

The Impact of Ownership Reform in Chinese Industry, 1995-2001¹

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Abstract

During the 1980s, the restructuring of Chinese industry was driven principally by the entry of new enterprises into the enterprise system and by the restructuring of managerial incentives. In 1993, China's leadership formally inaugurated the shareholding experiment. This paper examines the impact on eight performance measures of the conversion of both state- and collective-owned enterprises to shareholding enterprises. The analysis distinguishes between the direct effect of conversion and the induced effect, involving the attraction of non-state investment, which reduces the proportion of state assets and state control rights. We find evidence for SOEs that both conversion and a decline in the share of state-owned assets motivate rising productivity and R&D intensity. While rising proportions of non-state assets motive lower employment and rising wages, the initial conversion effect is associated with higher employment and lower wages. These latter impacts may result from agreements with workers as part of the conversion process. The SOE conversion process exhibits selection bias in which SOEs with high rates of capital productivity and profitability, high tax burdens, and comparatively low wages and smaller labor forces are more likely to be selected for conversion. No similar selection bias is evident in the collective sector.

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1. Introduction

The formal ownership structure of China's enterprise system has changed dramatically over the past two decades. In 1980, the universe of China's industrial enterprises consisted virtually exclusively of state-owned enterprises and collective-owned enterprises (see Table 1). China's second industrial census, conducted in 1985, identified a total of 1,522 enterprises that lay outside the scope of the state and collective sectors. A decade later, the ownership composition of Chinese industry was far more diverse.

By 1997, nearly six million individually-owned enterprises (with 8 or fewer employees) were operating within the industrial sector. Since all of these very small enterprises are neither "independent accounting units at or above the township level" nor report annual sales of more than five million yuan, they are not included in Table 1. Table 1 does show, however, that in 2001, among China's larger enterprises – the 171,000 enterprises with sales over five million yuan – fully 55 percent were operating outside the state and collective sectors. The 46,767 state-owned enterprises reporting in 2001 represented a precipitous decline from the 84,397 enterprises logged in 1997. Also by 2001, the collection of shareholding enterprises had grown to nearly 25,000, more than double the figure reported just three years earlier. Finally, having in 2001 grown to more than 36,000 firms, the number of private sector firms with sales in excess of five million yuan exceeded the number of surviving collectives and was closing in on the number of surviving state-owned enterprises.

Beginning in 1998, China's process of ownership conversion accelerated dramatically. In this paper, we focus on the conversion experience of a subset of China's approximately 22,000 large and medium-size enterprises. During the latter half of the 1990s until the present, the principal mode of enterprise restructuring in China has been the conversion of former state-owned enterprises and collective-owned enterprises to shareholding enterprises. These constitute the focus of our study.

While most studies of ownership reform focus narrowly on productivity and profitability, the purpose of this study is to investigate the effect of ownership reform and conversion on a broad set of performance measures. In addition to the conventional measures of labor and capital productivity and profitability, we also examine the impact of conversion on employment and wages, taxes, and two dynamic measures of enterprise performance, namely R&D expenditures and new product sales.

The impact of conversion on performance may operate through multiple channels. In our modeling and regression analysis, we explicitly distinguish between two channels of impact of the conversion process. The first of these is the direct impact of conversion of enterprise performance, holding constant the firm's asset mix. The second impact of conversion, the induced effect, results from the ability of converted firms to attract new

investment and thereby benefit from the performance-enhancing effects of investment from the non-state sector.

This paper is organized as follows. The next section reviews four forms of ownership reform in China. Section 3 presents a literature review, both a broad overview of findings in the research focused on Eastern Europe and the Commonwealth of Independent States (CIS) as well as the growing body of research focused on enterprise conversion in China. The data set of large and medium-size enterprises that we use in this data set is described in Section 4. In Section 5, so that a priori we might anticipate the direction of the performance effect of enterprise conversion, we estimate differences in performance across established ownership categories. Section 6 outlines our research methodology, while Section 7 summarizes the estimation results. Section 8 compares the performance of converted and non-converted enterprises within our sample. Section 9 concludes.

2. Ownership reform in China

The reform of China's enterprise system has generally proceeded along four tracks. The first is the entry of new non-state enterprises. The second is the reform of incentive structures within established systems of public ownership, such as strengthening incentives through the contract responsibility system. The third avenue of reform is the outright conversion of enterprises, usually from state or collective ownership to some other formal ownership classification. Finally, irrespective of changes in incentive structures and formal ownership classifications, enterprises may experience substantial changes in their structure of asset ownership. In practice, in a significant number of state-owned enterprises, the state owns a minority of the assets.

New entry. Until the mid-1990s the principal avenue of ownership reform in Chinese industry was the entry of new firms. The sheer number of newly formed individual-owned enterprises (*getihu*) dominated the population of new entries. Since the classification of individual household enterprises includes only those with eight or fewer employees, the contribution of these enterprises to total industrial sales is necessarily limited. Nonetheless, as a competitive prod to established state and collective-owned enterprise, a source of firms that grow and enter the formal accounting system, and a laboratory for entrepreneurial talent, these enterprises play important roles – direct and indirect – in motivating the reform of China's enterprise system. The second principal source of new enterprise formation has been foreign investment, both from investors in Hong Kong, Taiwan, and Macao (HKT) and overseas, primarily OECD countries. By 2001, among enterprises with annual sales in excess of 5 million yuan, the number of foreign invested enterprises (FIE) of 31,423 exceeded the counterpart total for collective-owned enterprises. Because many of China's FIEs result from the conversion of domestic enterprises, the FIE phenomenon should not be characterized purely as new entry. Nonetheless, whether joint ventures or wholly-owned FIEs, the entry of foreign direct investment has been critical to this aspect of China's ownership reform.

Reform of control rights. The introduction of the contract responsibility system in the mid-1980s was intended to strengthen and clarify the system of incentives and rewards for SOE managers and workers. Jefferson, Zhang, and Zhao (1999) and Jefferson, Lu, and Zhao (1999) document the *vertical* reassignment of control rights from government supervisory agencies to enterprises under their jurisdiction and within enterprises the *horizontal* assignment of managerial control rights among manager, workers' councils, and party secretaries.

The restructuring of state-owned enterprises without formal ownership conversion has met with limited success. McMillan and Naughton (1992) find that managers responded to expanded autonomy, including greater profit retention, by strengthening worker discipline, increasing the proportion of workers' income paid in the form of bonuses, and raising the fraction of workers on fixed term contracts. However, while most studies documented efficiency gains in the state sector, productivity in state industry was generally not only lower than that of other ownership categories but also grew more slowly.² The continuing decline in SOE profitability also resulted from the rapid influx of domestic enterprises and foreign investment, which, in most industries, greatly heightened competition, thereby eroding the monopoly rents that had been enjoyed by many SOEs during the pre- and early reform periods.

In the mid-1990s, the persistently lagging performance of the state sector led to several policy initiatives, which served to accelerate the restructuring of the SOEs. The first of these was a substantial reduction in SOE employment resulting from the furlough policy (*xiagang*), introduced in 1996. By the end of the decade, approximately 6 million of 44 million workers in the industrial SOE workforce had been laid off (Rawski, 2002). During the late 1990s, two policies – the shareholding experiment and “releasing the small...” – shifted the locus of enterprise reform to the formal conversion of both state and collective enterprises.

Conversion. The introduction of the shareholding experiment in 1993 initiated a process of broad-based reform involving the conversion of SOEs and COEs to shareholding enterprise status. In 1997, the Chinese Communist Party's 15th Party Congress made the joint stock system a centerpiece of economic restructuring. While formal privatization was ruled out for ideological reasons, the shareholding experiment was widely viewed as a covert mandate for privatization (Li, Li, and Zhang, 2000, p. 269). Also in the later half of the Nineties, China's leadership committed the country to a massive restructuring program under the slogan “seize the large, release the small” (*juada fangxiao*), which, in principle, allowed for converting all but the largest 300 or so SOEs. In that year, Premier Zhu Rongji put China's loss-making SOEs on a strict three-year schedule during which they were instructed to implement a “modern enterprise system” and convert losses to surpluses. The principal response to these mandates was a rapid acceleration in the number of conversions across both China's state and collective sectors. From 1997 to 2001, the number of registered state owned enterprises declined by nearly one half. According to Fan Gang (2002), “preliminary provincial data indicate that in some regions more than 70 percent of small SOEs have been privatized or restructured” (p. 3). This

² See Jefferson, Rawski, Li, and Zhang (2000).

conversion of state-owned enterprises was not limited to small-size enterprises. During the 1997-2001 period, the number of large and medium-size SOEs declined from 14,811 to 8,675, while the number of large and medium-size shareholding enterprises mushroomed from 1,801 to 5,659.

Furthermore, the conversion process extended to collective-owned enterprises, including the township and village enterprise sector that had earlier been celebrated for its competitive performance (Weitzman and Xu, 1994). In 2000, Li and Rozelle reported that the privatization of rural industry had been “deep and fundamental.” They found that “more than 50 percent of local government-owned firms have transferred their shares to the private sector, partially or completely.” This process of conversion has been extensive even among the largest, most successful collective-owned enterprises. During 1998 to 2001, the number of large and medium-size COEs declined by 35 percent from 3,613 in 1998 to 2,465 in 2001.

Asset structure. One might expect a substantial association between formal ownership classification and the ownership structure of the assets. In China’s enterprise sector, this association is quite loose. Our data set of large and medium-size enterprises shows, for example, that in 1999, for 1,417 of the approximately 11,000 state-owned enterprises, the state held a minority of the assets. Conversely, among the 11,550 non-state enterprises, in approximately 1,935 enterprises the state owned a majority of the assets. This condition represents the tendency over the past 15 years for China’s state-owned assets, previously concentrated in the state-owned sector, to migrate beyond the state sector as state-owned enterprises have increasingly been converted to other ownership classifications. The question that arises from this analysis is: In light of the increasingly weak correspondence between formal ownership classifications and asset structure, how meaningful is either of these in explaining differences in firm performance? We examine this issue later in the paper.

3. Literature review and comparative perspective

Our review of the literature spans two types of studies. The first set of studies consists of three broad literature reviews of privatization and enterprise restructuring. Because of the relative emphasis on privatization in Eastern Europe and the CIS, these reviews focus largely on the restructuring experiences of these regions. We use these reviews to identify broad conclusions and lessons to be drawn from enterprise reform across the full set of transition economies. The second set of studies on which we focus is the research that evaluates enterprise restructuring in China.

Reviews of the literature on privatization and restructuring. The literature on privatization includes three remarkably comprehensive reviews of the privatization experience in transition and developing economies. These are Megginson and Netter (“From State to Market: A Survey of Empirical Studies on Privatization,” 2001), Birdsall and Nellis, “Winners and Losers: Assessing the Distributional Impact of Privatization,” 2002), and Djankov and Murrell, “Enterprise Restructuring in Transition,” 2002). In each of these reviews, we identify the salient findings.

Meggison and Netter (2001) present a comprehensive review of 12 studies of the impact of privatization in the transition economies of Central and Eastern Europe and six studies from Russia and the former Soviet Republics. Their study also includes salient privatization episodes in OECD and non-transition developing economies. Key conclusions from this sample of privatization experience include (i) privatization improves firm-level performance, (ii) concentrated private ownership, foreign ownership, and majority outside ownership are associated with significantly greater improvement than the alternatives, and (iii) the impact of privatization on employment is ambiguous, since employment falls for virtually all firms in transition economies

Most of these studies largely limit their scope to productivity, profitability, and occasionally employment. None of these studies examines impacts on a broad range of stakeholders. Among those reviewed by Meggison and Netter, the study by La Prota and Lopez-de-Silanes (1999) of the privatization of 218 Mexican SOEs spans the widest range of performance impacts. According to the authors, as a result of privatization, the output of privatized firms increased by 54.3 percent, and employment declined by half, although wages for remaining workers increased. Firms achieved a 24 percent increase in operating profitability, eliminating the need for subsidies equal to 12.7 percent of GDP. Higher product prices explain 5 percent of improvement, transfers from laid off workers explain 31 percent, and incentive-related productivity gains account for the remaining 64 percent.

Djankov and Murrell (2002) draw on more than 100 studies of enterprise restructuring in transition economies. Their study is distinctive in its attempt to synthesize the studies into composite rankings of the effectiveness of various privatization strategies and outcomes. Like Meggison and Netter, Djankov and Murrell find that state ownership within traditional state firms is less effective than all other ownership types. Privatization to outsiders is associated with the largest restructuring gains; furthermore, privatization to workers has no effect in Eastern Europe and is detrimental in the CIS. Privatization to outsiders is associated with 50 percent more restructuring than privatization to insiders (managers and workers). Investment funds, foreigners, and other block-holders produce more than ten times as much restructuring as diffuse individual ownership. State ownership within partially privatized firms is surprisingly effective, producing more restructuring than enterprise insiders and non-block-holder outsiders.

Birdsall and Nellis (2002) develop the theme that, by altering the distribution of costs and benefits of ownership, privatization potentially affects a broader range of stakeholders than accounted for in the conventional privatization literature. They find that privatization programs appear to have worsened the distribution of assets and income, at least in the short run. This tendency toward a less equal distribution of assets is more evident in transition economies than in Latin America. Birdsall and Nellis also distinguish distributive effects across industries. They find that the adverse distributional effects of privatization have been less severe for utilities such as electricity and telecommunications, where the poor have tended to benefit from much greater access, than for banks, oil companies, and other natural resource producers.

While the number of China-specific studies included in these three reviews is limited, we are particularly interested in the broad findings based on a comprehensive review of the literature that may have bearing on China's experience with enterprise restructuring. Among these are: (i) the relative effectiveness of outsider privatization, (ii) the effectiveness of state ownership within partially privatized firms, (iii) adverse distributional effects of the privatization of assets, and (iv) ambiguous employment effects.

Review of the research on Chinese enterprise restructuring. A substantial body of research on the determinants and impacts of privatization and restructuring in Chinese industry is just beginning to emerge. We summarize some of the key research results of that literature.

Tian (2001) uses a sample of 826 corporations listed on China's stock market to study the impact of state shareholding on corporate value. Tian discovers a U-shaped relationship between the proportion of government equity and corporate value with higher values for low shares of government equity than for values associated with higher shares of government ownership. He argues that the U-shape reflects the behavior of a government that is maximizing its overall interests. At lower ends of the government's equity ownership share, governments tend to exhibit a "grabbing hand," which induces lower corporate values. As the government's equity share increases, becoming sufficiently large, the government provides "helping hands" thereby increasing overall corporate value.

Li and Rozelle (2000) focus on a sample of 168 township enterprises in Jiangsu and Zhejiang Provinces of which 88 privatized. They find that "transitional costs apparently reduce private firm efficiency in the year that firms are being privatized." However, Li and Rozelle find that two or more years after privatization, private firms produce five to seven percent more with the same inputs. They further surmise that "as privatized firms complete their ownership transition and continue to learn how to adapt to China's business environment that the gains could rise further." An important insight of this study is the importance of adjustment costs in the conversion process, which may result in a lag between conversion and realized benefits.

Dong, Bowles, and Ho (2002) investigate the determinants of employee share ownership in Jiangsu and Shandong provinces. Their analysis shows that the privatization process resulted in a higher concentration of share ownership in management, enterprise managers, and other board members. While regular employees did own shares in 16 of the 39 privatized enterprises in their sample, even in these enterprises, the distribution of these shares was highly skewed towards those who were wealthier, male, local residents, and in managerial positions. Dong finds that the privatization process exhibits an important political dimension in which local leaders sell dominant ownership shares to managers, subject to the leaders' revenue objectives and the wealth constraints of managers. The effect of this pattern of shareholding is to increase the degree of earnings inequality within the enterprise and presumably more broadly in China's rural society.

Dong, Bowles, and Ho (2002) report the impacts of share ownership on employee attitudes in China's rural industries based on their survey in Jiangsu and Shandong Provinces. Their results indicate that, in general, employee shareholders have higher levels of job satisfaction, perceive greater degrees of participation in enterprise decision making, display stronger organizational commitment, and exhibit more positive attitudes towards the privatization process than non-shareholders in privatized firms.

Su and Jefferson (2003) investigate the determinants of ownership conversion in China's large and medium-size enterprises. They find that the probability of ownership conversion increases with the firm's profitability, its productivity, and the intensity of competition faced by the firm. In addition, the lower the following four factors - the price of production factors, the private investor's opportunity cost of buying a Chinese SOE, the equity ratio of the firm, and the cost of privatization - the higher the probability of formal conversion. While theoretically, the impact of firm size on the probability of privatization is ambiguous, the authors find from their empirical work that the probability of conversion falls with firm size. This result is consistent with the government's policy of releasing the smaller firm and retaining the larger firms. The paper confirms the presence of selection bias in the privatization process of Chinese SOEs. In evaluating the effects of ownership and ownership restructuring on firm performances, selection bias needs to be recognized and accounted for in the estimation procedures.

Li, Li, and Zhang (2000) enlarge on the finding of Su and Jefferson regarding the role of competition in driving conversion. According to Li, Li, and Zhang, competition requires local governments to improve the efficiency of SOEs and COEs under their jurisdiction. In particular, they conclude that because the efforts of managers are not verifiable, local governments often respond by granting total or partial residual shares to the managers. By concluding that "intense competition stimulates the rise of a private property system" (p. 269), the authors postulate a certain inevitable quality to the process of privatization in which insider privatization plays an important role.

4. China's Large and Medium-Size Enterprises: The Data Set

The statistical system, which China uses to track its industrial enterprises, consists of three concentric circles, or populations, of enterprises. The largest population consists of a count of all of the enterprises in the industrial system. In 1997, this broad measure included 7.9 million enterprises (NBS, 1998). For this broad collection of enterprises, China's statistical authorities report only skeletal information - generally not more than the number of enterprises and gross industrial output.

The middle circle consists of less than five percent of China's total industrial enterprise population. Prior to 1998, these enterprises consisted of all independent accounting units (*duli hesuan*) at the level of the township or above (*xiang yishang*). As shown in Table 1, the statistical system used to track this middle tier changed in 1998. In that year, China's National Bureau of Statistics (NBS) changed the scope for tracking these middle tier enterprises. The new scope restricts the enterprises to those reporting more than five

million yuan of sales annually. As with the old system, the new system includes all state-owned enterprises regardless of their annual sales. Although this change results in a substantial decline in the number of enterprises – as much as one-third – a comparison of the GVIO data for 1997 and 1998 in Table 1 shows that the coverage measured by output and sales are relatively unchanged. The statistical authorities collect and report a broader set of enterprise measures than for the total enterprise population.

Finally, the inner circle of China’s industrial enterprise system consists of the country’s large and medium-size enterprises (LMEs). As shown in Table 2, in the last year of the old accounting system, these LMEs accounted for approximately 57 percent of the total sales of enterprises with annual sales in excess of 5 million yuan ; during 1998 to 2001, the share of sales represented by LMEs rose from 57.9 percent to 62.4 percent. China’s industrial authorities collect highly detailed information from the approximately 22,000 firms that it classifies as large and medium. These firms and the data they report constitute the database for this study.

This collection of large and medium-size enterprises, whose performance is carefully tracked by China’s NBS, at once includes China’s most successful companies – those that have grown and sustained their status at the pinnacle of China’s industrial enterprise sector – as well as many of its most troubled enterprises. As the focus of decades of central planning and administered allocations of subsidized capital, skilled labor, and raw materials, some of these large and medium-size state-owned enterprises continue to impede China’s transition to an advanced market economy.

During the period covered by our panel of data – 1995-2001 – the NBS changed its system of ownership classification. For the purpose of comparing categories of ownership and tracking ownership reform between 1995 and 2001, we use the concordance shown in Annex I, which aligns the 1998 system of ownership classification with the preexisting system. This aggregation of 23 detailed categories into seven broader categories – state-owned enterprises (SOEs), collective-owned enterprises (COEs), Hong-Kong, Macao, and Taiwan-owned enterprises (HKT), foreign-owned enterprises (FOR), shareholding enterprises (SKT), and other domestic enterprises (OTH) – closely tracks the classification system currently used in the China Statistical Yearbook.³ Using this concordance, we have compiled in Table 3 a description of the changing ownership profile of China’s LME sector.

5. Performance by firms with established ownership

Although this study investigates the consequences of a change in formal ownership structure, we first focus on the question of why ownership classification matters in Chinese industry. To do this, we compare performance across established ownership types. We do this in three ways. The first is to incorporate a set of ownership dummies,

³ The exceptions are that (i) the concordance excludes “individual-owned enterprises” (none of which qualify as large or medium-size enterprises), (ii) it distinguishes between foreign owned and Hong Kong, Macao, and Taiwan-owned enterprises, and (iii) it breaks out private-ownership from the category of “enterprises of other type of ownership.” (NBS, 2000, p. 407).

which enables us to compare directly performance by ownership type. The second approach acknowledges the disparities that sometimes exist between ownership classification and the composition of assets described in Section 2. Our second approach, therefore, is to examine the impact of asset composition – the share of state-owned assets and the combined share of foreign and Hong Kong, Macao, and Taiwan-owned assets – on firm performance. The third approach examines the combined impact on performance of both ownership classification and asset composition.

We perform this comparison for eight performance measures. These are: labor productivity, capital productivity, profitability, employment, wages, taxes paid, new product sales, and R&D intensity. The profitability measure represents the difference between sales revenue and the production costs of sold output. It excludes, therefore, certain taxes, pension payments, welfare subsidies, and other payments that are not directly associated with production.

The results, shown in Tables 4a-c, are reported below and summarized in Table 5:

- Table 4a shows that ownership classifications exhibit a highly significant association with performance. SOEs tend to report lower labor and capital productivity and wages. We also find that SOEs exhibit higher profitability than all the other classifications with the exception of the collective and shareholding sectors. While lower (average) wages in SOEs may explain a tendency for sales profits in SOEs to be higher, Table 4a also shows that employment and taxes are higher in SOEs than for other ownership classifications. The tendency for SOEs to operate in less competitive industries may also explain the relative profit advantage of SOEs.
- Table 4b reports the estimation results for the impact on performance of asset composition alone. We construct two measures of asset shares – those for state (STATE) and assets originating from Hong Kong, Macao, and Taiwan (HKT) and foreign sources (FOR). The omitted third category of assets is other domestic assets, whose impact on the performance measures is represented by the constant in each of the equations. The coefficients on STATE and FOR/HKT should therefore be interpreted in relation to the magnitudes shown in the constants. Our results show that the share of state-owned assets (STATE) impacts negatively on labor and capital productivity and on wages; conversely STATE is positively associated with profitability, employment, new products and R&D expenditures. The FOR/HKT asset share exhibits a pattern, which is virtually the inverse of the STATE asset shares. FOR/HKT is positively associated with labor and capital productivity and wages. Conversely, FOR/HKT is strongly associated with profitability, employment, taxes, new product sales, and R&D intensity.
- Table 4c includes estimates of the performance impact of both ownership classification and asset composition. Since our interest in this paper is on a comparison of the state-owned and shareholding sectors, we focus on these. Relative to Table 4a, which include only the ownership classifications, we can see in Table 4c that most of the t-statistics on STATE decline significantly. For

employment, the sign changes. We conclude that the consequences of shareholding ownership for performance depend substantially on the asset composition of the enterprise.

Overall, the results in Tables 4a-c demonstrate the explanatory powers of both ownership classification and asset shares. This conclusion is based on the fact that the adjusted R-square values for all eight performance equations that include both classification and asset share are larger than the adjusted R-squares reported for the ownership classification and asset share equations separately. This result underscores the importance of distinguishing between the impact of a change in ownership classification and a change of asset composition on enterprise performance.

While Tables 4a-c provide a useful perspective on performance differences across different ownership types, this analysis may be of limited predictive value regarding the impact of a given firm changing its ownership status from say state-ownership to shareholding status or for a state-owned firm substantially increasing the share of non-state assets in its ownership structure. This ambiguity is true for the following reasons:

- Selection bias. The quality of the converted firms may reflect selection bias, that is, in the case of converted SOEs, the firms that are chosen for conversion may not be typical of the existing population of SOEs. This is the finding made by Su and Jefferson. The important consequence of this finding is that, if relative to the average, converted SOEs are say high-quality SOEs, then following a period after the conversion, any measured quality advantage of the converted SOEs may reflect selection bias rather than the salutary consequences of conversion.
- Adjustment costs. Following the conversion, time may be required to adjust to new governance arrangements and achieve efficiency improvements associated with changes in the firm's labor force, asset composition, and product mix. This condition appears to be reflected in the findings of Li and Rozelle (2000), who find evidence of "transitional costs" in their investigation of the privatization of rural collectives.

We formally test for selection bias but can only speculate on the importance of transition costs.

6. Impact of conversion on enterprise performance: research methodology

Our research method for analyzing the performance impact of the conversion of SOEs and COEs to shareholding enterprises is as follows:

1. Create a sample. Our sample consists of a balanced sample of SOEs and COEs. To be included in the sample a firm must report data for the year prior to its conversion (i.e. $t-1$), as well as in 2001. Within the sample, conversions years are $t=1996, 1997, 1998, \text{ and } 1999$. Because the proximity of 2000 to 2001 is likely to diminish the

realized impact of conversion, we exclude firms that were converted in 2000. We also eliminate enterprises that report multiple conversions, i.e. those that convert from SOE or COE to STK and then again convert to some other ownership type. Finally, we eliminate firms that report implausible figures for key variables, such as zero or negative sales or fixed capital stock.

2. Identify the relevant set of performance variables. The study examines the impact of conversion and asset ownership change on eight performance measures. These are: labor productivity, capital productivity, profitability, employment, wages, taxes paid, new product sales, and R&D intensity. For each of our performance measures, we compare for converted vs. non-converted enterprises their levels of performance in 2001 controlling for performance levels in t-1, the year prior to conversion.
3. Estimate the independent contributions of four factors to the eight performance measures. These four factors are: (i) the independent effect of conversion, holding the firm's asset structure fixed, (ii) a reduction in the share of state-owned assets, controlling for the firm's formal ownership classification, (iii) an increase in the share of state-owned (legal persons) asset structure, and (iv) the unexplained part.
4. Examine the impact of conversion on the firm's ability to attract non-state investment and thereby lower the state's ownership share of the firm's assets. This set of estimates is critical, since the total impact of conversion includes both its direct impacts as well as the impact of a change in asset composition, which itself may be affected by formal ownership conversion.
5. Identify the characteristics that raise the likelihood of an SOE or COE being selected for conversion. That is, we investigate the extent to which converted firms tend to be associated with one or more of the performance measures in t-1, the date preceding the conversion.

The formal model. Our formal estimation model assumes that ownership reform affects the performance of the firm according to the following process:

$$\ln Z_{j,01} = \alpha_0 + \alpha_1 \text{STK}_t + \alpha_2 \Delta \ln \text{ST_SH}_{t-1 \text{ to } 01} + \alpha_3 \text{DSTA_LP}_{t-1 \text{ to } 01} + \alpha_4 \ln Z_{j,t-1} + \varepsilon_1. \quad (1)$$

In equation (1), we examine the impact of conversion on a vector of performance measures (i.e. $Z_{j,01}$) where j spans the set of eight performance measures (i.e. $j = 1 \dots 8$). Equation (1) attributes the performance of the converted enterprises to five sources. The first of these, represented by $\alpha_4 \ln Z_{j,t-1}$, is the initial performance level of the enterprises in the year prior to conversion. Controlling for the initial performance level, the four other variables that affect the firm's performance in 2001 are: (i) the direct impact of conversion (i.e. $\alpha_1 \text{STK}_t$), (ii) the decline in the share of state-owned assets (i.e. $\alpha_2 \Delta \ln \text{ST_SH}_{t-1 \text{ to } 01}$), (iii) an increase in the measured share of assets owned by the state's ownership share (i.e. $\alpha_3 \text{DST_LP}_{t-1 \text{ to } 01}$), and (v) the residual or unexplained portion (i.e. ε_1).

In equation (1), $\Delta \ln ST_SH_{t-1 \text{ to } 01}$ is defined as $(\ln ST_SH_{01} - \ln ST_SH_{t-1})$, where ST_SR is the ratio of state-owned assets to total assets and occupies the range $0 < ST_SR \leq 1$. $DSTA_LP_{t-1 \text{ to } 01}$ is a dummy variable, which assumes the value of one if the share of state-owned assets (i.e. ST_SR) increased subsequent to conversion and zero otherwise. This dummy variable is intended to identify the direction of impact of change in the ownership structure that entails increases in state asset shares. By including the dummy, we are allowing that increases and decreases in state asset shares are may not exhibit symmetric effects.

Using equation (2), we also measure the impact of conversion on the tendency for asset composition to change. Since the total effect of conversion includes its impact on the firm's asset ownership share, an assessment of the total impact of conversion requires an estimate of the coefficient β_1 .

$$\Delta \ln Z_{j,t-1 \text{ to } 01} = \beta_0 + \beta_1 STK_t + \varepsilon_2 \quad (2)$$

We use the estimation results from Equations (1) and (2) to estimate the total effect on firm performance of a conversion from a SOE to a STK enterprise. We accomplish this by subtracting the initial performance level ($\ln Z_{j,t-1}$) from both side of equation (1), so that the coefficient on $\ln Z_{j,t-1}$ is transformed from α_4 to $(\alpha_4 - 1)$. Defining $\ln Z_{j,01} - \ln Z_{j,t-1}$ as $\Delta \ln Z_{j,t-1 \text{ to } 01}$, we represent the total effect of conversion as:

$$\partial \Delta \ln Z_{j,t-1 \text{ to } 01} / \partial STK_t = \text{direct conversion effect} + \text{asset adjustment effect} \quad (3)$$

Substituting equation (2) into equation (1), transposing the level performance variable into a change variable as described above, and computing the derivative as shown on the left hand side of equation (3), we obtain:

$$\partial \Delta \ln Z_{j,t-1 \text{ to } 01} / \partial STK_t = \alpha_1 + \alpha_2 \beta_1 \quad (4)$$

We can also use our estimation results to construct a ratio of the performance measure for converted enterprises (CON) relative to non-converted enterprises (NCON). This is shown as:

$$[\Delta \ln Z_{j,t-1 \text{ to } 01}]^{\text{CON}} / [\Delta \ln Z_{j,t-1 \text{ to } 01}]^{\text{NCON}} = \alpha_1 STK + \alpha_2 STK * \ln ST_SH_{t-1 \text{ to } 01}. \quad (5)$$

For outcomes in which this ratio shown on the left side of equation (5) differs from unity, we conclude that conversion has affected the performance of the j^{th} performance measure.

7. Estimation results

Tables 7a and 7b provide a profile of the conversions of SOEs and COEs to shareholding enterprises. Table 7a shows that over the period 1996-2001 the data identify a total of 3,036 conversions of state-owned enterprises. Among these, 2,265, i.e. 75 percent, entailed conversions of SOEs to shareholding enterprises. The lower panel identifies the number of enterprises that report a single conversion, for which the key data are

continuously available during 1995-2000, and for which the data observations are plausible. Within our sample, 404 enterprises satisfy these criteria. Since we do not include conversions that were reported in the year 2000, our effective sample size for the SOE conversions is 258. The 3,568 SOEs that were not converted constitute the control part of the sample that allows us to identify the independent impact of conversion. For the collectives, Table 7b shows that among the 1,614 reported conversions, 970 were conversions of COEs to shareholding enterprises. Among these, 103 enterprises satisfy the criteria for continuous data, a single conversion, and plausible data. The unconverted subset consists of 858 COEs.

Sample selection bias. Before estimating the conversion equations, equations (1) and (2) above, we identify the characteristics of enterprises that are drawn for conversion from the population of SOEs and COEs. These results are shown in Table 7. Our principal findings are that, relative to the unconverted SOEs, the firms that are selected for conversion exhibit relatively high levels of capital productivity and profitability. They also exhibit relatively low levels of employment and relatively high tax burdens. Unlike the converted SOEs, the COEs that are selected for conversion appear not to exhibit characteristics that distinguish them from the underlying population of COEs.

Note that equation (5) computes rates of change in the performance levels, not the ex post (2001) performance levels. As such, we control for selection biases, which are likely to be embedded in comparisons of performance levels but not their rates of change.

Estimates of the conversion equations. We report the results of estimates for our two samples in Table 8. Table 8a reports estimates for our pooled subsamples of converted and unconverted SOEs.; Table 8b reports estimate for the same period for the pooled subsample of collective-owned enterprises. We summarize our estimation results below:

SOE conversions. Estimates of the impact of SOE conversions on enterprise performance are reported in Table 8a and summarized in the left-hand column of Table 9.

Direct impact of conversion. Absent changes in asset structure, the effects of the conversion of SOEs to shareholding enterprises include increases in capital productivity, employment, and R&D intensity. Wages decline. One notable impact of conversion is the increase in employment relative to our sample of unconverted SOEs.. A possible explanation of this outcome is that conversions during 1996-1999 took place during a period when furloughs of workers (i.e. *xiagang*) were widespread within the state sector. Efforts to obtain approval from public authorities to convert state-owned enterprises to shareholding enterprises may have included negotiations and agreements with workers, a key stakeholder in the conversion process, that layoffs would be avoided or limited. The finding that conversion by itself also tends to be associated with downward wage adjustments suggests that the quid pro quo for the retention of workers was wage reductions or slower wage growth.

Impact of a reduction in the state's asset share. A reduction in the state's asset share over the period from the year prior to conversion (i.e. t-1) to 2001 is significantly

associated with rising labor and capital productivity. Paradoxically, notwithstanding the rise in labor and capital productivity, profitability is relatively unaffected by a declining state asset share. This paradox of rising productivity and stable profitability may partially be explained by the robust increase in wages associated with declining state asset shares. While some of this rise in the average wage is offset by declining employment, the elasticity of wage increase with respect to a 10 percent decline in state asset share (0.25%) is somewhat larger than the associated decline in employment (0.02%). Moreover, the magnitude of the wage elasticity is approximately equal to and of the opposite sign relative to the magnitudes of the estimates for labor and capital productivity. Hence for both employment and wages, the induced impacts of conversion associated with declining state asset shares tend to run contrary to the direct impact of conversion. Reductions in the share of non-state assets is also associated with both a rise in R&D intensity and new product sales, which may auger relative productivity gains for the converted shareholding enterprises.

Impact of an increase in state asset share. Some enterprises experience increases in the share of state-owned assets over the period t-1 to 2001. These increases generally result from an increase in shares owned by state-owned legal persons (*faren*). The inclusion of a dummy variable for these cases of increase allows us to check whether increases and decreases in state-owned asset shares exhibit symmetric, but opposite, impacts on enterprises performance. We find that increases in asset shares of state legal persons are associated with a weakly significant increase in labor productivity, lower profits and somewhat higher new product sales.

COE conversions. Table 8b reports the estimation results for the sample of COEs; the results are summarized in Table 9.

Impact of conversion. Conversion of COEs to shareholding enterprises accelerates the growth of capital productivity and weakly improves profitability. Similar to converted SOEs, we find that a consequence of conversion is the tendency to retain or add employment relative to the unconverted sample. Again, this outcome may be a reflection of the interest of workers and local leaders to stem layoffs or increase jobs, Relative to non-converted COEs, new product sales rise. None of the other performance measures is significantly affected by the independent effect of conversion.

Impact of a reduction in the state's asset share. For collective-owned enterprises, the reduction in the state's asset share has no highly significant impacts on firm performance. This outcome is unsurprising, since the share of state ownership in COEs is relatively low.

Impact of an increase in the state's asset share. An increase in the state's legal person asset share appears to have no impact on any of the eight performance measures.

The impact of conversion on asset structure. Since our conversion estimates shown in Tables 8a and 8b demonstrate the important role of the induced effects of changes in asset structure, we test the implications of conversion for changes in asset structure.

Table 10 shows that converted SOEs are significantly more able than unconverted SOEs to attract non-state investment and therefore reduce their share of state owned assets. As shown in Table 11, the ratio of state asset shares falls considerably faster in converted SOEs than it does during a comparable period for non-converted enterprises. While Table 11 indicates that, on average, converted COEs reduce the state shares in their asset structures by more than unconverted COEs, the result in the right hand column of Table 10 indicates that this difference is not statistically significant.

The issue of endogeneity. Before we settle on these results, we need to address the issue of potential endogeneity bias in the estimates of Equation (1). In Section 6, we explained that the estimation equation could be reformulated with $\Delta \ln Z_{j,t-1 \text{ to } 01}$ as the dependent variable. Since both the dependent variable $\Delta \ln Z_{j,t-1 \text{ to } 01}$ and the right hand side variable $\Delta \ln ST_SH_{t-1 \text{ to } 01}$ span the same time frame, t-1 to 2001, causality may not only proceed from change in asset structure to performance, it may also run from performance to change in asset structure. For example, an enterprise that exhibits an unusually high level of capital productivity in 2001, controlling for its level in t-1, may reasonably attract more than the usual level of new investment. If such endogeneity does exist, its effect will likely be to cause an upward bias in estimates of the coefficients on the variable $\Delta \ln ST_SH_{t-1 \text{ to } 01}$, which will result in our assigning too much importance to the impact of declining shares of state asset ownership.

In principle, we can use one of two approaches to address the problem of simultaneity bias. The first is to create an instrumental variable for $\Delta \ln ST_SH_{t-1 \text{ to } 01}$. We attempted this without success.⁴ The second approach is to create a lag structure between the dependent and independent variables. This approach can be justified if we expect the variable $\Delta \ln ST_SH_{t-1}$ to act on the dependent variable $\Delta \ln Z_{j,t-1 \text{ to } 01}$ with a lag. While in principle, a lag structure can lead to as robust, or an even more robust, relationship than the contemporaneous form, it has the advantage of reducing the likelihood that the dependent variable, which is moved toward the future, can effectively influence the quasi-historical pattern of investment. Specifically, by introducing substituting $\Delta \ln ST_SH_{t-2 \text{ to } 00}$ for the t-1 to 2001 variable, we might still anticipate that investment will drive firm performance, while at the same time curtailing the potential for simultaneity bias, i.e. the impact of performance on the firm's asset mix.

When we lag the asset ownership variable by one year, we find change. The most notable is that whereas in Table 8a, the coefficient on the asset variable in the capital productivity equation is quite robust, when we lag the asset variable one period, the coefficient on asset mix becomes insignificant, while that asset mix coefficient in the profit equation turns more significant. The remaining estimates retain levels of statistical significance that are comparable to those reported using the original contemporaneous time structure. That estimates of the coefficient on lagged values of $\Delta \ln ST_SH_{t-1 \text{ to } 01}$ in the capital productivity equation turn insignificant suggest that investment behavior may be particularly sensitive to capital productivity. None of the other estimates is nearly as

⁴ We attempted a variety of IVs, for $\Delta \ln Z_{j,t-1 \text{ to } 01}$, but none of the IV's reported an adjusted R-square in excess of 0.06.

sensitive to this indirect test of endogeneity, i.e. introducing a lag structure, as is the capital productivity equation.⁵

8. Comparisons of converted and non-converted enterprises

For the purpose of comparing the performance of converted and non-converted enterprises, we compute three sets of measures. These are the predicted annual rates of growth for each of the performance measures during t-1 to 2001, the actual growth rates for each of the measures over this period, and the relative levels of each of the performance measures in 2001. These results are shown in Table 12. We then compare the converted shareholding enterprises with the established shareholding enterprises, whose performance levels relative to SOEs (represented by the constant) are shown in Table 4a. We investigate the question of whether conversion to shareholding enterprise status is causing the former SOEs to look more like established shareholding enterprises.

Converted versus non-converted SOEs and COEs. We first focus on the state-owned sector. Table 12 shows that relative to the unconverted SOEs, the converted SOEs exhibit actual rates of labor productivity growth that are marginally lower than those reported for the unconverted SOEs. Conversely, capital productivity rises nearly four times as fast among converted enterprises. These opposite effects may reflect, in some measure, the tendency of converted SOEs to pare their workforces more slowly than unconverted SOEs, thereby slowing the growth of labor productivity and adding more workers to the firm's capital stock.

Both converted and non-converted enterprises exhibit declining profitability, but the decline is relatively more rapid among converted enterprises than non-converted enterprises. Converted SOEs therefore lose some of their profit advantage relative to non-converted SOEs at the time of their conversion. Whereas a slower attrition of employment and growing R&D budgets may explain some of this relative profit decline, slower wage growth and a lessened tax burden should work to the advantage of the converted enterprises.

In Table 12, we see in 2001, that relative to non-converted enterprises, converted enterprises enjoy higher labor and capital productivity, profit, and R&D intensity. Employment and wages – hence the wage bill – are lower in converted enterprises. A portion of the capital productivity advantage of converted enterprises can be attributed to initial selection bias, however, Table 12 shows that grows more robustly in the converted enterprises. The results are different for the profitability advantage of converted enterprises. Since Table 10 shows that profitability declines more rapidly in the converted enterprises, the 2001 productivity advantage enjoyed by converted enterprises

⁵ When we lag the independent variable, $\Delta \ln ST_SH_{t-1 to 01}$, the number of observations drops to approximately 9,000 from the larger sample number of observations of 13,243. This causes some of the estimated coefficients to change relative to those obtained from the larger sample. We therefore attempt the estimation with the smaller sample and without the lag. The results with and without the lag are similar; the difference in estimates seems to arise from the use of the lag structure to limit the effect of endogeneity.

must arise, as shown in Table 7, from the selection of SOEs that are relatively more profitable. While firms with relatively small employment levels are chosen for conversion, the lower 2001 employment levels for shareholding enterprises shown in Table 12 are, since employment attrition is slower in the converted enterprises, due to initial selection bias.

The comparison of converted and non-converted COEs yields outcomes that differ from their SOE counterparts. For COEs, converted enterprises exhibit faster paced labor productivity growth as well as faster growth of capital productivity. Consistent with these productivity differences, profits decline more slowly for the converted enterprises. Employment growth also declines more slowly for COEs, while wage growth for the two sets of firms is virtually indistinguishable. Also, taxes rise more quickly for COEs, new product sales decline more slowly, and R&D spending stagnates for the converted enterprises while it rises for their non-converted counterparts.

9. Conclusions

China's shareholding experiment appears to be having widespread, if not yet dramatic, effects on the performance of publicly owned enterprises, particularly converted state-owned enterprises. The impact of conversion affects enterprise performance through two channels – the direct impact of conversion and the indirect effect, which is to accelerate the non-state assets and reduction in state control. Our findings include the following.

SOEs that are selected for conversion to shareholding enterprises tend to exhibit higher capital productivity and profitability and lower wages and smaller workforces than unconverted SOEs. They also pay higher taxes.

In some areas, the performance impacts of conversion and associated decline in state asset ownership operate in the same direction. This is the case for labor and capital productivity and R&D intensity. Conversely, the impacts of conversion and change in asset structure operate on employment and wages in different directions, with the long-run impact, associated with changing asset structure, seeming to favor lower employment and higher wages.

While the direct impact of conversion for COEs are favorable for capital productivity, profitability, employment, and new product sales, with little state capital to start with, reductions in state asset shares exhibit negligible impact on COEs. Further research should examine the separate impact of change in foreign direct investment on the impact of converted collective-owned enterprises.

Once converted, shareholding enterprises exhibit a larger fall in their share of state-owned assets than do the unconverted SOEs. They apparently attract more non-state investment than do their counterparts. This induced decline in state asset ownership is an important consequence of the conversion of SOEs to shareholding enterprises.

Among SOEs and shareholding firms in which the state's asset share rises, we find no pattern of diminished performance. This result is consistent with Tian's finding in which the government provides "helping hands" in order to increase corporate value.

While the studies that we reviewed were unable to isolate the employment effect of conversion, since most firms suffer employment losses, we are able to identify the employment effect. We find that the direct conversion impact on employment is positive – possibly a condition of conversion – whereas the induced reduction in state-owned asset shares tend to lead to labor shedding.

Some of the higher capital productivity and lower employment observed in converted SOEs can be attributed to selection bias. However, the magnitude of the differences in capital productivity between converted and unconverted enterprises is clearly magnified by conversion, whereas the relatively low levels of employment observed in SOEs that are selected for conversion are offset through the impacts of conversion.

Overall, our findings do not conflict with those that we identify in the literature. None of our findings is inconsistent and several tend to reinforce those found in the literature. Conversion generally exhibits a positive impact on the efficiency of converted state-owned enterprises. We may wish to distinguish between the effects of an increase in the relative share of non-state domestic assets and foreign-owned assets. While reductions in the state's asset share contribute to efficiency gains, these are being realized at relatively high overall levels of state asset ownership: 52 percent in 2001.

Table 1
Change in ownership distribution
of industrial enterprises (%)

Measure	Old accounting system ¹				New accounting system ²	
	1980 ³	1985	1994	1997	1998	2001
State-owned	62,437	69834	85334	84397	64737	46767
Collective-owned	263,378	300687	342908	319438	47745	31018
H.K, Macao, Taiwan	-	-	16388	23020	15725	18257
Foreign	-	-	12713	19861	10717	13166
Shareholding	-	-	4359	3898	11411	24648
Private	-	-	3898	13188	10667	36218
Other domestic	-	1522	627	1356	224	321
Total in the system	326,160	372,043	465,239	468,506	165,080	171,256
Total GVIO (billion yuan)	471	839	5,135	6,835	6,774	9,545
Individual enterprises	-	-	8,007,400	5,974,700	-	-
National total	377,066	463,210	10,017,100	7,922,900	7,974,600	-
Total GVIO (billion yuan)	490	972	7,018	11,373	11,905	-

¹ Includes all industrial enterprises that operate as independent accounting units at or above the township level.

² Includes all state-owned enterprises plus non-state enterprises that report annual sales in excess of 5 million yuan.

³NBS (1998).

Table 2
Shares of LMEs in aggregate industry (%)

Measure	Old accounting system ¹		New Accounting system ²	
	1994	1997	1998	2001
Sales	58.2	57.4	57.9	62.4
Employment	43.5	47.4	55.1	51.1
Assets	65.5	65.9	69.9	69.2
# of enterprises	4.4	5.1	14.2	13.4

¹ Includes all industrial enterprises that operate as independent accounting units at or above the township level.

² Includes all industrial enterprises that report annual sales in excess of 5 million yuan.

Table 3
LME ownership distribution [%]

Ownership type	1994		2001	
State-owned	15,533	[67.9]	8675	[37.9]
Collective-owned	4,068	[17.8]	2465	[10.8]
Hong-Kong, Macao, Taiwan	967	[4.2]	2271	[9.9]
Foreign	1,041	[4.6]	2675	[11.7]
Shareholding	961	[4.2]	5659	[24.7]
Private	7	[0.0]	984	[4.3]
Other domestic	293	[1.3]	149	[0.7]
Total	22,870	[100.0]	22878	[100.0]

Table 4a
Comparison by ownership type only
(panel, 1996-2001)

Variable	VA/L	VA/K	Profit/ sales	Employ- ment	Wages (average)	Taxes/ sales	New prod/sales	R&D exp/sales
Constant	0.659 (45.607)	0.659 (45.607)	-2.369 (273.692)	7.108 (776.069)	1.605 (251.415)	-4.889 (398.462)	-13.443 (174.883)	-17.427 (267.528)
K/L	0.459 (153.335)	-0.541 (180.615)	-	-	-	-	-	-
COE	0.597 (72.284)	0.597 (72.284)	0.067 (9.917)	-0.553 (75.731)	0.007 (1.436)	0.050 (5.137)	-1.845 (-30.087)	-1.385 (26.647)
FOR	1.102 (95.535)	1.102 (95.535)	-0.031 (3.373)	-0.876 (90.211)	0.913 (134.861)	-0.927 (68.361)	-3.245 (-39.840)	-2.565 (37.162)
GAT	0.901 (74.334)	0.901 (74.334)	-0.150 (15.139)	-0.802 (76.584)	0.621 (85.039)	-0.972 (65.816)	-2.706 (30.797)	-1.514 (20.335)
OTH	0.455 (16.632)	0.455 (16.632)	-0.093 (4.101)	-0.562 (23.268)	0.254 (15.048)	-0.155 (4.838)	-1.100 (5.425)	-1.475 (8.581)
PRI	0.846 (34.663)	0.846 (34.663)	-0.219 (10.968)	-0.821 (37.988)	0.141 (9.388)	0.043 (1.490)	-2.739 (15.104)	-1.490 (9.695)
STK	0.602 (68.646)	0.602 (68.646)	0.054 (7.536)	-0.124 (16.083)	0.177 (32.836)	0.252 (24.610)	0.088 (1.361)	0.354 (6.433)
IND	yes	yes	yes	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes	yes	yes	yes
Adj. R-sq (obs)	0.375 (138843)	0.262 (138843)	0.098 (12.5611)	0.249 (138843)	0.231 (138843)	0.238 (133064)	0.176 (138843)	0.088 (138843)

Table 4b
Comparison by asset composition only

Variable	VA/L	VA/K	Profit/ sales	Employ- ment	Wage (average)	Taxes/ sales	New prod/sales	R&D exp/sales
Constant	1.279 (60.905)	1.279 (60.905)	-2.273 (169.920)	7.004 (481.074)	2.004 (203.266)	-5.756 (294.064)	-13.930 (116.022)	-19.551 (193.317)
K/L	0.574 (162.856)	-0.426 (120.759)	-	-	-	-	-	-
STATE asset share	-0.077 (68.632)	-0.077 (68.632)	0.006 (6.540)	0.070 (67.315)	-0.019 (27.217)	0.001 (0.745)	0.169 (19.864)	0.160 (22.232)
FOR/HKT asset share	0.088 (57.535)	0.088 (57.535)	-0.003 (2.112)	-0.039 (29.498)	0.094 (104.158)	-0.138 (75.499)	-0.194 (17.638)	-0.203 (21.900)
IND	yes	yes	yes	yes	yes	yes	yes	yes
YEAR	yes	yes	yes	yes	yes	yes	yes	yes
Adj. R-sq (obs)	0.379 96908	0.283 96908	0.101 87820	0.231 96908	0.244 96908	0.226 92718	0.170 96908	0.093 96908

Table 5c
Comparison by ownership classification and asset composition

Variable	VA/L	VA/K	Profit/ sales	Employ- ment	Wages (average)	Taxes/ sales	New prod/sales	R&D exp/sales
Constant	1.086 (44.507)	1.086 (44.508)	-2.295 (130.261)	7.697 (402.711)	1.700 (130.869)	-5.214 (203.023)	-11.257 (70.368)	-18.015 (133.412)
K/L	0.580 (164.763)	-0.420 (119.419)		-	-	-	-	-
COE	0.308 (24.005)	0.308 (24.005)	-0.054 (4.983)	-0.335 (28.698)	-0.175 (22.016)	0.110 (7.030)	-1.655 (16.940)	-0.994 (12.046)
FOR	0.563 (26.914)	0.563 (26.914)	0.118 (6.741)	-1.013 (53.505)	0.507 (39.395)	-0.599 (23.211)	-3.958 (24.988)	-2.677 (20.018)
GAT	0.342 (16.404)	0.342 (16.404)	-0.038 (2.161)	-0.902 (47.689)	0.206 (16.025)	-0.659 (25.333)	-3.333 (21.047)	-1.576 (11.789)
OTH	0.315 (9.398)	0.315 (9.398)	-0.065 (2.297)	-0.422 (13.821)	0.146 (7.015)	-0.113 (2.773)	-0.838 (3.282)	-1.240 (5.749)
PRI	0.509 (19.609)	0.509 (19.609)	-0.108 (4.942)	-0.494 (20.919)	-0.129 (8.064)	0.072 (2.268)	-1.901 (9.630)	-1.569 (9.413)
STK	0.428 (40.585)	0.428 (40.585)	0.118 (13.31)	0.017 (1.740)	0.024 (3.662)	0.261 (20.438)	0.401 (4.986)	0.217 (3.203)
STATE asset share	-0.046 (31.394)	-0.046 (31.394)	0.004 (3.257)	0.041 (30.673)	-0.028 (30.674)	0.009 (4.912)	0.044 (3.941)	0.080 (8.461)
FOR/HKT asset share	0.062 (23.786)	0.062 (23.786)	-0.008 (-3.571)	0.062 (26.563)	0.041 (25.782)	-0.05 (-15.71)	0.193 (9.793)	0.022 (1.304)
IND	yes	yes	yes	yes	yes	yes	yes	yes
Time	yes	yes	yes	yes	yes	yes	yes	yes
Adj. R-sq (obs)	0.392 (96908)	0.298 (96908)	0.106 (87820)	0.261 (96908)	0.268 (96908)	0.240 (92718)	0.179 (96908)	0.099 (96908)

Table 5
Ranking by Ownership Classification and Asset Composition
(results from Table 4a)

	VA/L	VA/K	Profit/ sales	Employ- ment	Wages (avg)	Taxes/ sales	New prod/sale	R&D exp/sales
SOE/DOM ¹	0	0	0	0	0	0	0	0
COE	*	*	_*	_*	_*	*	_*	_*
FOR	*	*	*	_*	*	_*	_*	_*
GAT	*	*	_**	_*	*	_*	_*	_*
PRI	*	*	_*	_*	_*	**	_*	_*
STK	*	*	*	***	*	*	*	*
OTH	*	*	_**	_*	*	_*	_*	_*
STATE	_*	_*	*	*	_*	*	*	*
FOR/HKT	*	*	_*	*	*	_*	*	0

¹The constant should be interpreted as the performance level of a state-owned enterprise with domestic assets. *Statistically significant at the 1% level; **Statistically significant at the 5% level; ***statistically significant at the 10% level

**Table 6a
Converted SOEs**

Total population of SOE conversions								
Old	New	1996	1997	1998	1999	2000	2001	Total
SOE	DSOE	12909	13268	11326	9824	8711	6899	62937
SOE	DCOE	16	69	145	64	52	52	398
SOE	DSTK	87	342	546	319	517	454	2265
SOE	DPRV	1	10	31	14	30	36	122
SOE	DFOR	11	15	21	5	5	6	63
SOE	DGAT	3	13	16	14	10	14	70
SOE	DOTH	5	28	40	23	12	10	118
TOTAL		13032	13745	12125	10263	9337	7471	3,036
Conversions for which data are continuously available from 1995-2001								
Old	New	1996	1997	1998	1999	2000	2001	Total
SOE	DSOE	5343	5235	4964	4887	4697	4425	29551
SOE	DCOE	5	17	66	26	18	30	162
SOE	DSTK	31	110	210	110	204	236	901
SOE	DPRV	0	2	8	5	10	19	44
SOE	DFOR	2	4	5	3	2	2	18
SOE	DGAT	0	3	3	6	1	4	17
SOE	DOTH	2	10	18	4	5	5	44
TOTAL		5383	5381	5274	5041	4937	4721	1,186
Conversions for which data are continuously available from 1995-2001, there is only one conversion, and data are plausible								
Old	New	1996	1997	1998	1999	2000	2001	Total (96-99)
SOE	SOE	3484	3413	3225	3170	3107	-	3,569
SOE	SHR	13	48	128	69	146	-	258

**Table 7b
Converted COEs**

Total population of COE conversions								
Old	New	1996	1997	1998	1999	2000	2001	Total
COE	DSOE	37	45	56	27	12	22	199
COE	DCOE	3109	3526	2566	2698	2539	1716	16154
COE	DSTK	35	124	211	157	187	256	970
COE	DPRV	5	8	35	30	73	65	216
COE	DFOR	8	10	18	10	10	11	67
COE	DGAT	6	9	41	15	14	12	97
COE	DOTH	11	12	24	8	4	6	65
TOTAL		3211	3734	2951	2945	2839	2088	1,614
Conversions for which data are continuously available from 1995-2001								
Old	New	1996	1997	1998	1999	2000	2001	Total
COE	DSOE	9	14	21	9	2	12	67
COE	DCOE	1053	1008	924	968	938	834	5725
COE	DSTK	12	44	64	42	49	91	302
COE	DPRV	1	2	7	9	20	26	65
COE	DFOR	3	2	5	4	2	4	20
COE	DGAT	3	1	14	7	3	2	30
COE	DOTH	2	5	7	6	1	1	22
TOTAL		1083	1076	1042	1045	1015	970	506
Conversions for which data are continuously available from 1995-2001, there is only one conversion, and data are plausible								
Old	New	1996	1997	1998	1999	2000	2001	Total
COE	COE	1053	1002	849	787	723	-	858
COE	SHR	3	20	47	23	-	-	103

Table 7
Characteristics of converted enterprises in t-1
(includes conversions for 1996-2000)

	SOE-STK conversions	COE-STK conversions
Constant	0.060 (2.664)	-0.083 (-1.179)
VA/L _{t-1}	-0.004 (-1.303)	-0.001 (-0.248)
VA/K _{t-1}	0.006 (2.516)	0.002 (0.352)
Profit/sales _{t-1}	0.004 (2.382)	0.008 (1.433)
Employment _{t-1}	-0.009 (-3.425)	0.005 (0.712)
Wage _{t-1}	-0.005 (-1.630)	0.002 (0.290)
NP/sales _{t-1}	-0.000 (-0.246)	0.001 (1.444)
RDE/sales _{t-1}	0.000 (0.037)	0.000 (0.468)
Tax payment _{t-1}	0.009 (6.548)	0.002 (0.474)
IND	(+) 27; (-) 6,10,12,16, 23, 44, 46	
Year	(+)1997,1998, 1999,2000	(+)1997,1998, 1999,2000
Region	(-) D1, D2, D4, D5	
Adj R-sq	0.023	0.013
Obs (SHR)	15,552	3,418

Table 8a
All SOE conversions (1996, 1997, 1998, 1999)
lnZ₂₀₀₁

Independent Variable (Z ₂₀₀₁)	VA/ LABOR	VA/ CAPITAL	PROFIT/ SALES	EMPLOY- MENT	WAGES (average)	TAX/ SALES	NP/ SALES	RDE/ SALES
Constant	1.144 (44.427)	-0.135 (7.623)	-1.135 (49.365)	0.187 (6.598)	0.829 (45.703)	-1.341 (37.908)	-7.311 (46.336)	-8.738 (44.659)
STKdummy	0.003 (0.048)	0.149 (2.492)	-0.042 (0.821)	0.023 (3.273)	-0.100 (2.842)	0.022 (0.342)	0.727 (1.546)	0.251 (1.916)
Δ in share state assets, t-1 to 01	-0.032 (6.295)	-0.026 (4.815)	-0.006 (1.199)	0.002 (2.976)	-0.025 (7.904)	0.005 (0.884)	-0.212 (4.996)	-0.118 (2.870)
Dummy for “increase” in state asset share	0.049 (1.712)	0.037 (1.196)	-0.051 (1.948)	-0.002 (0.657)	-0.021 (1.187)	-0.045 (1.406)	0.431 (1.797)	0.174 (0.750)
lnZ _{t-1}	0.714 (94.746)	0.694 (76.819)	0.525 (51.266)	0.934 (245.793)	0.734 (85.933)	0.682 (93.495)	0.522 (71.246)	0.329 (37.236)
1997	-0.060 (2.774)	-0.147 (6.415)	0.038 (1.941)	0.006 (0.736)	-0.045 (3.378)	0.027 (1.120)	0.187 (1.040)	-0.588 (3.376)
1998	-0.098 (4.522)	-0.225 (9.656)	0.057 (2.842)	0.003 (0.271)	-0.065 (4.779)	0.032 (1.304)	0.430 (2.366)	-0.652 (3.696)
1999	-0.114 (5.207)	-0.208 (8.840)	0.116 (5.708)	0.064 (5.641)	-0.087 (6.308)	0.024 (0.976)	0.270 (1.475)	-0.797 (4.484)
Adj R-sq (obs)	0.406 (13243)	0.330 (13243)	0.187 (11552)	0.821 (13243)	0.367 (13192)	0.404 (12954)	0.284 (13243)	0.097 (13243)

Table 8b
All COE conversions (1996, 1997, 1998, 1999)
lnZ₂₀₀₁

Independent Variable (Z ₂₀₀₁)	VA/ LABOR	VA/ CAPITAL	PROFIT/ SALES	EMPLOY -MENT	WAGES (average)	TAX/ SALES	NP/ SALES	RDE/ SALES
Constant	1.214 (17.222)	-0.092 (2.586)	-1.152 (20.224)	-0.043 (0.475)	1.053 (28.902)	-2.490 (24.697)	-8.983 (23.453)	-11.492 (25.574)
STKdummy	0.130 (1.554)	0.266 (2.809)	0.136 (1.788)	0.152 (3.071)	0.044 (0.935)	0.098 (0.931)	2.084 (2.645)	0.083 (0.122)
increase in share state assets, t-1 to 01	-0.014 (0.859)	0.001 (0.052)	-0.024 (1.550)	0.004 (0.427)	0.009 (1.013)	0.003 (0.155)	0.235 (1.553)	-0.101 (0.775)
Dummy for “increase” in state asset share	0.087 (0.861)	0.047 (0.411)	0.143 (1.443)	-0.055 (0.911)	-0.030 (0.522)	0.216 (1.638)	-0.458 (0.481)	0.469 (0.571)
lnZ _{t-1}	0.688 (35.679)	0.754 (33.587)	0.607 (24.625)	0.967 (71.573)	0.555 (30.434)	0.445 (21.444)	0.397 (20.672)	0.268 (12.226)
1998	0.005 (0.127)	-0.025 (0.517)	0.014 (0.348)	-0.009 (0.363)	-0.037 (1.521)	0.030 (0.548)	0.044 (0.110)	-0.112 (0.322)
1999	0.017 (0.389)	0.018 (0.369)	0.122 (3.013)	0.058 (2.277)	-0.021 (0.850)	0.012 (0.217)	0.129 (0.321)	0.118 (0.337)
Adj R-sq (obs)	0.369 (2184)	0.346 (2184)	0.235 (2003)	0.705 (2184)	0.303 (2168)	0.180 (2121)	0.169 (2184)	0.065 (2184)

Table 9
Summary of conversion results
Ranked in terms of statistical significance
(all are statistically significant at $\geq 90\%$ level)

Variable change	sign	SOEs	COEs
Baseline performance (relative to unconverted firms) (see Table 8)	+	VA/K* Profit* Tax*	-
	-	Employment* Wage***	-
Direct conversion effect (assuming no change in asset structure)	+	VA/labor* VA/capital* Employment* RDE/sales**	VA/capital* Profit/sales*** Employment* NP/sales*
	-	Avg. wage*	-
Effect of an decrease in STASST share	+	VA/labor* VA/capital* Wages* NP/sales* RDE/sales*	-
	-	Employment*	-
Dummy for an increase in state faren share	+	VA/labor***	-
	-	Profit**	-

*statistically significant at the 1% level

**statistically significant at the 5% level

***statistically significant at the 10% level.

Table 10
Change in state asset share (i.e. $\Delta \ln ST_SH_{t-1 \text{ to } 01}$) in converted enterprises relative to unconverted enterprises

variable	SOE-SHR conversions	COE-SHR conversions
Constant	-0.017 (15.579)	-0.075 (2.255)
DSTK	-0.078 (9.209)	-0.052 (0.317)
Adj. R-sq (obs)	0.008 (3,851)	0.000 (961)

Table 11
Reduction in state asset share, t-1 to 2001

$\Delta \ln ST_SH_{t-1 \text{ to } 01}$	Unconverted			Firms converted to SHRs		
	t-1	2001	Ratio 2001/t-1	t-1	2001	Ratio 2001/t-1
SOEs	91.6	72.5	0.792	78.1	40.6	0.520
COEs	7.3	3.2	0.438	9.1	2.1	0.231

Table 12
Comparisons of rates of growth and levels: converted vs. unconverted

	VA/ LABOR	VA/ CAP	PROFIT/ SALES	EMPLOY- MENT	AVERAGE WAGE	TAX/ SALES	NP/ SALES	RDE/ SALES
SOE – converted vs. non-converted								
Growth rates predicted, t-1 to 2001								
Converted	0.063	0.015	-0.067	-0.047	0.049	-0.008	-0.055	0.437
Non-converted	0.066	0.003	-0.045	-0.063	0.067	0.008	-0.237	0.227
Actual Growth rates, t-1 to 2001								
Converted	0.062	0.014	-0.068	-0.048	0.051	-0.009	-0.081	0.418
Non-converted	0.066	0.004	-0.045	-0.062	0.068	0.008	-0.233	0.227
Actual level, 2001: CONV/NCONV	1.07	1.19	1.05	0.70	0.85	0.98	1.18	1.29
COE – converted vs. non-converted								
Growth rates predicted, t-1 to 2001								
Converted	0.080	0.056	-0.054	-0.025	0.056	0.014	-0.068	0.017
Non-converted	0.067	0.010	-0.071	-0.057	0.058	-0.001	-0.232	0.182
Actual Growth rates, t-1 to 2001								
Converted	0.090	0.065	-0.052	-0.025	0.056	0.013	-0.083	-0.040
Non-converted	0.066	0.009	-0.071	-0.057	0.058	-0.001	-0.235	0.182
Actual level, 2001: CONV/NCONV	1.09	1.10	1.18	1.07	1.04	1.10	1.56	0.69

References

- Birdsall, Nancy and John Nellis. 2002, "Winners and Losers: Assessing the distributional impact of privatization," working paper, Center for Global Development.
- Djankouv, Simeon and Peter Murrell. 2002, "Enterprise Restructuring in Transition: A Quantitative Survey," *Journal of Economic Literature*, XL,3:739-792.
- Dong, Xiao-yuan, Paul Bowles, and Samuel P.S. Ho. 2002, "Share Ownership and Employee Attitudes: some Evidence from China's Postprivatization Rural Industry," *Journal of Comparative Economics*, 30,4: 812-835.
- Dong, Xiao-yuan, Paul Bowles, and Samuel P.S. Ho. 2002, "The Determinants of Employee Ownership in China's Privatized Rural Industry: Evidence from Jiangsu and Shandong," *Journal of Comparative Economics*, 30, 415-437.
- Fan Gang. 2002, "Progress in Ownership Changes and Hidden Risks in China's Transition," *Transition Newsletter*, May-June, 2002; 13,3:1-5.
- Jefferson, Gary H., Zhang Ping, and John. Z.Q. Zhao, 1998, "Structure, Authority, and Incentives in Chinese Industry, in eds. G. Jefferson and I. Singh, *Enterprise Reform in China: Ownership, Transition, and Performance*, Oxford University Press, New York.
- Jefferson, Gary H., Lu Mai, and John Z.Q. Zhao. 1998, "Reforming Property Rights in Chinese Industry," in eds. G. Jefferson and I. Singh, *Enterprise Reform in China: Ownership, Transition, and Performance*, Oxford University Press, New York.
- Jefferson, Gary H., Thomas G. Rawski, Li Wang, and Yuxin Zheng. 2000, "Ownership, Productivity Change, and Financial Performance in Chinese Industry," *Journal of Comparative Economics*, 28,4:
- La Prota and Florencio Lopez-de-Silanes. 1999, "Benefits of Privatization _ Evidence from Mexico," *Quarterly Journal of Economics*, 114,4: 193-242.
- Li, Hongbin and Scott Rozelle, 2000. "Savings or Stripping Rural Industry: An Analysis of Privatization and Efficiency in China," *Agricultural Economics*, 23,3:xxxx.
- Li Shaomin, Li Shuhe, and Zhang Weiyong. 2000, "The Road to Capitalism: Competition and Institutional Change in China," *Journal of Comparative Economics*, 28: 269-292.
- Lin, Justin Yifu; Fang Cai, and Zhou Li. 1998, "Competition, Policy Burdens, and State-Owned Enterprise Reform," *American Economic Review*, 88:422-27.
- McMillan, John and Barry Naughton. 1992, "How to Reform a Planned Economy: Lessons from China," *Oxford Review of Economics and Politics*, 8,1: 130-143.

Meggison, William L. and Jeffrey M. Netter. 2001, "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature*, 39,2: 321-389.

NBS (National Bureau of Statistics), various years, *China Statistical Yearbook*, China Statistics Press, Beijing.

Rawski, Thomas G. 2002, "Recent Developments in China's Labor Market," Report prepared for International Policy Group, International Labor Office, Geneva.

Tian, George Lihu, 2000, "State Shareholding and Corporate Performance: A Study of a Unique Chinese Enterprise Data Set," working paper, London Business School.

Su Jian and Gary H. Jefferson. 2003, "The Determinants of Decentralized Privatization: Theory and Evidence from China," working paper, December 17, 2002.

Weitzman, Martin and Xu Chenggang. 1994, "Chinese Township and Village Enterprises as Vaguely Defined Cooperatives," *Journal of Comparative Economics*, 18:2: 121-45.

Annex 1

Concordance of Ownership Classifications, 1994-1999

1994		1999	
Code	Ownership category	Code	Ownership category
State-owned			
11	State-owned enterprises	110	State-owned enterprises
12	State owned jointly operated enterprises	141	State owned jointly operated enterprises
11	Wholly state-owned companies	151	Wholly state-owned companies
Collective-owned			
21	Collective-owned enterprises	120	Collective-owned enterprises
		130	Shareholding cooperatives
22	Collective jointly operated enterprises	142	Collective jointly operated enterprises
Hong Kong, Macao, Taiwan-owned			
81	Overseas joint ventures	210	Overseas joint ventures
82	Overseas cooperatives	220	Overseas cooperatives
83	Overseas wholly-owned enterprises	230	Overseas wholly-owned enterprises
		240	Overseas shareholding limited companies
Foreign-owned			
71	Foreign joint ventures	310	Foreign joint ventures
72	Foreign cooperatives	320	Foreign cooperatives
73	Foreign wholly-owned enterprises	330	Foreign wholly-owned enterprises
		340	Foreign shareholding limited companies
Shareholding			
62	Limited liability company	159	Other limited liability companies
61	Shareholding limited companies	160	Shareholding limited companies
Private			
31	Private wholly-owned enterprises	171	Private wholly-owned enterprises
32	Private cooperative enterprises	172	Private cooperative enterprises
33	Private limited liability companies	173	Private limited liability companies
		174	Private shareholding companies
Other domestic			
51	State-collective jointly operated enterprises	143	State-collective jointly operated enterprises
		149	Other jointly operated enterprises
52	State-private jointly operated enterprises		
53	Collective-private jointly operated enter.		
54	State-collective-private jointly operated enter.		
9	Other enterprises	190	Other enterprises