate what affects the performance of different ownership sectors, the ratio of sales profit minus value added tax payable to total capital held is used as the measure of performance for each sector. The 2002 data for 30 provincial regions is used for estimation. Tibet is not included as there are missing data for certain variables.⁷ Most available industrial data are tried as explanatory variables. The investigation results are reported in Tables 2 to 6.

TABLE 2.

Determinants of the Performance of SOEs and State Controlled Enterprises' Sector

Explanatory variables	Coefficient	t-Statistic	p-value
Constant for East China	0.022287	5.102824	0.0000
Constant for Central China	0.024959	7.196649	0.0000
HKMTW share in sector capital actually received	0.265562	2.820274	0.0097
Value added tax payable	0.000138	4.823463	0.0001
Regional per capita GDP of West China in 2001	5.37E-06	10.04009	0.0000
Adjusted R-squared		0.629	

It can be seen from Table 2 that the performance of the state sector was positively affected by the Hong Kong, Macau and Taiwan share in capital

⁷In addition to Tibet, Heilongjiang and Shaanxi are excluded from regression of state sector and Jilin is excluded from regression of foreign sector due to their idiosyncrasies.

actually received by the sector in the year and value added tax payable. In addition, the higher the regional development level (represented by per capita GDP of the last year), the better the performance of the state sector in West China. Conjecture of these positive effects is as follows. First, the more capital invested by businessmen from Hong Kong, Macau and Taiwan would bring in more advanced technology and sales channels to the state sector. Second, a regional state sector which contributed more taxes was more likely to obtain government support in conducting business. And last, higher per capita GDP indicated a larger home market (in terms of purchasing power). In addition to the explanatory variables, the regional differentials in constant indicate that the overall sector performance in east China and central China is better than in west China, *Ceteris Paribus*.

TABLE 3.

Determinants of the Performance of Collective Sector

Explanatory variables	Coefficient	t-Statistic	p-value
Number of cities in provinces and Chongqing	0.001674	5.180535	0.0000
Regional marketization level of autonomous cities excluding Chongqing	0.006326	3.827902	0.0007
Ratio of Creditors' Equity to total liability of the sector	0.030556	1.874464	0.0717
Adjusted R-squared	0.489		

Table 3 reveals that the performance of the collective sector was positively affected by regional urbanization state, market condition, and the financing situation represented by the ratio of creditors' equity to total liability. For provinces, the urbanization state is approximated with number of cities. For autonomous cities, performance is positively related to the marketization level. Unlike Beijing, Tianjing and Shanghai, Chongqing includes three cities. Hence Chongqing is treated as a province here. There are wide observations that collectives, especially TVEs, were better performed in regions with a higher urbanization level and better infrastructure. Confirming the prediction from corporate governance literature, the ratio of creditors' equity to total liability did positively affect the performance of collectives.

Similarly, provincial urbanization level, marketization level of autonomous cities and the ratio of creditors' equity to total liability are found to positively affect the performance of the domestic private sector as shown in Table 4. In addition, in East and Central China, the domestic private sector performed relatively poorly in regions with a higher capital-labor ratio of the sector *ceteris paribus*, shown by the negative effect of capital-labor ratio in East China and Central China. This indicates that in east and central China, domestic private labor intensive firms might outper-

form capital intensive ones. Meanwhile, the constant shift indicates that the overall sector performance in east China and central China is better than in west China, *Ceteris Paribus*.

TABLE 4.

Determinants of the Performance of Domestic Private Sector

Explanatory variables	Coefficient	t-Statistic	p-value
Constant for East China and Central China	0.051540	2.640795	0.0143
Ratio of Creditors' Equity to total liability of the sector	0.052389	5.979783	0.0000
Sector capital labour ratio (Ratio of net value of fixed assets to average of employment in the year) for East China	-0.008577	-2.483866	0.0204
Sector capital labour ratio for Central China	-0.011603	-3.212753	0.0037
Regional marketization level of autonomous cities excluding Chongqing	0.006448	4.418751	0.0002
Number of cities in provinces and Chongqing	0.000734	2.278907	0.0319
Adjusted R-squared	0.704		

TABLE 5.

Performance of the Determinants of Hong Kong, Macau and Taiwan Funded Sector

Explanatory variables	Coefficient	t-Statistic	p-value
Constant for East China	0.073398	11.77746	0.0000
Per capita GDP of West China in 2001	5.39E-06	2.111031	0.0445
Regional capital labour ratio of the sector for Central China	0.005584	10.61156	0.0000
Regional capital labour ratio of the sector for West China	0.001329	2.263528	0.0322
Adjusted R-squared	0.353		

Interestingly, it can be seen in Table 5 that the Hong Kong, Macau and Taiwan funded sectors performed relatively evenly across regions within East China. In Central and West China, performance was positively affected by the capital-labor ratio of the sector, which should encourage more investment into Central and West China from the sector. In West China, regional per capita GDP also positively affected the performance of the sector.

Like the Hong Kong, Macau and Taiwan funded sector, the performance of the foreign funded sector was also relatively even in East China, as shown in Table 6. In Central and

West China, regional marketization level had a positive effect on performance of the sector. But the average size of the firm had a negative effect,

TABLE 6.

Determinants of the Performance of Foreign Funded Sector

Explanatory variables	Coefficient	t-Statistic	p-value
Constant for East China	0.093234	18.45119	0.0000
Ratio of Creditors' Equity to total liability of the sector for West China	0.037491	2.388441	0.0251
Average size of firm (ratio of net value of fixed assets to number of firms for Central China and West China)	-0.014232	-1.735163	0.0955
Regional marketization level for Central China	0.008355	7.688002	0.0000
Regional marketization level for West China	0.005768	3.109199	0.0048
Adjusted R-squared	0.459		

which might be because the foreign sector in Central and West China has longer term profit targets which made its capital-labor ratio not optimal in short run. In addition, the ratio of creditor' equity to total liability is found to positively affect the performance of the foreign funded sector in West China. This effect could be due to capital shortage in West China and should encourage more foreign firms to bring in more FDI into West China.

4. CONCLUDING REMARKS

In the above sections, significant differences are found between different ownership sectors in terms of average firm size, average firm new product value, production function, profit-cost ratio and the determinants of sector performance. While the Cobb Douglas function fits the production of the state sector, collective sector and Hong Kong, Macau and Taiwan funded sector very well, production of the domestic private sector and foreign funded sector are better fitted by the Translog function. The estimated average total factor productivity across different regions in 2002 are ranked from the foreign funded sector, domestic private sector, collective sector, and the Hong Kong, Macau and Taiwan funded sector, to the state controlled sector in descending order.

The determinants of economic performance change from one ownership sector to another. They range from the Hong Kong, Macau and Taiwan funded sector's share in capital actually received by the sector in the year, value added tax payable, regional per capita GDP of the last year in West China, number of cities in provinces, marketization level of autonomous cities, ratio of creditors' equity to total liability, capital-labor ratio, regional per capita GDP, to average size of firm and regional marketization level. The statistical significance of the effect of these factors on performance

varies with ownership sector and region.⁸ The direction of the effect of capital-labor ratio also varies between the domestic private sector and the Hong Kong, Macau, and Taiwan funded sector and between East, Central and West China. While the capital-labor ratio is found to have negatively affected performance of the domestic private sector in East and Central China and the average size of firm affected the performance of the foreign funded sector negatively in Central and West China, all other significant effects are positive.

The differences found across different ownership sectors calls for further studies at different levels. On the one hand, firm level study may find different results due to different ownership distributions among industrial sectors and across regions. On the other hand, with rapid industrial development, ownership distribution changes rapidly. This study only provides the most recent picture (2002) by provincial regions and by five ownership sectors.

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⁸Insignificant factors are usually not shown in the final regression results.