Privatization and Restructuring in China: Evidence from Shareholding Ownership, 1995-2001

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Abstract

Studies of the impact of privatization on enterprise performance encounter difficult issues of selection bias, endogeneity, and adjustment costs. In this paper, we analyze the performance impact of conversion on China's state-owned enterprises (SOEs) taking these issues into account. We also distinguish between the direct effect of formal conversion, holding the firm's asset structure fixed, and the induced effect, in which formal conversion leads to new investment and reductions in the proportion of state-owned assets. We find that, within our sample, the conversion of SOEs to shareholding enterprises contributes to overall increases in both current productivity and innovative effort. In particular, relative to unconverted SOEs, conversion leads to the use of more labor-intensive modes of production, which is associated with significant increases in returns to capital.

JEL classifications: D24, O53, P26

1. Introduction

The ownership structure of Chinese enterprises has changed dramatically over the past two decades. In 1980, China's industrial sector consisted almost exclusively of state- and collective-owned enterprises. The year 1993 was a watershed year for the conversion of China's state owned enterprises (SOEs). The number of SOEs peaked and, for the first time during the reform era, the industrial gross output of China's non-state sector exceeded that of the state sector (NBS, 1996, p. 401).[1] Also in 1993, the Chinese government initiated the shareholding program, which became the principal vehicle for implementing ownership reform of the SOEs. In the large and medium-size enterprise sector, by 2001 the number of industrial SOEs fell to nearly one-half of the 15,533 firms that had existed in 1994. Mirroring the precipitous decline in SOEs during this period, the number of shareholding enterprises rapidly increased from less than 1,000 to nearly 6,000.

In this paper, we explore the impact of the conversion of China's SOEs to shareholding enterprises. In addition to evaluating the implications of ownership change for the conventional measures of labor and capital productivity and profitability, we also examine the impact of conversion on two dynamic measures of enterprise performance, namely R&D expenditures and new product sales. These latter measures are indicators of the degree to which the conversion of SOEs to shareholder enterprises results in deep restructuring that goes beyond the layoff of redundant workers.

In examining the impact of the shareholding experiment on these measures, we distinguish explicitly between two channels. The first is the direct impact of conversion on enterprise performance, holding constant the firm's asset mix. The second is the induced effect, which results from the ability of converted firms to attract new investment from outside the state sector. We document the range of impacts of non-state investment on firm performance for firms that have been formally converted as well as for those that remain unconverted. Similar to any assessment of the effect of privatization on firm performance, our analysis is forced to address three issues of modeling and econometric strategy, namely, selection bias, endogeneity, and adjustment costs. For this purpose, we exploit a panel of firm-level data that includes more than 20,000 large and medium-size enterprises in China.

The next section provides an overview of ownership reform in China. Section 3 reviews the growing body of research on enterprise conversion and draws relevant lessons from the privatization experiences in Eastern Europe and the Commonwealth of Independent States (CIS), as well as from the emerging literature on China's enterprise restructurings. Section 4 describes the dataset of large and medium-size enterprises, which provides the empirical basis for this paper. To anticipate the direction of the performance effects of enterprise conversion, we estimate differences in performance across established ownership classifications. We also use this exercise to highlight the problems of selection bias, endogeneity, and adjustment costs. Section 5 presents the estimation model, an outline of our estimation strategy, and a test for sample selection bias. In section 6, we present and interpret the estimation results. In this section, we investigate the impact of ownership conversion on the firm's asset ownership structure;

we also estimate the impact of conversion on the factor intensity and profitability of converted enterprises. Finally, in the concluding section we draw implications from our findings for China's development and the shift of production toward its comparative advantage.

2. Ownership Reform in China

China's enterprise reform has spanned four interrelated stages. The first is the entry of large numbers of new non-state enterprises. The second is the reform of managerial control rights within established systems of public ownership, e.g., the strengthening of managerial incentives through the contract responsibility system. The third is the change in asset structures resulting from non-state investment in the state sector. The last stage of ownership change is the outright conversion of enterprises, usually from state or collective ownership to some other formal ownership classification; we view this stage as the outcome of the three preceding stages of reform. A brief description of each stage follows.

Until the mid-1990s, the most dramatic method of ownership reform in Chinese industry was the entry of new non-state firms through three avenues. The first is the proliferation of collectives, principally, township and village enterprises (TVEs) during the 1980s.[2] Second, the number of individually owned enterprises (*getihu*) having eight or fewer employees increased rapidly into the millions by 1994. The third source of new entry is foreign investment, from investors in Hong Kong, Taiwan, and Macao (HMT) and from foreign sources (FOR), primarily OECD and Southeast Asian countries. Although many of these FOR and HMT firms had previously been state or collective-

owned enterprises that were converted to joint ventures as a vehicle for foreign direct investment (FDI), the restructuring of these firms represents an important form of new entry into China's industrial enterprise system. As an important consequence of this rapid entry of both domestic and foreign investment, the creation of intense competition in many sectors spurred a secular decline in profitability across all ownership types, as Naughton (1992) documents. The resulting erosion of monopoly rents in state industry motivated a search for technical innovations and new mechanisms of governance throughout Chinese industry, as Jefferson and Rawski (1994) and Su and Jefferson (2004) document.

The introduction of the enterprise contract responsibility system in the mid-1980s was intended to strengthen and clarify the system of incentives and rewards for SOE managers and workers, while avoiding the politically sensitive move to formal ownership change. Jefferson, Zhang, and Zhao (1999) and Jefferson, Lu, and Zhao (1999) document the vertical reassignment of control rights from government supervisory agencies to enterprises and the horizontal allocation of managerial control rights among managers, workers' councils, and party secretaries within enterprises. The restructuring of SOEs without formal ownership conversion 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, although Jefferson, Rawski, Wang, and Zhang (2000) compute efficiency gains in the state sector, productivity growth in state industry lagged behind

that outside the state sector. An important outcome of these reforms was the emergence of a managerial class that had a strong vested interest in privatization.

In China's enterprise sector, the association between formal ownership classification and the ownership structure of the assets has become increasingly fluid. In 1999, the population of China's large and medium-size enterprises was split about evenly between state-owned and non-state-owned enterprises but 1,417 of the former reported minority state asset ownership while 1,935 non-SOEs reported that a majority of their assets were state owned. This counterintuitive pattern of asset ownership across the range of ownership classifications calls into question the economic significance of China's formal classification system. By creating *de facto* conversion, this accumulation of non-state assets in the state sector played an important role in the historical progression of ownership reform in China and rendered conversion a mere formality in some cases.

In the mid-1990s, these three processes described above, i.e., new entry, the reform of control rights, and changing asset structure, created pressures for deep restructuring, including the formal conversion of SOEs, according to Su and Jefferson (2004). At the same time, the accumulation of non-performing loans and the attention given to financial stability due to the Asian financial crisis and the Chinese leadership's quest for entry into the World Trade Organization magnified pressures for enterprise restructuring. Filtered by the need for restructuring avenues that avoided the ideological and political perils of overt private ownership, three restructuring policies were initiated during the mid-1990s. The first is a furlough policy (*xiagang*), which led to the layoff of approximately six million out of 44 million workers in the industrial state sector by the end of the decade, according to Rawski (2002). By diminishing the role of the state

sector as the locus of guaranteed employment, the government's furlough program made conversion more feasible politically. Two policies focusing on enterprise conversion followed, namely, a mandate for the conversion of most SOEs and the intensification of the shareholding experiment.

Under the slogan "retain the large, release the small" (*juada fangxiao*), China's leadership mandated the conversion of all but the largest 300 or so of the nation's industrial SOEs, in principle. As part of this initiative, former Premier Zhu Rongji placed China's loss-making SOEs on a strict three-year schedule during which they were supposed 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. Although the shareholding experiment was introduced in 1993, shareholding conversion became a broad-based initiative involving large numbers of both SOEs and COEs only after the restructuring initiatives of 1997 to 1998. In 1997, the Chinese Communist Party's 15th Party Congress made the shareholding system a centerpiece of China's enterprise restructuring. While formal privatization was ruled out for ideological reasons, the shareholding experiment was viewed widely as a covert mandate for privatization, as Li, Li, and Zhang (2000) claim.

From 1997 to 2001, the number of registered state-owned enterprises declined by nearly one half. According to Fan (2002), more than 70 percent of small SOEs have been privatized or restructured in some regions during this period. However, conversion of SOEs enterprises was not limited to small-size enterprises. During the period from 1997 to 2001, 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 increased from 1,801 to 5,659. Furthermore, the conversion process extended to collective-owned enterprises, including the township and village enterprise sector that had been celebrated for its competitive performance, e.g., Weitzman and Xu (1994). Li and Rozelle (2000) report that the privatization of rural industry was deep and fundamental and that more than 50 percent of local government-owned firms transferred shares, either partially or completely, to the private sector. This process of conversion has been extensive even among the largest, most successful collective-owned enterprises (COEs). The number of large and medium-size COEs declined by 35 percent – from 3,613 in 1998 to 2,465 in 2001.

To summarize, the convergence of three factors, i.e., new entry and competition, strengthened managerial control, and the accumulation of non-state assets, created the conditions for formal conversion of SOEs during the latter half of the 1990s in China. Many local governments were anxious to rid themselves of loss-making enterprises, or to sell profitable ones before they became loss-making. Insider managers were poised to secure greater control over these enterprises and asset structures were often already extensively diversified. Taken together, these conditions provided a strong motive to complete the administrative formalities of shareholder conversion. [3]

3. Literature Review and Comparative Perspective

Several comprehensive surveys focus on the enterprise restructuring and privatization experiences of Eastern Europe and the former Soviet republics; we review two of them briefly to draw lessons for China. In addition to considering privatization

episodes in OECD and developing economies, Megginson and Netter (2001) examine 12 studies of the effectiveness of privatization in the transition economies of Central and Eastern Europe and six from the Commonwealth of Independent States, i.e., Russia and the former Soviet Republics, excluding the Baltic States. The authors conclude that privatization improves firm-level performance, while concentrated private ownership, foreign ownership, and majority outside ownership are associated with significantly greater improvement than the alternatives.

Djankov and Murrell (2002) survey more than 100 studies of enterprise restructuring in transition economies and synthesize the results using composite rankings of the effectiveness of various privatization strategies and outcomes. Like Megginson and Netter, Djankov and Murrell find that state ownership is less effective than all other ownership types. Privatization to outsiders is associated with the largest restructuring gains, resulting in an average of 50 percent more restructuring than privatization to insider managers and workers. Investment funds, foreigners, and other block-holders produce more than ten times as much restructuring as does diffuse individual ownership. Surprisingly, majority state ownership within partially privatized firms produces more restructuring than privatization involving enterprise insiders and non-block-holder outsiders. Furthermore, Djankov and Murrell find that different regions, particularly Eastern Europe and the CIS economies, exhibit different responses to similar privatization strategies. Whereas privatization to workers in Eastern Europe had no significant effect on enterprise performance, the same means of privatization resulted in substantial negative effects for the affected firms in the CIS economies. Finally, the authors determine that opening to import competition had significant and opposite

impacts on firm performance in Eastern Europe and the CIS.[4] We draw four lessons from these two surveys for China, namely, the relative effectiveness of outsider privatization, the relatively poor performance of insider privatization, the effectiveness of state ownership within partially privatized firms, and the possibility that just as privatization outcomes can differ significantly with the Eastern European and CIS region, they may also differ between that region and China.

In recent years, research on the determinants and impacts of privatization and ownership conversion in China has appeared. Using a survey of 736 firms drawn from five cities and seven sectors for 1996 to 2001, Yusuf, Nabeshima, and Perkins (2005) shows the conventional results that foreign ownership, reformed SOEs, and non-SOE ownership all enhance productivity. However, when the authors use fixed effects to control for potential endogeneity and selection bias, they find that the impact of restructuring is not robust. Although they find no strong statistical evidence that restructuring has led to productivity gains, their survey provides evidence of upgrading following restructuring, including the introduction of new production technologies. However, since technology acquisition requires an established absorptive capacity, this finding is also consistent with the proposition that the most efficient firms are those selected for reform and, hence, controlling for selectivity bias is crucial.

Song and Yao (2004) use a survey of enterprise data covering 683 firms in 11 cities over the period from 1995 to 2001. They find that state control and private control lead to higher profitability than state ownership but find little impact of these restructurings on unit cost and productivity. Like the previous authors, they find that introducing fixed effects reduces the statistical significance of the relevant estimates. Xu,

Zhu, and Lin (2005) employ data from a survey of 1,634 firms conducted in 1997 and 1998. They find that reformed firms performed better if managers have flexibility in labor deployment, if corporate governance mechanisms lead to better alignment between ownership and control, and if foreign ownership is higher. In addition, the authors find that dispersed ownership and operating autonomy lead to poorer performance. Since this study is based on a single cross-section, the authors acknowledge their inability to control for firm heterogeneity. Hence none of these studies finds robust evidence that enterprise restructuring results in improved performance once the appropriate controls are established for selection bias and endogeneity.

Su and Jefferson (2004) investigate the determinants of ownership conversion in China's large and medium-size enterprises and find that the probability of ownership conversion increases with the firm's profitability and productivity as well as with the intensity of competition faced by the firm. By demonstrating the characteristics of firms selected for privatization, these authors explicitly demonstrate the necessity to control for selection bias and endogeniety in investigating the privatization process of Chinese SOEs.

Using the same survey data as Xu *et al*. (2005), Lin and Zhu (2001) focus on the effectiveness of shareholder reform, but rather than estimating the impact of reform on performance, they focus their attention of survey responses.[5] The authors report that although 34 percent of the respondents to the survey identified improved internal management mechanisms and 23 percent claimed clearer property rights, only 11 percent indicated that restructuring had led to a significant improvement in performance.[6]

Unlike the studies of SOE conversion, Li and Rozelle (2000) focus on a sample of 168 township enterprises in Jiangsu and Zhejiang provinces, of which 88 have been privatized. These authors find that transitional costs appear to reduce efficiency in the year that firms are being privatized but that the productivity of private firms rises two or more years after privatization

Summarizing, the literature on ownership restructuring in China demonstrates the importance of controlling for selection bias and endogeneity in the reform process, both because governments systematically choose to privatize firms that perform above or below average performers and also because results that seem robust in the cross section are more ambiguous when fixed effects are applied. Moreover, the experience of township enterprises suggests that adjustment costs should also be accounted for in the privatization process.

4. The Data and Ownership Distribution

The National Bureau of Statistics (NBS) of China tracks industrial enterprises that lie in three concentric circles, or populations. The first broad measure includes all enterprises in the industrial system, which consisted of 7.97 million enterprises in 1998. The middle circle, which makes up less than five percent of China's total industrial enterprise population, consists of enterprises reporting more than five million yuan, or approximately $600,000, of sales annually. The inner circle contains the country's large and medium-size enterprises (LMEs), which numbered approximately 22,000 firms in 1998 and accounted for 57.9 percent of the total sales of industrial enterprises with

annual sales in excess of 5 million yuan. Because China's authorities collect highly detailed information from these enterprises, we use data for LMEs in this study. Our sample of LMEs includes China's most successful companies, i.e., those that have grown and maintained their status at the pinnacle of the industrial sector, as well as many of its most troubled enterprises. The legacies of decades of central planning and administered allocations of subsidized capital, skilled labor, and raw materials result in poor financial performance for some LMEs, which impedes China's transition to an advanced market economy.

Table 1 reports the changing ownership profile of China's LME sector from 1994 to 2001.[7] Table 1 shows the significant decline in the proportion of SOEs and COEs represented in the LME data set, while the proportions of the other major categories of ownership types have all grown substantially. One approach to evaluating the implications of ownership change is to compare the performance of firms that are already established in one or another ownership classification. Initially, we compare firm performance according to the formal ownership classification and to the ownership composition of assets to establish the relative importance of these two measures of ownership on performance.

We consider five categories of firm performance, namely, labor productivity measured as value added per unit of labor, capital productivity measured as value added divided by the net value of fixed assets, profitability, new product sales measured by new products as a percentage of sales, and R&D intensity measured by R&D expenditures divided by sales. Profitability is calculated as the difference between sales revenue and the production costs of sold output and, therefore, excludes certain taxes, pension

payments, welfare subsidies, and other costs that are not directly associated with production. To evaluate the significance of ownership, our regressions include a set of ownership dummies that enables direct comparisons by formal ownership type. The regressions also include measures of asset composition, namely, the share of state-owned assets and the combined shares of FOR and HMT assets, and the capital-labor ratio in the productivity regressions. As Table 2 indicates, the estimates of the coefficients on both ownership classification and asset type are statistically significant, except for R&D with respect to the FOR/HMT asset share. One implication of these results is that a firm's ownership classification gives an incomplete picture of its likely performance. Given a firm's ownership classification, the asset mix of the firm adds significantly to the firm's predicted performance.

Also, for several reasons these results which measure the implications of existing ownership structures for firm performance are of limited value regarding the predicted impact on a given firm of a *change* in ownership from state ownership to shareholding status. First, the differential quality of converted and unconverted firms may reflect selection bias, because the SOEs chosen for conversion may not be typical of the existing population of SOEs. If the chosen SOEs were above-average performers before conversion, any measured quality advantage of the converted SOEs may simply reflect the tendency to select higher quality firms for restructuring. Second, due to endogeneity, omitted variables such as managerial quality will lead to biased coefficients if such effects are correlated simultaneously with the dependent performance variables and with right-hand-side explanatory variables, e.g., the firm's asset composition. Third, following conversion, time may be required to adjust to new governance arrangements

and to achieve efficiency improvements associated with changes in the firm's labor force, asset composition, and product mix so that gains ensuing from privatization may appear only one or more years after conversion.

The remainder of this study focuses on the impact of a *change* in the status of China's large and medium SOEs. Because a large majority of these SOEs were converted to shareholding enterprises and the remainder of the conversions was spread over a variety of ownership types, the analysis focuses of the impact of SOEs that are converted to shareholding enterprises (SHR). To be included in the sample, a firm must report annual data continuously for the interval t-1, the year prior to conversion, to 2001, the last year included in our data set. From this sample, we eliminate enterprises that report multiple conversions, i.e. those that convert from SOE to SHR and then convert again to some other ownership type. We also eliminate firms that report implausible figures for key variables, such as non-positive values for sales, fixed capital stock, or employment. According to Table 3, a total of 3,036 state-owned enterprises were converted to non-state enterprises from 1996 to 2001, of these 2,265 were converted to shareholding enterprises.[8] The lower panel in Table 3 identifies the number of enterprises that meet our screening criteria. Within our sample, 730 of the SOEs converted to shareholding enterprises satisfy these criteria.[9] The 5,301 SOEs that were not converted constitute the part of the sample that allows us to test for selection bias and estimate the independent impact of conversion. Because each enterprise may generate multiple observations during the period, the total number of observations used for the

converted enterprise sample is 1,499 whereas the total number of observations for the SOE sample is 19,250.

Applying probit analysis, we test for selection bias by estimating the probability of conversion for SOEs based on the five performance characteristics used in Table 2. Because we are interested only in selection bias in the conversion year, not in the continuing impact of conversion, we include only the 730 observations associated with the initial conversion year for the converted enterprises as well as the total number of observations for unconverted SOEs, i.e., 19,250. The coefficients from probit regressions in which a single performance measure is included with dummies to control for industry, region, and year are reported in Table 4. Firms that are selected for conversion exhibit statistically significantly higher high levels of capital productivity and profitability, relative to unconverted SOEs, However, initial ratios of labor productivity, new product sales, and R&D intensity do not differ statistically significantly across converted and non-converted enterprises.

Finally, we consider the regional and industry biases of the conversion process.[10] Not surprisingly, SOEs located in the richer eastern and southern provinces of China, and thus more likely to be profitable, exhibit higher probabilities of conversion. In addition, SOEs producing medical and pharmaceutical products, beverages, and are most likely to be converted, while those in electric power generation, water production, tobacco processing, and printing are least likely to be converted. These findings indicate the importance of accounting for selection bias in determining the impact of the conversion process on firm performance. In the next section, we describe the methodology that we use to control for selection bias.

5. The Model and the Estimation Strategy

In a cross section of firms, the vector of enterprise performance variables, *Z*, is assumed to be determined by the following equation:

$$ln(Z_{it}) = a_0 + a_1 OWN_{it} + a_2 ln(SH\_NSA_{it}) + a_3 w_i + a_4 y_t + e_t , \qquad (1)$$

where OWN_{it} is a dummy variable representing the firm's ownership type, either 0 for SOE or 1 for SHR at *t*, SH_NSA_{it} is the share of the firm's non-state assets in total assets, w_i represents the time-constant characteristics that affect firm performance, including its location, industry, managerial quality, and other variables that may not be directly observable or measurable, y_t is the change of the external environment over time, e.g., macroeconomic fluctuations and changes in government policy, and e_t is the error term.[11] A possible source of endogeneity is unobservable fixed effects, e.g., managerial quality, that are correlated with both the dependent variable and with the included explanatory variables. One approach to control for unobservable, time-invariant characteristics is to differences equation (1) so that the w_i terms are eliminated.

Assuming that the model is stable over time so that the coefficients are unchanged between t-1, the year prior to privatization, and 2001, we have from differencing:

$$ln(Z_{i,2001})-ln(Z_{it-1}) = a_1(OWN_{i,2001} - OWN_{i,t-1}) + a_2(ln(SH\_NSA_{i,2001}) - ln(SH\_NSA_{i,t-1}) + a_3(y_{2001} - y_{t-1}) + (e_{2001} - e_{t-1}). \qquad (2)$$

Dividing the differences in log variables by [2001 – (t-1)], we transform the differenced logs into annual rate-of-change variables so that equation (2) becomes:

$$g(Z_{i,\,t-1\ to\ 2001}) = a_1 D(OWN_{i,\,t-1\ to\ 2001}) + a_2 g(SH\_NSA_{i,\,t-1\ to\ 2001}) + a_3 D(y_{\,t-1\ to\ 2001}) + D(e_{\,t-1\ to\ 2001}), \quad (3)$$

where $g(Z_{i,t-1\ to\ 2001})$ represents the annual rate of growth from t-1 to 2001 of the relevant performance variable, Z, in firm i. Also, $D(OWN_{i,\,t-1\ to\ 2001})$ indicates ownership change of the firm from t-1 to 2001, $g(SH\_NSA_{\,t-1\ to\ 2001})$ indicates the annual growth rate of the share of non-state capital, and $D(y_{\,t-1\ to\ 2001})$ indicates the change in time-variant factors that are common to all firms. The latter is proxied by year dummies.

Equation (3) omits two sets of variables that have the potential to affect firm performance, namely adjustment costs and initial conditions. Owing to dislocation, initial high expectations, and other transitory factors, the initial impact of conversion may either exceed or fall short of its longer-term sustained impact. In our sample, the period following the firm's conversion, i.e, 2001 – (t-1), may span one to five years. Hence, to control for these transitory effects of conversion, we differentiate two measures of $D(OWN_{i,\,t-1\ to\ 2001})$. First, we take a dummy variable, denoted $D(OWN_{it})$, for the year in which the conversion occurred, i.e. year t, and call it the impact effect. Second, we take a dummy variable for all years subsequent to ownership conversion in year t, denoted $D(OWN_{i,\,t+1\ to\ 2001})$, and call it the continuing ownership effect.

The initial conditions for Z_i and SH_NSA_i are eliminated from the differenced version of equation (1) so that the evolution of gZ_i is assumed to be independent of the

initial values of Z_i and SH_NSA_i in equation (2). Hence, equation (2) assumes that equivalent rates of growth of *SH_NSA* will have similar impacts on the growth of the performance measures. However, a 50 percent increase in the share of non-state assets from 50 to 75 percent may have a different impact than a similar proportional increase in *SH_NSA* from 2 to 3 percent. To control for the initial level of *SH_NSA*, we include the variable SH_NSA_{t-1} in our estimation equation. If absolute increments to *SH_NSA* as well as rates of growth of the share of non-state assets improves firm performance, we expect estimates of the coefficient on *SH_NSA* to be positive, i.e. for a given proportional increase in *SH_NSA*, i.e. $g(SH\_NSA_{i,\ t-1\ to\ 2001})$, the larger is $SH\_NSA_{t-1,}$ the larger the absolute increment to *SH_NSA* will be. Similarly, growth rates of $gZ_{it-1,2001}$ that are computed from high base values of Z_{it-1} may exert a larger impact on performance than identical rates of growth that are based on lower initial values. To control for this effect, we include the initial value of *Z*, i.e., Z_{it-1} in our estimate equation. *Ceteris paribus*, we expect that high rates of measured growth of $Z_{it-1\ to\ 2001}$ will be associated with low initial values so that we expect the estimates of the coefficient on Z_{it-1} to be negative.[12]

Incorporating the adjustment terms and the initial conditions, we have:

$$g(Z_{i,\ t-1\ to\ 2001}) = a_0 + a_1 D(OWN_{i\ t}) + a_2 D(OWN_{i,\ t+1\ to\ 2001}) + a_3 g(SH\_NSA_{i,\ t-1\ to\ 2001}) + a_4 ln(SH\_NSA_{i,\ t-1}) + a_5 lnZ_{i,t-1} + a_6 D(y_{\ t-1\ to\ 2001}) + \varepsilon_{t-1\ to\ 2001}, \quad (4)$$

where $\varepsilon_{t-1\ to\ 2001} = D(e_{\ t-1\ to\ 2001})/((2001-(t-1))$.

Equation (4) identifies seven factors that contribute to the firm's performance growth, i.e., $g(Z_{i,\ t-1\ to\ 2001})$. These are: (i) the contemporaneous impact of conversion, i.e.,

$a_1 D(OWN_{i\,t})$, (ii) the continuing impact of conversion, i.e., $a_2 D(OWN_{i,\,t+1\ to\ 2001})$, (iii) the growth of non-state assets relative to total assets, i.e., $g(SH\_NSA_{i,\,t-1\ to\ 2001})$, (iv) the initial share of non-state owned assets, i.e. $ln(SH\_NSA_{i,\,t-1})$,which controls for the change in the level of non-state assets, (v) the initial level of performance, i.e. $a_4 Z_{i,\,t-1}$, which identifies the propensity of lagging firms to catch-up, (vi) the differences in year-to-year conditions, including differences in the year of conversion, i.e., $D(y_{t-1\ to\ 2001})$, and (vii) the unexplained part captured by the residual or error term (i.e. $\varepsilon_{t-1\ to\ 2001}$).

The basic problem of selection bias occurs because, within the pool of potential conversions, high performing firms are typically selected for conversion so that $D(OWN) = 1$, $e_t > 0$, and $CORR[D(OWN), e_t] > 0$. Hence, coefficient estimates of ownership effects will be biased upward. If these sources of selection bias are fixed effects, so that firms in certain locations or industries or firms possessing high quality managerial skills are more likely to be converted, equation (4) controls for this type of selection bias. However, a second form of selection bias may arise from time-variant effects, which cannot be controlled for by equation (4). For example, firms with high or low profitability in t-1 may be expected to achieve high rates of growth of profitability from t-1 to 2001. If the decision-maker's expectation for $g(Z_{i,\,t-1\ to\ 2001})$ is conditioned by $Z_{i,\,t-1}$, potential simultaneity bias is avoided by including $Z_{i,\,t-1}$ in the estimation as in equation (4). However, time-variant characteristics other than the Z_i that systematically affect the decisions of agents to select firms from the pool of potential conversions are not controlled for in equation (4). For example, if government officials, managers, or investors expect a firm to perform poorly because it has a high debt-asset ratio and if that high debt-asset ratio is systematically correlated with the firm's post conversion

performance, our specification will not control for this potential source of selection bias.[13]

Although equation (4) takes account of selection bias, the potential for reverse causality arises from positive shocks to the growth of the dependent variable, embedded in $\varepsilon_{t-1,2001}$, that may also be a motive for greater non-state investment. For example, a firm having an unexplained high rate of growth of capital productivity may be expected to attract greater quantities of non-state investment, which could have the effect of imparting bias to the estimates of $g(SH\_NSA_{i\ t-1\ to\ 2001})$. In addition to such endogeneity bias, we anticipate that certain dependent variables, e.g., the measures of capital stock, new product sales, and spending on R&D, are difficult to account for accurately thus leading to measurement error. Moreover, because we are estimating relationships between rates of growth, measurement errors are likely to be compounded by the computation of rates of change between two levels that are themselves measured with error. Hence, measurement error is expected to bias our coefficient estimates toward zero.

To address each of these two potential forms of bias, endogeneity bias and measurement error bias, we construct an instrument for $g(SH\_NSA_{i\ t-1,\ 2001})$ using $g(SH\_NSA_{i\ t-1,\ 2001})$ at the 3-digit SIC level and industry, location, firm-size, and 3-digit industry dummies. The first-stage estimation results for the instrumental variables (IV) approach are presented in Table 5.[14] The robust negative estimate of the coefficient for $ln(SH\_NSA_{it-1}+1)$ confirms that high initial values of *SH_NSA* are associated with relatively low rates of growth of non-state asset shares. Controlling for the other

variables, firms with high shares of non-state assets in the year prior to conversion, exhibit the slowest rates of growth of non-state asset shares after conversion. In addition, non-state asset shares at the 3-digit industry level are robust predictors of non-state asset shares of individual firms. Furthermore, the first stage estimates show that non-state asset shares grew most rapidly in the eastern provinces, followed by firms in provinces in the south and southwest. Across size classifications, the largest enterprises exhibited the highest rates of growth of non-state asset shares, although the differences are small. Finally, our time dummies show a monotonically increasing growth of non-state assets relative to the levels reported for the year preceding the conversion of the SOEs.

Both the estimation equation and the transformation of the variables raise issues regarding the interpretation of the estimates, especially with regard to the coefficient of $g(SH\_NSA_{i,\,t-1,\,2001})$ in equation (4). First, the estimated model is a differenced version of the log linear version of the original model. Second, by adding one, the coefficient a_2 in equation (1) becomes the elasticity of $(Z_{it-1,2001}+1)$ with respect to $(SH\_NSA_{i,\,t-1,\,2001}+1)$ and equal to $d\ln(Z_{it-1,2001}+1)/d\ln(SH\_NSA_{i,\,t-1,\,2001}+1)$, which is estimated in equation (4) as a_3. The method for computing elasticities of Z with respect to $SH\_NSA_{i,\,t-1,\,2001}$ based on equation (1) with x = $SH\_NSA_{i,\,t-1,\,2001}$ is:

$$
\begin{aligned}
E = d(\ln(Z))/d(\ln(x)) &= [d(\ln(Z))/d(Z)]*[d(Z)/d(Z+1)]* \\
&\quad [d(Z+1)/d(\ln(Z+1))]*[d(\ln(Z+1))/d(\ln(x+1))] \\
&\quad *[d(\ln(x+1))/d(x+1)]*[d(x+1)/dx]*[dx/d(\ln(x))] \\
&= (1/Z)*1*(Z+1)*a_2*(1/(x+1))*1*x \\
&= a_2*[(Z+1)/Z)*(x/(x+1)],
\end{aligned}
$$

where Z and x are evaluated at $[Z(01) + Z(t\text{-}1)]/2$ and $[x(01) + x(t\text{-}1)]/2$, respectively.

6. Estimation Results and Interpretations

We estimate equation (4) using both OLS and IV procedures and report the results in Table 6. Three general results are obtained. First, the estimates of the coefficients for the initial level of the dependent variable, i.e. $\ln Z_{i\,t-1}$, are consistently negative and significant. The magnitude is largest for R&D intensity, whose levels are likely to exhibit a high variance, and lowest for labor productivity, for which the variance is likely to be relatively low. Second, the estimates of the coefficient for the initial level of the non-state asset share, i.e., $ln(SH\_NSA_{i,\,t-1} + 1)$, are positive and mostly significant with the profit variable providing the only exception. These results confirm our expectation that, given two firms with identical rates of growth of the non-state asset share, the firm with the higher initial share of non-state assets is likely to exhibit the greater improvement in performance. Third, the IV estimates of the impact of the growth rate of non-state assets are consistently larger than the OLS estimates, with the exception of the profit equation in which the coefficients are insignificant in both cases. This result suggests that the correction for the negative bias associated with measurement error is typically larger than the correction for potential endogeneity bias resulting from unobserved fixed effects. Indeed, the upward adjustment for the IV estimate is largest for new product sales and R&D expenditures for which measurement error is likely to be most serious. The Hausman test indicates that we are unable to reject the hypothesis of endogeneity for all the coefficients with statistically significant estimates in the IV equations.

In addition to these three general findings, we consider results specific to each of the five performance equations. With respect to capital productivity, the OLS and IV results show that both the contemporaneous impact of conversion and the continuing effect of conversion accelerate the growth of capital productivity. Furthermore, increases in the share of non-state assets contribute to rising capital productivity. Regarding labor productivity, conversion imparts a positive immediate impact on labor productivity, but this impact is not sustained in subsequent years. Sustained increases in the growth of labor productivity, relative to unconverted SOEs, requires increases in the share of non-state assets. In contrast to the capital and labor productivity results, profitability appears to be unaffected by conversion as none of the conversion coefficients is statistically significant. Turning to new product sales, the direct continuing effect of conversion is a reduction in the growth of new product sales. However, as state asset shares are reduced, the growth of new product sales rises. Hence, the net impact of conversion on the growth of new products is ambiguous. Finally, considering R&D intensity, the direct effects of conversion are negligible but increases in the share of non-state assets have a positive and significant impact on the R&D intensities of converted firms.

In summary, the impact of conversion from SOEs to shareholding enterprises operates through several channels. Holding the firm's asset mix constant, conversion has both immediate and longer-term impacts. Formal conversion exhibits direct immediate positive effects on the productivity of both capital and labor and continuing effects on capital productivity and new product sales, although the latter is negative. The channel having the most consistent impact on firm performance is the induced effect of an increase in share of non-state assets. With the exception of profitability, increases in the

share of non-state assets improve all performance measures. Hence, we investigate the extent to which such increases are themselves a result of the conversion process.

Formal conversion of an SOE to a shareholding enterprise may have no effect on the asset composition of the firm or it may enhance the ability of the firm to attract outside non-state investment. To test the impact of conversion on the firm's asset composition, we estimate the following equation:

$$g(SH\_NSA_{t-1 \text{ to } 01}) = \beta_0 + \beta_1 D(OWN)_t + \beta_2 D(OWN)_{t+\tau} + \beta_3 ln(SH\_NSA_{i,\,t-i}) + \varepsilon_2. \quad (5)$$

If $\beta_1 > 0$, we conclude that conversion in year t of a state-owned enterprises to a shareholding enterprise leads to the subsequent increase in the share of non-state assets. If $\beta_2 > 0$, we conclude that the firm maintains an advantage over its non-converted counterparts in increasing its non-state asset share during the years following conversion. As in equation (4), the addition of $ln(SH\_NSA_{i\,t-1})$ controls for the initial level of non-state asset shares because identical growth rates will be associated with different initial values in the absolute level of non-state asset shares.

In Table 7, the estimates of β_1 and β_2 are both highly statistically significant; that $\beta_1 > \beta_2$ implies that the larger increase in non-state asset shares occurs during the conversion year. Thereafter, converted firms enjoy a continuing, but slower, shift toward non-state asset ownership relative to unconverted SOEs. Consistent with these results, the data reported, in Table 8 show the average ratio of non-state assets for converted shareholding enterprises increasing from 32.6 to 47.9 percent between the year prior to

conversion year and 2001 and the volume of non-state assets held by converted enterprises rising by 127.5 percent. For unconverted SOEs, the comparable figures show an average increase from 24.9 to 27.2 percent and an 18.9 percent increase in the total volume of non-state assets. The source of this change in converted SOEs may be either the accumulation of new non-state assets or the conversion of state-owned assets to non-state ownership. In converted enterprises, the volume of state owned assets rises from an average of 48.2 million yuan in the year prior to conversion to 57.7 million yuan in 2001 for a 19.6 percent increase compared with an increase of only 9.2 percent in unconverted SOEs.

We draw two conclusions from these findings. First, conversion results in a substantially enhanced ability to attract non-state investment. Second, conversion does not result in a decline in the asset ownership by the state in converted enterprises. The second conclusion has two important implications. Conversion does not result in either the sale or uncompensated transfer of state-owned assets to non-state interests. Conversion tends not to involve retaining high-performing state assets in the converted enterprise, while shedding non-performing assets and debt obligations to the state and its banking system. Although examples of such stripping and creaming of the best state-owned assets exist, this behavior does not characterize the conversion of SOEs in our sample.[15]

The results in Table 6 indicate that conversion exerts a greater impact on capital productivity, at least through its direct continuing effect and induced effect, than on labor productivity. Since both capital and labor productivity are measured with respect to value added, this differential impact indicates that conversion results in a reduction in the

growth of the capital-labor ratio relative to unconverted SOEs so that converted shareholding enterprises exhibit relative decreases in the rate of capital deepening. To test this implication, we re-estimate equation (4) using the growth of the capital-labor ratio as the dependent variable. As Table 9 shows, all three channels of conversion, i.e., both the direct impact and continuing effects of conversion and the rise in non-state asset shares, contribute to reductions in the growth of the capital-labor ratio. This result may reflect the tendency of many LMEs to have experienced soft budget constraints associated with subsidized capital during central planning and continuing into the reform period. By relying more on non-state investment, converted firms may be assessing more aggressively the opportunity cost of bad investments.

These implications of conversion for the factor input mix of Chinese enterprises indicate that our estimate of the impact of conversion on profitability may be sensitive to the measure chosen. Hence, we re- estimate equation (4) using the return on capital, i.e., *PROF/K*, as the profitability measure. The results in Table 9 confirm these expectations. Whereas conversion had no statistically significant impact on the growth of profitability measured as a ratio of sales in Table 6, conversion increases profitability through all three channels to a statistically significant extent when the alternative measure of return to capital is used.

7. Conclusion

Conventional wisdom suggests that shifting firms toward private control leads to improved firm performance; our findings for China support this view. We identify the channels through which conversion leads to improvements in firm performance, the most

important being the accumulation of non-state assets associated with the conversion event. Our results indicate that, whether or not firms are converted, non-state investment embodies technologies that are more labor using while conversion substantially accelerates the acquisition of these labor-using non-state investments. Hence, the benefit of conversion is not simply that the pace of non-state investment accelerates, but also that the speed up in non-state investment resulting from conversion is labor-using. This tendency for converted firms to accelerate labor-using investment may result from a stronger profit orientation. Although we cannot determine whether this reorientation arises from a change in internal governance or an external hardening of the budget constraint, the more extensive use of labor-using technologies is consistent with China's underlying comparative advantage.

A pervasive legacy of central planning is the overcapitalization of Chinese industrial enterprises. This reliance on capital-intensive production techniques was promoted by financial repression that provided inexpensive capital to industry. Facing little technical innovation to increase labor productivity, during the socialist era central planners largely relied on capital deepening to achieve gains in labor productivity. Pursuit of this capital-intensive development strategy under a regime of distorted factor prices led China away from its comparative factor advantage and significantly compromised economic efficiency. We expect the greater use of labor-intensive production methods by converted SOEs to enhance the productivity and profitability of China's industrial enterprises. In addition, we find that the infusion of non-state investment associated with conversion leads also to an intensification of R&D effort. Fisher-Vanden and Jefferson (2004) show that in-house R&D in Chinese enterprises

tends to be labor-using and capital-saving, which is consistent with the reorientation of non-state investment that we identify in this paper. The extent to which non-state investment and R&D interact through the conversion process to promote the adoption of labor-using technologies in China is an interesting issue for further study.

Table 1: Ownership Distribution: Number of Firms and % of Total

Ownership type	1994	2001
State-owned (SOE)	15,533 [67.9]	8,675 [37.9]
Collective-owned (COE)	4,068 [17.8]	2,465 [10.8]
H.K., Macao, Taiwan (HMT)	967 [4.2]	2,271 [9.9]
Foreign (FOR)	1,041 [4.6]	2,675 [11.7]
Shareholding (SHR)	961 [4.2]	5,659 [24.7]
Private (PRI)	7 [0.0]	984 [4.3]
Other domestic (OTH)	293 [1.3]	149 [0.7]
Total	22,870 [100.0]	22,878 [100.0]

Table 2: Ownership Classification and Asset Composition

Dependent Variable	ln(*VA/L*)	ln(*VA/K*)	ln(*Profit/ sales*)	ln(*New prod/sales*)	ln(*R&D exp/sales*)
Constant	1.086 (44.507)[2]	1.086 (44.508)	-2.295 (130.261)	-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)	-1.655 (16.940)	-0.994 (12.046)
HMT	0.342 (16.404)	0.342 (16.404)	-0.038 (2.161)	-3.333 (21.047)	-1.576 (11.789)
FOR	0.563 (26.914)	0.563 (26.914)	0.118 (6.741)	-3.958 (24.988)	-2.677 (20.018)
SHR	0.428 (40.585)	0.428 (40.585)	0.118 (13.31)	0.401 (4.986)	0.217 (3.203)
OTH	0.315 (9.398)	0.315 (9.398)	-0.065 (2.297)	-0.838 (3.282)	-1.240 (5.749)
PRI	0.509 (19.609)	0.509 (19.609)	-0.108 (4.942)	-1.901 (9.630)	-1.569 (9.413)
STATE asset share	-0.046 (31.394)	-0.046 (31.394)	0.004 (3.257)	0.044 (3.941)	0.080 (8.461)
FOR/HMT asset share	0.062 (23.786)	0.062 (23.786)	-0.008 (-3.571)	0.193 (9.793)	0.022 (1.304)
Industry	yes	yes	yes	yes	yes
Time	yes	yes	yes	yes	yes
Adj. R-sq (obs.)	0.392 (96,908)	0.298 (96,908)	0.106 (87,820)	0.179 (96,908)	0.099 (96,908)

Note: The figures in parentheses are t-statistics.

Table 3: SOE Conversions

Total population of SOE conversions								
Old	New	1996	1997	1998	1999	2000	2001	Total
SOE	SOE	12,909	13,268	11,326	9,824	8,711	6,899	62,937
SOE	COE	16	69	145	64	52	52	398
SOE	HMT	3	13	16	14	10	14	70
SOE	FOR	11	15	21	5	5	6	63
SOE	SHR	87	342	546	319	517	454	2,265
SOE	PRI	1	10	31	14	30	36	122
SOE	OTH	5	28	40	23	12	10	118
TOTAL		13,032	13,745	12,125	10,263	9,337	7,471	65,973
Sample								
Old	New	1996	1997	1998	1999	2000	2001	Total (96-00)
SOE	SOE	2,644	3,255	3,690	4,360	5,301	-	19,250
SOE	SHR	13	72	269	415	730	-	1,499

Table 4: Characteristics of Converted Enterprises

	SOE-SHR conversions (probit: SOE = 0; SHR = 1)				
ln(*VA/L*$_{t-1}$)	0.001 (0.98)	-	-	-	-
ln(*VA/K*$_{t-1}$)	-	0.030 (2.85)	-	-	-
ln(*Profit/sales*$_{t-1}$)	-	-	1.877 (5.20)	-	-
ln(*NP/sales* $_{t-1}$)	-	-	-	0.216 (0.98)	-
ln(*RDE/sales* $_{t-1}$)	-	-	-	-	0.790 (0.70)
IND	yes	yes	yes	yes	yes
Region	yes	yes	yes	yes	yes
Year	yes	yes	yes	yes	yes
# of obs (pseudo R^2)	20,282 (0.073)	20,282 (0.074)	20,282 (0.078)	20,282 (0.073)	20,282 (0.073)

Table 5. First-stage Results

Dependent Variable: $g(SH\_NSA_{t-1,2001} + 1)$	
$\ln(SH\_NSA_{t-1} + 1)$	-0.136 (-49.18)
$g(SH\_NSA_{t-1,2001} + 1)$ (3-digit SIC level)	0.713 (15.94)
North	0.010 (4.00)
Northeast	0.005 (1.73)
East	0.019 (8.06)
South	0.011 (4.66)
Southwest	0.013 (4.57)
Large I (largest)	0.019 (4.69)
Large II (second tier largest)	0.012 (6.28)
Large III (third tier largest)	0.009 (6.43)
Middle I (large middle size)	0.005 (3.73)
Dummy for 1996	0.004 (1.95)
Dummy for 1997	0.007 (3.64)
Dummy for 1998	0.011 (5.75)
Dummy for 1999	0.016 (8.30
Dummy for 3-digit industries	yes
Number of obs.	20,736
Adj. R-squared	0.163

Table 6: Second-stage Results

Dependent Variable	g($VA/K_{t-1,2001}+1$)		g($VA/L_{t-1,2001}+1$)		g($Prof/sales_{t-1,2001}+1$)		g($NP/sales_{t-1,2001}+1$)		g($RD/sales_{t-1,2001}+1$)	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
lnZ_{t-1}	-0.137 (-54.45)	-0.136 (-54.11)	-0.074 (-40.88)	-0.074 (-40.51)	-0.170 (-73.19)	-0.169 (-72.86)	-0.166 (-79.00)	-0.174 (-81.48)	-.273 (-131.21)	-0.275 (-132.78)
SHR dummy (conversion year)	0.015 (3.82)	0.025 (6.47)	0.018 (1.87)	0.033 (3.46)	0.002 (1.32)	0.003 (1.68)	-0.002 (-1.10)	0.000 (0.17)	-.001 (-1.76)	0.000 (-1.19)
SHR dummy (continuing	0.017 (4.19)	0.022 (5.46)	-0.004 (-0.41)	0.003 (0.33)	-0.001 (-0.43)	0.000 (-0.28)	-0.008 (-4.80)	-0.006 (-4.19)	0.000 (0.38)	0.000 (0.74)
g($SH\_NSA_{t-1,2001}+1$)	0.121 (13.05)	n.a.	0.166 (7.38)	n.a.	0.005 (1.31)	n.a.	0.037 (10.12)	n.a.	0.004 (6.53)	n.a.
IV g($SH\_NSA_{t-1,2001}+1$)	n.a.	0.239 (7.80) [0.080]	n.a.	0.199 (2.67) [0.031]	n.a.	-0.006 (-0.51) [-0.007]	n.a.	0.249 (20.05) [0.502]	n.a.	0.039 (16.96) [0.816]
ln($SH\_NSA_{t-1}+1$)	0.026 (6.79)	0.039 (7.37)	0.063 (6.64)	0.064 (4.99)	0.002 (1.60)	0.001 (0.48)	0.018 (11.34)	0.044 (20.48)	0.003 (8.84)	0.007 (17.16)
1996	0.000 (-0.10)	-0.001 (-0.32)	0.002 (0.34)	0.002 (0.29)	-0.001 (-1.29)	-0.001 (-1.25)	-0.001 (-1.24)	-0.002 (-2.16)	0.000 (1.30)	0.000 (0.61)
1997	-0.001 (-0.21)	-0.002 (-0.81)	0.008 (1.33)	0.007 (1.15)	-0.003 (-2.58)	-0.003 (-2.48)	-0.001 (-1.30)	-0.004 (-3.49)	0.000 (1.48)	0.000 (-0.24)
1998	0.003 (1.02)	0.001 (0.27)	0.022 (3.59)	0.021 (3.37)	-0.003 (-3.02)	-0.003 (-2.85)	-0.002 (-2.33)	-0.005 (-5.20)	0.000 (1.62)	0.000 (-0.76)
1999	0.008 (3.14)	0.004 (1.69)	0.029 (4.99)	0.028 (4.5)	-0.004 (-4.09)	-0.004 (-3.69)	-0.004 (-4.33)	-0.009 (-9.37)	0.000 (0.74)	-0.001 (-3.60)
_cons	0.043 (18.65)	0.040 (16.93)	0.258 (36.92)	0.256 (35.5)	0.020 (22.88)	0.020 (22.47)	0.010 (12.92)	0.007 (7.91)	0.001 (9.92)	0.001 (5.04)
Number of obs.	20,736	20,736	20,736	20,736	20,736	20,736	20,736	20,736	20,736	20,736
Adj. R-squared	0.137	0.133	0.078	0.075	0.206	0.206	0.233	0.244	0.455	0.461

Table 7: Change in Non-state Asset Share

Dependent variable	g($SH\_NSA_{t-1,01}$)
Constant	0.029 (48.98)
Ln(SH_NSA_{t-1})	-0.136 (50.05)
D(OWN) dummy (conversion year)	0.100 (33.88)
D(OWN) dummy (continuing effect)	0.050 (17.15)
Adj. R-sq (obs)	0.140 (20,749)

Table 8: Average Non-state Asset Shares, in thousands of yuan

	unconverted firms (obs. = 19,250)			newly converted firms (obs. = 730)		
	state assets	non-state assets	total assets	state assets	non-state assets	total assets
t-1	100,686	33,350	134,036	48,213	23,295	71,508
2001	109,899	41,138	151,037	57,683	52,988	110,671
growth	9.2%	18.9%	11.3%	19.6%	127.5%	35.4%

Table 9: The Impact of Conversion

Dependent Variable	$g(K/L_{t-1,2001}+1)$		$g(Prof/K_{t-1,2001}+1)$	
	OLS	IV	OLS	IV
$\ln Z_{t-1}$	-0.054 (-32.24)	-0.056 (-32.73)	-.159 (-63.01)	-0.159 (-62.57)
D(OWN) (continuing effect)	-0.028 (-3.52)	-0.031 (-3.93)	.008 (2.78)	0.011 (4.02)
D(OWN) dummy (conversion year)	-0.018 (-2.25)	-0.024 (-3.03)	.009 (3.18)	0.016 (5.73)
$g(SH\_NSA_{t-1,2001}+1)$	-0.087 (-4.64)	-	.086 (12.74)	-
IV for $g(SH\_NSA_{t-1,2001}+1)$	-	-0.418 (-6.72)	-	0.183 (8.18)
$\ln(SH\_NSA_{t-1}+1)$	0.004 (0.50)	-0.036 (-3.36)	.022 (7.72)	0.033 (8.39)
1996	-0.016 (-2.92)	-0.014 (-2.58)	-.002 (-1.26)	-0.003 (-1.51)
1997	-0.01 (-1.96)	-0.006 (-1.2)	-.004 (-1.91)	-0.005 (-2.57)
1998	-0.011 (-2.22)	-0.006 (-1.2)	-.002 (-1.10)	-0.004 (-1.93)
1999	-0.017 (-3.33)	-0.008 (-1.49)	-.000 (-0.22)	-0.003 (-1.70)
constant	0.322 (45.38)	0.332 (45.38)	.025 (15.34)	0.023 (13.79)
Number of obs.	20,736	20,736	20,716	20,716
Adj R-squared	0.055	0.056	0.171	0.167

Note: For both estimation equations, the Hausman test is unable to reject the hypothesis of endogeneity at the 5% level.

References

Birdsall, Nancy and Nellis, John, 2003. "Winners and Losers: Assessing the Distributional Impact of Privatization," *World Development*, 31,10: 1617-1633.

Djankov, Simeon and Murrell, Peter, 2002. Enterprise Restructuring in Transition: A Quantitative Survey, *Journal of Economic Literature*, 40, no. 3:739-792.

Dong, Xiao-yuan, Bowles, Paul, and. Ho, Samuel P.S., 2002. Share Ownership and Employee Attitudes: Some Evidence from China's Post privatization Rural Industry, *Journal of Comparative Economics*, 30, no. 4: 812-835.

Fan, Gang, 2002. Progress in Ownership Changes and Hidden Risks in China's Transition, *Transition Newsletter*, 13, no. 3 (May-June):1-5.

Fisher-Vanden and. Jefferson,. Gary H., 2004. "Technology Diversity and Development: Evidence from China's Industrial Enterprises," working paper, http://people.brandeis.edu/~jefferso/index.htm

Forbes, Kristen. J., 2000. "A Reassessment of the Relationship Between Inequality and Growth," *American Economic Review*, 90, no. 4:868-887.

Hausman, Jerry.A., 1978. "Specification Tests in Econometrics," *Econometrica* 46, 1251-1271.

Jefferson, Gary H., Zhang, Ping, and. Zhao, John. Z.Q., 1998. Structure, Authority, and Incentives in Chinese Industry. In *Enterprise Reform in China: Ownership, Transition, and Performance*, ed. G. Jefferson and I. Singh. New York: Oxford University Press.

Jefferson, Gary H., Lu, Mai and Zhao. John Z.Q., 1998. “Reforming Property Rights in Chinese Industry" in Jefferson and Singh, *Enterprise Reform in China: Ownership, Transition, and Performance*, Oxford University Press, 1998.

Jefferson, Gary H. and Rawski, Thomas G., 1995. "How Industrial Reform Worked in China: The Role of Innovation, Competition, and Property Rights," *Proceedings of the World Bank Annual Conference on Development Economics 1994*, 129-156, 1995.

Jefferson, Gary H., Rawski, Thomas G., Wang, Li and Zheng, Yuxin, 2000. “Ownership, Productivity Change, and Financial Performance in Chinese Industry,” *Journal of Comparative Economics*. 28, no. 4: 786-813.

La Porta and Lopez-de-Silanes, Florencio, 1999. “Benefits of Privatization - Evidence from Mexico,” *Quarterly Journal of Economics* 114, no. 4: 193-242.

Li, Hongbin and Rozelle, Scott, 2000. “Savings or Stripping Rural Industry: An Analysis of Privatization and Efficiency in China,” *Agricultural Economics* 23, no. 3:241-252.

Li, Shaomin, Li, Shuhe, and Zhang, Weiying. 2000. “The Road to Capitalism: Competition and Institutional Change in China,”. *Journal of Comparative Economics* 28: 269-292.

Li, Zhenhua, 2005. “A big move for the Bank of China and the Construction Bank of China-riding of non-performing assets of 197 billion yuan,”(Zhonghang, Jianhang gugai zaichu dashoubi, boli buliang zichan 1970 yiyuan), *Twenty-first Century Financial Report*, 05/24/2004, http://www.e521.com/cjkx/guonei/0524085702.htm, accessed June 5, 2005.

Lin, Justin Yifu: Cai, Fang, and Li, Zhou., 1998. Competition, Policy Burdens, and State-Owned Enterprise Reform. *American Economic Review* 88:422-27.

Lin, Yimin and Zhu, Tian., 2001. "Ownership Restructuring in Chinese State Industry: An Analysis of Evidence on Initial Organizational Changes," *China Quarterly*, 166.

McMillan, John and Naughton, Barry, 1992. "How to Reform a Planned Economy: Lessons from China," *Oxford Review of Economics and Politics*, 8,1: 130-143.

Megginson, William L. and. Netter, Jeffrey M., 2001. "From State to Market: A Survey of Empirical Studies on Privatization," *Journal of Economic Literature* 39, no. 2: 321-389.

Naughton, Barry, 1992. "Implications of the State Monopoly over Industry and its Relaxation," *Modern China* 18,1:14-41.

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

Ning, Shao, Zhou, Fangshen and Zhijun Xiong, 2002. *Report on the Loss-stopping of Chinese Enterprises (Zhongguo Qiye Tuokun Baogao)*, Economics and Management Press, Beijing.

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

Song, Ligang and Yao,Yang., 2004. "Impacts of Privatization on Firm Performance in China," Working paper, Peking University.

Su, Jian and. Jefferson, Gary H., 2004.. "The Determinants of Decentralized Privatization:Theory and Evidence from China," http://people.brandeis.edu/~jefferso/index.htm

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

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

Wu, Hui and Tang , Kun, 2005. "One more move toward shareholding reform, the Industrial and Commercial Bank of China dispose of 246 billion yuan of its non-performing assets (gonghang gugai you jin yibu, 2460 yuan sunshi lei buliang daikuan bei boli), 05/31/2005, *First Financial Daily*, http://news.hexun.com/detail.aspx?lm=1713&id=1173274, accessed 06/05/2005.

Xu, Colin, Zhu, Tian, and Lin, Yimin, 2005, "Politician Control, Agency Problems, and Ownership Reform: Evidence from China," *Economics of Transition*, 13(1).

Yusuf, Shahid, Nabeshima, Kaoru and. Perkins. Dwight H., 2005. "Under New Ownership: Privatizing China's Enterprises," manuscript, January 13, 2005.

Endnotes

[1] Output from the collective-owned sector accounted for nearly two-thirds of the balance.

[2] Subsequent to the conversion of commune enterprises to TVEs in the early 1980s and in an effort to build on their success, many townships and villages established new TVEs.

[3] Li, Li, and Zhang (2000) demonstrate that competition requires local governments to improve the efficiency of SOEs and COEs under their jurisdiction. They postulate a certain inevitable process in which reform and competition lead to privatization, with an emphasis on insider privatization.

[4] Birdsall and Nellis (2003) focus less on the impact of privatization on the conventional performance measures of performance and more its distributive implications. They find that, by altering the distribution of costs and benefits of ownership, privatization may affect a broader range of stakeholders than is taken account of in the conventional privatization literature. Specifically, they find that privatization appears to have made the distribution of assets and income less equal, at least in the short run, in transition economies and, to a lesser extent, in Latin America.

[5] Based on the same survey, Dong, Bowles, and Ho (2002b) report the impacts of share ownership on employee attitudes. Their results indicate that 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 do non-shareholders in privatized firms.

[6] Using a sample of 826 corporations listed on China's stock market, Tian (2000) investigates the impact of state shareholding on corporate value and finds a U-shaped relationship between the proportion of government equity and corporate value. He argues that the U-shape reflects the behavior of a government that is maximizing its overall.

[7] During the period from 1995 to 2001, the NBS changed its system of ownership classification. For the purpose of comparing categories of ownership and tracking ownership reform, we use the concordance that aggregates 23 detailed categories prior to 1998 into seven broader categories, namely, SOEs, COEs, HMT, FOR, shareholding enterprises (SHR), and other domestic enterprises (OTH) and tracks closely the classification system currently used in the *China Statistical Yearbook*. The concordance is available from the authors upon request.

[8] The number 3,036 is computed as the sum of the SOE to non-SOE conversions shown in the last column of Table 3.

[9] A substantial number of converted enterprises change their ID in the conversion process and, therefore, cannot be tracked. Our attempt to match pre- and post-converted enterprises indicates that conversions involving changing in industry classifications, size classifications, or locations raise the likelihood of the issuance of a new ID. Therefore,

although our sample is only a fraction of the total number of converted enterprises, we tend to control for industry, size, and location so that the comparative statistical analysis focuses on the independent effect of conversion.

[10] These results, not reported in the paper, are available from the authors.

[11] The standard models of single factor productivity, based on intensive forms of the production function, profit equations, or R&D effort equations, typically include inputs of capital and labor or measures of factor intensity. The fixed-effects term in our model accounts for systematic differences in these measures across firms, while the evolution of these measures, e.g. the capital-labor ratio, are assumed to be endogenous in that they are generated by conversion and the accumulation of non-state assets.

[12] In addition, values of Z may exhibit mean reversion due to diminishing returns to managerial quality in firms with high quality managers, knowledge spillovers from stronger to weaker firms, and greater learning by doing opportunities for low performing firms. This phenomenon would also lead to the prediction of negative estimates of the coefficient on $Z_{it-1.}$

[13] The prospect of such predictive sample selection bias is likely to be small for the following three reasons. First, the firm's fixed characteristics, e.g., location, specific industry classification, and managerial quality, are likely to be the most important determinants of the conversion decision. Second, apart from these firm-specific fixed characteristics, the conversion decision is to depend on characteristics of the agents themselves, such as the fit of the firm in the agent's portfolio of other investments and the agent's specific entrepreneurial and managerial capabilities. To the extent that these fixed effects shape the firm's post-conversion performance, they are captured by w_i; to the extent that they are idiosyncratic, time-varying effects, they are captured by e_t and not correlated with D(OWN) across the sample. Finally, even if time-variant determinants of the conversion decision apart from Z_i affect the conversion decision, they may not be associated systematically with the firm's subsequent performance. Hence, information that is available at the time of the decision apart from w_i, and Z_i may not provide significant predictive value for $gZ_{i,t-1 \text{ to } 2001}$. All new information emerging after the conversion decision that is firm-specific, such as unanticipated quits and innovations, or that is within the firm's market environment, such as new competitors and regulations, is captured by $\varepsilon_{t-1 \text{ to } 2001}$ and uncorrelated with D(OWN). Nonetheless, we acknowledge that equation (4) does not control for possible predictive selection bias that could lead to biased estimates of the ownership coefficients.

[14] To account for the possibility that some calculated growth rates may be negative or zero, we add one (1) to the variable so that we take the natural log of $g(Z+1)$ and $g(SH\_NSA_{i,\, t-1,\, 2001} + 1)$.

[15] The restructuring of the Changchun Motor Vehicle Lights Factory entailed the use of its high-performing assets to set up a new, independent company, the Changchun Motor Vehicle Lights Corporation (Ltd), while the low-quality assets remained in the hands of

the original state-owned factory (Ning et al, 2002, pp. 310-311).