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The Colour of the Cats

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Abstract: China has experimented with two strategies of reform of its state-owned enterprises (SOE). One is diversification of SOEs' ownership through introducing non-state sources of investment. Another is to improve the management of SOEs by granting SOEs' managers autonomy and their employees profit incentives. Utilising a data set on 680 SOEs over 1980-94, we tested the relative effectiveness of two kinds of reform measures. Our results show that ownership diversification had a significant impact on the performance of SOEs while efforts to improve SOE's management had very little effect. Moreover, the impact of ownership diversification on SOE's economic performance was as strong as that of enhancing product market competition.

No matter whether it is black or white, a cat that catches mice is a good cat.

Deng Xiaoping, Chinese leader

I INTRODUCTION

State-owned enterprises (SOEs), which refer to the enterprises with majority government ownership and under direct government control, continue to be difficult targets of reform in many economies under reform. In China, despite many years of reform, SOEs still drag on the economy by occupying 70 per cent of bank credits, employing 50 per cent of non-agricultural labour force, but producing less than 25 per cent of total industrial output.[1]

[1]Although we are mostly concerned with SOE reform in transition economies, the same issue is also of great importance in industrialised economies. The discussions on SOEs in OECD countries can be found in Toninelli (2000).

Along with the long and difficult history of SOE reform, there have been continuous debates on strategies of SOE reform in the academic community. In the debates, two schools of thought stand out. They have distinct explanations of the sources of the inefficiency of SOEs and the best approaches to reforming them. One school can be called *the ownership school*. According to this school, SOEs are intrinsically inefficient. It is because they are controlled by government agencies and government agencies are bad "owners", causing a litany of bad SOE behaviour. Thus, the key of the SOE reform is to separate the government from the SOE. Privatisation, broadly defined, is essential to achieve this goal. Many economists have long articulated this view. For example, in his analysis of the former socialist system, Kornai (1992) has maintained that the root problem of the inefficiencies of socialism and of state enterprises is bureaucratic control. Similarly, Shleifer and Vishny (1994) blame politicians' influence of enterprise decisions for the inefficiency of state enterprises.

The other school believes that "nothing is intrinsically inefficient about SOEs". SOEs are no different from those listed companies in market economies, such as IBM, with widely spread public ownership. The reason that SOEs are inefficient, according to this school, is because the government as a large shareholder has not been effective in managing its investment in SOEs. Therefore, the solution is to improve government's management of SOEs. Possible measures include granting SOE managerial autonomy and linking the bonus of SOE employees to enterprise performance. We call this *the management school*.

Despite the long-standing and sharp division between the two schools of thought on SOE reform, there has been little empirical research aimed at testing directly the validity of the theories. Instead, most of existing empirical research has been embedded in one of the two schools. For example, Barberis *et al.* (1996) tested the mechanism through which privatisation of Russian shops improves efficiency. Frydman *et al.* (1999) were also concerned with the impact of privatisation on firm performance.

On the other hand, Groves *et al.* (1994 and 1995) examined how granting autonomy and profit incentives to SOE managers improve SOE performance and how improving managerial incentives improve SOE efficiency. Li (1997) measured how managerial reform and increased market competition enhance SOE's efficiency. While testing the importance of managerial reform, these authors do not consider the factor of ownership changes.

The purpose of the paper is to test empirically the two schools of thought on SOE reform. We were able to do so because of a unique data set on China's SOE. The data set tracks 680 Chinese state-owned enterprises over 15 years. Departing from the large amount of empirical research on China's SOE

reform, we observed and documented the fact that both managerial reforms and ownership reform were implemented in China during this 15 year period.

Ownership reform in China was not in the form of a large-scale and thorough privatisation. Instead, ownership changes in Chinese state enterprises came about by introducing non-government sources of investment funds. State enterprises were allowed to raise funds from their employees, foreign investors, non-state enterprises, and outside individual investors. As a result, state enterprises in China have undergone steady changes in ownership over time. The state ownership has been gradually diluted while the non-state owners penetrated into the enterprises. Managerial reforms were also implemented concurrently. Through observation of enterprises undergoing both kinds of reforms, we are able to evaluate the relative importance of each kind of reform.

Our empirical tests reveal the following findings. First, non-state ownership shares in a state enterprise is a significant – both statistically and economically – predictor of the enterprises' performance. The higher the non-state shares, the better the economic performance of the enterprise. Second, contrary to the results reported in Groves *et al.* (1994, 1995), we find that managerial autonomy and incentives are insignificant for improving state enterprise' performance once the ownership changes were controlled. Third, product market competition has a significant and positive impact on enterprise performance.

In the next section, we discuss the institutional changes in China's enterprise reforms. Section III will discuss the dataset and the research methodology. The results are reported in Section IV, which is followed by concluding remarks.

II THE EVOLUTION OF CHINA'S STATE ENTERPRISE REFORM

In comparison with other transition economies, China not only has had one of the longest histories of state enterprise reform but also has experimented with a variety of reform measures in the process. The entire period of state enterprise reform can be roughly divided into three stages. In the first stage of the reform, which lasted throughout the whole 1980s, the thinking of the managerial school of reform was espoused and many reform measures were implemented. The most common was the so-called *contract responsibility system*, in which SOE managers or all the employees of an enterprise were asked to sign performance contracts with the supervising government agencies. A contract typically specified how much profit and tax an enterprise must remit to the government agency and, in return, how much

bonus the employees could get. By the early 1990s, such reforms ran into serious trouble and stalled gradually due to the wide spread renegotiation of government-enterprise contracts.

The second stage of China's state enterprise reform was implemented in the first half of the 1990s, and was aimed at separating SOEs' daily management from direct government intervention. The objective was preventing government agencies from issuing administrative commands to SOEs. To implement that measure, many SOEs were incorporated as independent legal entities. As a result, the government agencies that had been the supervisors of SOEs became SOEs' equity holders. The government agencies distanced themselves from day-to-day operations of the SOEs.

Although the intellectual impulse behind this reform measure was still the managerial school, corporatisation opened up avenues to diversify the ownership structure of SOEs. For example, as a corporation, an SOE could raise funds from employees, independent investment institutions, foreign investors, etc. As a result, the equity structure of an enterprise could change. Although privatisation of the entire enterprise was not allowed, it was possible for non-state investors to hold the equity of the SOEs. This is clearly different from the privatisation in countries like Russia and the Czech Republic. It only diversified ownership structure of SOEs rather than selling existing stock of assets to non-government investors. Thus, incidentally, the second stage of the reform actually started the process of ownership diversification of China's SOEs. This is a point often neglected by observers of China's SOE reform.

The third stage of China's state enterprise reform involved extensive ownership changes. By the mid 1990s, many SOEs ran into serious financial difficulties and the urgency of the enterprise reform had become increasingly acute. Building upon lessons from the previous two stages of reform, the Chinese government began to formulate policies that amounted to privatisation or liquidation of some of the state enterprises.

China's long history of state enterprise reform provides the best opportunity to test the two competing schools of thought of state enterprise reform. Not only have different enterprises undergone different reforms, but also individual enterprises have had different reform measures imposed on them at the same time.

III DATA AND METHODOLOGY

The Data

The data set we used is unique in the sense that it covers all three stages of the reform. It is based on two surveys of 680 state enterprises covering the period 1980–1994. The first survey was conducted in 1990 by a research team

consisting of economists from the Chinese Academy of Social Sciences (CASS), Oxford University, and the University of Michigan. The survey gathered enterprise information from 1980 to 1989. The second survey was implemented in 1995 by researchers from the CASS and the University of Michigan and collected information on the same group of enterprises from 1990 to 1994. The data cover four provinces, including Jilin, Jiangsu, Shanxi, and Sichuan, representing four geographical regions of economic development in China. (northeast, east, north, and west). The sample SOEs come from 39 industries, which we grouped into five major industrial categories: mining and utilities, heavy manufacturing, chemicals, light manufacturing, and others. Unlike surveys conducted by government agencies, the two surveys were carefully designed and pilot-tested by economics researchers. The data set contains detailed information on the operations and financial information of the SOEs in the sample. It also contains qualitative information from the senior management of the SOEs. The first part of the data set has been widely used in other studies (e.g., Groves *et al.*, 1994, 1995; Li, 1997).

The Design of the Econometric Test

We adopted the programme evaluation approach to test the propositions based on the two schools of the enterprise reform. That is, we include in our empirical model two sets of proxies that represent the measures for managerial reform and ownership reforms respectively to see how these proxies can explain changes in the performance of a state enterprise. Specifically, the econometric model we use is as follows:

$$y_{it} = f_i + \alpha_m m_{it} + \alpha_o o_{it} + \alpha_z z_{it} + \varepsilon_{it} \quad (1)$$

where:

y_{it}: a measure of the performance of firm i at year t;
f_i: the firm specific fixed effect variable which is not observed;
m_{it}: a vector of measures of the managerial reform on firm i at year t;
o_{it}: a measure of ownership changes in firm i at year t;
z_{it}: a vector of control variables of firm i at year t;
ε_{it}: the error term.

Measuring Enterprise Performance y_{it}

For the performance measure y_{it}, we used two alternative approaches. The first is to measure the total factor productivity (TFP) of the enterprise. The TFP is defined as the portion of a firm's real output (after deflating prices to a base year) that is not explained by real inputs, including labour, capital, and raw materials. The TFP is a measure of a firm's production efficiency, since it relates a firm's input and output after taking out any effects of price changes.

The TFP can be obtained by regressing the real output on real inputs such as capital, labour, and raw materials. After obtaining the TFP of a firm of each year, we use model (1) to evaluate the impact of each reform measures. Equivalently, we can combine the two steps by doing the following one regression

$$\begin{aligned} \text{Log}(Y_{it}) = {} & f_i + \alpha_m\, m_{it} + \alpha_o\, o_{it} + \alpha_z\, z_{it} \\ & + \beta_l \log(L_{it}) + \beta_l \log(K_{it}) + \beta_l \log(M_{it}) + \eta_{it} \end{aligned} \tag{2}$$

where:

Y_{it}: real output;
L_{it}: size of labour force the enterprise;
K_{it}: capital of the firm;
M_{it}: raw material.
η_{it}: the error term,
TFP: $f_i + a_m\, m_{it} + a_o\, o_{it} + a_z\, z_{it} + \eta_{it}$

Despite the fact that TFP has been used extensively as a measure of SOE performance, it may not take into account changes in the behaviour of the firm because it is based on production function of a firm. Under the assumption of profit maximisation, other things being equal, a higher TFP means higher efficiency. For state enterprises, which have non-profit objectives, it is possible that a higher TFP induces a lower efficiency and waste of resources. Bai *et al.* (1997) have developed a model to illustrate this possibility.

Because of the possible deficiency of the TFP as the measure of SOE performance, we introduce the gross rate of return on assets (GROA) as an alternative measure in this study. The GROA is constructed as before-tax profit based on market prices divided by the total net asset value of the firm. The before-tax-profit is calculated by adjusting all raw material and output prices to market prices and then dividing all by economy-wide inflation rate. In addition, wage rates are adjusted by weeding out extra bonuses, which were returns to employees' *de facto* control rights of the state enterprise and should be excluded from normal wage costs. The net asset value is adjusted by perpetual inventory method and by deflating the nominal value of investment of each year.

The GROA based on market prices captures the total return to one unit of investment available for division among the stakeholders. The stakeholders of an SOE include employees, banks, government agencies, and other investors. Thus, the GROA is a composite index of the economic efficiency of an enterprise incorporating many factors. A change of behaviour of SOE managers should be reflected in the GROA. A higher TFP coupled with profit maximising decisions of an SOE also increases the GROR. Thus, it should be more accurate than the TFP measurement. It is also more accurate than an

accounting-measure of profitability of the enterprise, since the latter is subject to changes in the bonuses paid to SOE employees.

Measuring Managerial Autonomy and Incentive m_{it}

We follow Groves *et al.* (1994) in measuring managerial autonomy and incentive m_{it} . For managerial autonomy, they used a dummy variable $auto1_{it}$ that was equal to 1 if for firm i in year t, the director had obtained production autonomy. Alternatively, we also use $auto2_{it}$ equalling the ratio of the enterprise's output sold in the market in total output. The rest of the output would go to the government at a planned price.

As the measure of incentives, we use the sum of the two contractual rates of profit retention. The first is the pre-agreed rate of profit retention for the SOE and the other is the rate of profit retention if the total profit is beyond a pre-determined level. We use the sum of these two since when the total profit is high, the sum of the two rates is the expected rate of profit retention. This is consistent with Groves *et al.* (1994).

Measuring Ownership Diversity o_{it}

The index of ownership diversity, o_{it}, was meant to capture the percentage of non-government shares in the enterprise's total capital stock. For this purpose, we construct two series of capital stock for each enterprise. One is the total capital stock constructed by the perpetual inventory method as in the case of K_{it} in the production function. The other is the capital stock constructed similarly by only using each year's investment from non-government sources. The ratio of the second capital stock to that of the first one constitutes the ownership diversity index o_{it} that falls between 0 and 1.

Control Variables z_{it}

The main control variable we included in the regression was a measure of product market competition since previous works have shown that this is an important factor inducing a better performance among China's state enterprises in the reform era. Following Li (1997), we calculate the difference between the growth of input price and output price for each year and each enterprise. We use this value as a reverse index of the mark-up ratio. That is, a high growth difference indicates that the terms of trade of the firm worsens and the lower the mark-up ratio.

IV RESULTS OF THE EMPIRICAL TESTS

Before discussing the test results, let us first take a look at the summary statistics of the key variables used in our study. Table 1 categorises those

variables in the test period. It shows that managers of the SOEs in our sample had gained more production autonomy over time in the reform period. In 1980, on average, SOEs sold 44 per cent of their output to the market place while that figure increased to 75 per cent in 1994. With more autonomy of production and sales, SOEs in the sample could also keep more of the profit generated. In 1980, SOEs in the sample were able to retain 22 per cent of profit for their own use on average. The ratio steadily increased to 70 per cent by 1994. Meanwhile, the proportion of non-government shares in total capital stock increased at a much slower pace from 6 per cent in 1980 to about 27 per cent in 1994. At same time, mark-up ratios were also decreasing as evidenced by Table 1's accumulated input inflation rates minus accumulated output inflation rates. The difference in inflation rate peaked around the end of 1980s and persisted at a high level until 1994.

Table 1: *Summary Statistics of Managerial Autonomy, Incentive, Ownership Diversification, and Mark-up Ratios*

Year	*Autonomy (%): Percentage of Output Sold at the Market in the Total Output Value*	*Profit Share (%): Percentage of Retained Profit in the Total Profit*	*Ownership Fraction (%): Percentage of Accumulative Non-state Investment in the Accumulative Total Investment*	*Markup Ratio (%): the Difference Between Accumulative Input Inflation Rate and Accumulative Output Inflation Rate*
1980	44	22	6	0
1981	46	24	7	5
1982	48	27	7	6
1983	49	31	7	16
1984	51	36	8	19
1985	57	38	9	27
1986	59	41	10	43
1987	61	39	11	58
1988	62	40	13	95
1989	63	39	14	101
1990	72	61	18	97
1991	73	60	21	92
1992	74	63	24	87
1993	74	68	25	91
1994	75	70	27	73

Table 2 provides information on the GROA of the SOEs in the sample. The first column from the left is the rate of return on assets calculated by directly using accounting data. It shows a dramatic decrease in the gross rate of return on assets in nominal or accounting terms. The rate was as high as 54 per cent in 1980 and dropped to as low as 14 per cent in 1990. The second column makes an adjustment to the first column by using the 1994 prices of input and output to reconstruct the gross profit. The gross profit is measured at the same price level of 1994. Note that the calculated rate of return was very high in the early years of the reform period. This is due to the fact that the denominator, the total asset value, was calculated at the price level of 1980. Thus, the final adjustment we made was to deflate the rate of return of the second column by economy wide inflation rate. The outcome after adjustment still shows the same picture, i.e., the gross rate of return on assets decreased from well above 20 per cent in the 1980s to under 20 per cent after 1990.

Table 2: *Summary Statistics of Various Rates of Return (GROA) by Year (in percentage)*

Year	*Nominal Market Return on Total Assets*	*Return on Total Assets at 1994 Market Prices*	*GDP Deflated Return on Total Assets at 1994 Market Prices*
1980	54	88	34
1981	46	78	32
1982	43	73	28
1983	40	79	30
1984	43	84	36
1985	19	40	18
1986	19	47	22
1987	21	52	26
1988	23	60	35
1989	16	36	24
1990	14	29	19
1991	14	25	17
1992	15	22	16
1993	19	24	21
1994	18	18	18

Note: The asset value is calculated by perpetual inventory method taking depreciation into account.

We are now ready to describe the regression results. Table 3 shows the regression results based on the total factor productivity model. Production autonomy, whether it is measured by a dummy variable of obtaining the

autonomy or a ratio of market output to total output, is statistically insignificant in all regressions. Profit incentive, as measured by profit shares, is statistically significant in all regressions. The coefficients on non-government shares of ownership as well as mark-up ratios are all statistically significant. Moreover, the ownership shares and mark-up ratios are of higher order in economic importance than profit shares. For example, for an increase of 50 per cent in profit share, the one time TFP increase is around 3 per cent; for the same amount of increase in non-government ownership share or mark-up ratio, the TFP increase would be 9 per cent and 11 per cent, respectively. Interestingly, the cross-effect of autonomy and ownership is statistically insignificant while that between profit share and ownership is negative and statistically significant.

Turning to the average TFP growth, we need to look at the second column of Table 3, which shows a regression of logarithm of deflated output on that of labour, capital, and deflated raw material, and time trend. The coefficients on logarithm of labour, capital, and raw material are all statistically significant and are of appropriate values. They add up to a level close to 0.98, suggesting a proximity to a constant return to scale in production technology. The coefficient of the time trend captures the annual growth rate of TFP, which turns out to be statistically significant at more than 1 per cent level. The estimated TFP growth rate of the SOEs in our sample is 3.2 per cent, which is very close to those reported in may studies on Chinese SOEs' TFP growth in the literature.

The regression results using the gross rate of return on assets are given in Table 4. The results show the same pattern as those in the TFP regressions. Production autonomy does not have a stable positive and statistically significant effect across alternative regression models. Profit share retention is mostly statistically insignificant except for one specification of the regression. Meanwhile, ownership share and mark-up ratio are consistently and positively significant across the regressions. In addition, they are economically significant. For example, an increase of 50 per cent in non-government ownership share and mark-up ratio, the gross rate of return would jump by 40 and 13 per cent, respectively. Finally, estimates on the cross-effect between autonomy and ownership share are not stable, while the same between profit share and ownership share tend to be negative.

Table 3: *Fixed-Effect Regressions on Total Factor Productivity*

	Dependent Variable: Log(output) at 1980 Prices															
Log(raw mat.), at 1980 prices	0.40***	(43.58)	0.48***	(19.2)	0.43***	(51.4)	0.43***	(51.6)	0.52***	(22.8)	0.52***	(22.8)	0.52***	(22.8)	0.52***	(22.8)
Log(raw mat.) *Min. & util. ind. dum.			–0.25***	(–6.8)					–0.27***	(–8.19)	–0.27***	(–8.21)	–0.28***	(–8.33)	–0.28***	(–8.44)
Log(raw mat.)*Light manu. ind. dum.			–0.06	(–1.8)					–0.06**	(–2.0)	–0.06**	(–2.0)	–0.06**	(–2.08)	–0.06**	(–2.07)
Log(raw mat.)*Chem. Ind. Dummy			–0.13***	(–4.1)					–0.11***	(–3.74)	–0.11***	(–3.7)	–0.11***	(–3.73)	–0.11***	(–3.7)
Log(raw mat.)*Heavy manu. ind. dum.			–0.07**	(–2.5)					–0.08***	(–3.05)	–0.08***	(–3.05)	–0.08***	(–3.10)	–0.08***	(–3.12)
Log(capital) at 1980 prices	0.18***	(10.2)	0.37***	(8.8)	0.14***	(8.7)	0.14***	(8.7)	0.27***	(6.96)	0.27***	(6.98)	0.27***	(6.99)	0.27***	(7.03)
Log(cap.) *Min. and util. ind. dummy			–0.2***	(–2.7)					–0.11	(–1.61)	–0.11	(–1.62)	–0.11	(–1.58)	–0.11	(–1.63)
Log(cap.)*Light manu. Ind. dummy			–0.3***	(–6.3)					–0.24***	(–5.64)	–0.25***	(–5.68)	–0.25***	(–5.64)	–0.25***	(–5.72)
Log(cap.)*Chem. ind. dummy			–0.19***	(–3.6)					–0.13***	(–2.66)	–0.13***	(–2.69)	–0.13***	(–2.67)	–0.13***	(–2.73)
Log(cap.)*Heavy manu. ind. dummy			–0.17***	(–3.5)					–0.09*	(–1.93)	–0.09*	(–1.95)	–0.09**	(–1.97)	–0.09**	(–1.98)
Log(labor)	0.43***	(13.4)	0.47***	(3.4)	0.39***	(13.5)	0.39***	(13.5)	0.33***	(2.62)	0.33***	(2.58)	0.32**	(2.49)	0.32**	(2.53)
Log(labor) *Min. and util. ind. dummy			–0.33**	(–2.0)					–0.26*	(–1.72)	–0.26*	(–1.7)	–0.24	(–1.59)	–0.25	(–1.62)
Log(labor)*Light manu. ind. dummy			–0.11	(–0.7)					0.02	(–0.15)	–0.02	(–0.17)	0.03	(0.25)	0.03	(0.21)
Log(labor)*Chem. ind. dummy			–0.01	(–0.05)					0.10	(0.71)	0.10	(0.73)	0.11	(0.81)	0.11	(0.77)
Log(labor)*Heavy manu. ind. dummy			0.12	(0.4)					0.19	(1.4)	0.20	(1.43)	0.21	(1.52)	0.21	(1.49)
Autonomy					–0.012	(–0.772)			–0.0006	(–0.044)			–0.011	(–0.57)		
Output autonomy year dummy							0.008	(0.54)			–0.005	(–0.38)			–0.016	(–0.78)
Profit share					0.059***	(2.61)	0.058***	(2.58)	0.07***	(3.22)	0.07***	(3.24)	0.099***	(3.86)	0.10***	(3.90)
Ownership fraction					0.11**	(1.96)	0.10*	(1.87)	0.15***	(2.72)	0.15***	(2.74)	0.22**	(2.36)	0.25***	(3.07)
Mark-up ratio					0.22***	(28.1)	0.22***	(28.1)	0.22***	(28.2)	0.22***	(28.2)	0.22***	(28.2)	0.22***	(28.1)
Auto.*Owner. Fraction													0.099	(1.11)		
Auto. Dum.*Owner. Fraction															0.062	(0.92)
Prof. Share*Owner. Fraction													–0.25**	(–2.22)	–0.25**	(–2.18)
1984 year dummy					0.07***	(3.37)	0.07***	(3.43)	0.066***	(3.47)	0.066***	(3.45)	0.06***	(3.39)	0.064***	(3.34)
1989 year dummy					0.024	(1.20)	0.025	(1.26)	0.026	(1.35)	0.025	(1.32)	0.02	(1.26)	0.024	(1.22)
1993 year dummy					–0.013	(–0.826)	–0.014	(–0.85)	–0.014	(–0.908)	–0.014	(–0.87)	–0.012	(–0.77)	–0.012	(–0.76)
Time trend	0.032***	(19.6)	0.033***	(19.98)	0.017***	(7.95)	0.016***	(6.81)	0.017***	(8.11)	0.017***	(7.52)	0.017***	(8.15)	0.017***	(7.48)
Constant	0.23	(1.12)	–0.013	(–0.065)	0.45*	(2.57)	0.44**	(2.47)	0.32**	(1.69)	0.32**	(1.72)	0.32*	(1.67)	0.32*	(1.69)
Number of observations	4,414		4,414		4,414		4,414		4,414		4,414		4,414		4,414	
R-square	0.6295		0.6485		0.6933		0.6932		0.7099		0.7099		0.7103		0.7102	

Note: t-ratios are in parentheses.
* (**, ***) Significant at the 10 (5, 1) per cent level.

Table 4: *Fixed-effect Regressions on Gross Rate of Return on Assets Based on Constant Market Price (GROA)*

	Dependent Variable: GROA							
Autonomy	–0.04*	(–1.65)	0.13***	(4.43)				
Output autonomy year dummy					–0.019	(–0.77)	–0.065*	(–2.06)
Profit share	0.018	(0.53)	0.028	(0.70)	0.019	(0.56)	0.076*	(1.86)
Ownership fraction	0.56***	(6.46)	1.42***	(10.1)	0.55***	(6.41)	0.67***	(5.23)
Mark-up ratio	0.27***	(22.5)	0.27***	(23.0)	0.27***	(22.5)	0.27***	(22.4)
Auto.*Owner. fraction			–1.42***	(–10.2)				
Auto dummy*Owner. fraction							0.26**	(2.45)
Prof. Share*Owner. fraction			0.13	(0.73)			–0.49***	(–2.71)
1984 year dummy	0.049	(1.61)	0.048	(1.58)	0.05	(1.64)	0.05	(1.48)
1989 year dummy	–0.05	(–1.62)	–0.06	(–1.91)	–0.05	(–1.64)	–0.05*	(–1.71)
1993 year dummy	0.002	(0.085)	0.008	(0.34)	0.006	(0.22)	0.007	(0.28)
Time trend	–0.014***	(–4.9)	–0.018***	(–6.1)	–0.014***	(–4.4)	–0.013***	(–3.9)
Constant	0.04*	(1.82)	0.04*	(1.93)	0.018	(0.97)	0.000006	(0)
Number of Observations	4,414		4,414		4,414		4,414	
R-square	0.1313		0.1313		0.1309		0.1331	

Note: t-ratios are in parentheses.
* (**, ***) Significant at the 10, 5, 1 per cent level, respectively.

Overall, the two sets of empirical tests yield the following conclusions. First, ownership diversification has economically large and positive impact on the performance of state enterprises. Second, managerial autonomy and profit incentives do not have the same consistent and positive impact. Third, product market competition improves the performance of state enterprises.

V CONCLUDING REMARKS

In the paper, we test two schools of thought on strategies of state enterprise reform, the ownership school and the management school. We are able to do so by utilising a large panel dataset of state enterprises in China, which has experimented with a wide range of strategies in reforming the state enterprises. We find that ownership diversification has a consistent and economically significant impact on improving the performance of state enterprises while strategies of management reform including granting production autonomy and profit incentives do not have a persistent and economically significant effect on enterprise performance.

Our empirical findings carry important policy implications. Managerial reforms might have some positive impact in the short run but cannot achieve their objectives in the long run. Diversification of the ownership structure of state enterprises is a key to improving the economic performance of enterprises. As the ownership changes carry a significant impact on the economic performance of state-owned enterprises, any reform strategy should put the ownership change as the priority in the reform agenda. Although autonomy and incentives clearly matter, the policy makers should not be preoccupied by those measures. Our finding on the impact of firm performance on market competition and development of market institutions suggests that gradualism may be a viable alternative to reform the state-owned enterprises. One of the undesirable consequences of massive privatisation without a competitive environment is the shrinking of economic activities and high unemployment. China's experiences shows that privatisation at the margin facilitates a smooth transition.

REFERENCES

BAI, CHONG-EN, DAVID LI, YIJIANG WANG, 1997. "Enterprise Productivity and Efficiency: When Is Up Really Down?" *Journal of Comparative Economics*, Vol. 24, No. 3, pp. 265-280.

BARBERIS, NICHOLAS, MAXIM BOYCKO, ANDREI SHLEIFER and NATALIA TSUKANOVA, 1996. "How Does Privatisation Work? Evidence from the Russian Shops," *Journal of Political Economy*. Vol. 104, No. 4, pp. 764-790.

FRYDMAN, ROMAN, CHERYL GARY, MAREK HESSEL, and ANDRZEL RAPACZYNSKI. 1999 "When Does Privatisation Work? The Impact of Private Ownership on Corporate Performance in the Transition Economies," *Quarterly Journal of Economics*, Vol. 114, No. 4, pp. 1153-1191.

GROVES, THEODORE, HONG YONGMIAO, JOHN MCMILLAN and BARRY NAUGHTON, 1994, "Autonomy and Incentives in Chinese State Enterprises," *Quarterly Journal of Economics*, Vol. 109 No. 1, pp. 183-209.

GROVES, THEODORE, HONG YONGMIAO, JOHN MCMILLAN and BARRY NAUGHTON, 1995, "China's Evolving Managerial Labor Market." *Journal of Political Economy*, Vol. 103, No. 4, pp. 873-892.

KORNAI, JANOS, 1992. *Socialist Systems,* New York: Cambridge University Press.

LI, WEI, 1997. "The Impact of Economic Reform on the Performance of Chinese State Enterprises, 1980-1989," *Journal of Political Economy*, Vol. 105, No. 5, pp. 1080-1110.

SHLEIFER, ANDREI, and ROBERT VISHNY, 1994. "Politicians and Firms," *Quarterly Journal of* Economics, Vol. 109, No. 4, pp. 995-1025.

TONINELLI, PIER ANGELO, 2000. *The Rise and Fall of State-Owned Enterprise in the Western World*, Cambridge University Press.