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Abstract: This paper studies the impact of privatization on firm performance in China. Using a unique dataset, we are able to control the selection biases of privatization and handle the missing variable problem that are frequently encountered in the transition economics literature. Privatization is found to have a significantly positive impact on firm profitability, but a weak or no significant impact on unit cost and labor productivity. Clear time trends are found for the effect of privatization. Firms with medium length of privatization and firms privatized in the period 1997-1999 are found to have more robust effects.

Keywords : privatization, transition economics, Chinese economy

JEL Classification: L25, P27, P31

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Impacts of Privatization on Firm Performance in China

1. Introduction

While the early reforms had improved the efficiency of the Chinese state-owned enterprises (SOEs) in various aspects (Gordon and Li, 1995; Groves, Hong, McMillan, and Naughton, 1994, 1995; and Li, 1997), market liberalization in the 1990s had nonetheless increased the competition from the private sector and pressed local governments to privatize their SOEs (Cao, Qian, and Weingast, 1999; Li, Li, and Zhang, 1999; Tian, 2001; Guo and Yao, 2003; Su and Jefferson, 2003). The privatization drive started in the early 1990s and has considerably accelerated since the mid-1990s when the central government formally sanctioned restructuring, or *gaizhi* in Chinese, as a way to reform the Chinese SOEs. Restructuring in the Chinese context covers a wide variety of forms ranging from corporatization of the SOE to an outright sale of the firm to an outside private buyer. Through restructuring, the government has released the control of a large number of SOEs. Figure 1 shows the trends of privatization of industrial SOEs in China and the 11 cities in the sample of this study for the period of 1996–2001. The figure takes the number of state-controlled industrial firms — defined as those with more than 50 per cent (inclusive) of their shares controlled by the government — in 1996 as 100 per cent and shows the percentage of the remaining state-controlled firms in each subsequent year. Treating the lost firms as being privatized,¹ one realizes that about 40 per cent of the SOEs were privatized in China during the period 1996-2001. The pace of privatization was even faster in our sample. Only about half of the state-controlled firms of 1996 were left by 2001.

[Figure 1 here]

Despite the significance of the change, there are surprisingly a limited number of empirical studies regarding its process and impacts (Megginson and Netter, 2001 and Djankov and Murrell, 2002). This deficiency is largely related to the lack of data. Thanks

¹ Such treatment is subject to two qualifications, though. First, some firms may have vanished not because of privatization but because of simple closing-up, which implies that our measure of privatization is upward-biased. Second, new SOEs may be established over the period, which implies that our measure is downward-biased.

to a recent large survey of 683 firms in 11 cities for the period 1995-2001, this paper is able to provide an in-depth assessment of the impacts of the Chinese privatization on firm performance. In a way it is a continuation of the earlier studies on the incentive schemes adopted by the earlier reforms, but the sheer magnitude of the event under this study singles it out from the early studies.

In addition, with the help of a panel structure and detailed accounting information, our data enables us to effectively deal with the difficulties, noticeably, the selection bias of privatization and the missing variable problem, that have frequently plagued similar studies on other transition countries. We adopt two ways to control the selection bias of privatization. One is to control a firm's past performance, and the other is to control the firm specific effects in a standard panel model. We lay more confidence on results that are robust in both kinds of estimation.

We study the productive implications of the amount of private shares in a firm and compare the efficiency of fully state-owned firms (with 100 per cent state shares), state controlled firms (the amount of state shares is no less than 50 per cent but less than 100 per cent), and private controlled firms (the amount of private shares is no less than 50 per cent). The indicators that we adopt to measure efficiency are pre-tax profit rate over assets, cost per unit revenue, and labor productivity. These three indicators are frequently studied in the literature. We find that increasing private shares has a positive effect on profitability but only under the condition that the amount of private shares passes a certain threshold. A firm controlled by state shares trims a fully state-owned firm by 2.70 percentage points in the profit rate, and a firm controlled by private shares does so by 1.21 percentage points. Compared with the yearly average profit rate of -0.93 per cent to -1.17 per cent in the sample, those differences have a high economic significance. However, unit cost and labor productivity do not respond to the amount of private shares. These results are qualitatively preserved after we control the debt reductions and discounts in privatization prices in the first year of privatization.

We have also studied two kinds of time trend. One is the post-privatization trend arising from the transitory selection biases proposed by Frydman, Gray, Hessel, and Rapaczynski (1999), and the other is the "pretty daughters" effect by which earlier privatized firms

perform better than the latecomers. The study finds that the effect of privatization is more robust for firms with medium length of privatization and firms privatized in the period 1997-1999 (the middle of the coverage of our data). This rejects the existence of transitory selection biases, but lend supports to the “prettier daughters” effect.

Jefferson and Su (2003) and Xu, Zhu, and Lin (2003) also study the performance of the Chinese privatization. Xu et al. (2003) study the effects of politician control and board structure, so their results are complementary to ours. Jefferson and Su (2003) address the same question that this paper tries to answer. While it is considerably larger than ours, their dataset lacks detailed information of share structure. This forces them to categorize privatization by the change of a firm’s legal registration. A firm is regarded as privatized if its legal registration is changed from state-owned firm to another type of registration. This categorization faces two problems. An SOE is given the option to register as a state-owned firm or a company, so changing the registration from a state-owned firm to a company does not necessarily mean that this firm was privatized. In addition, Jefferson and Su cannot identify the extent of privatization because they do not have information on shares. Therefore, we are able to provide a more detailed study than theirs despite having a smaller dataset.

The remainder of the paper is arranged as follows. Section 2 describes the data, re-samples the data to correct the selection biases arising in the implementation stage of the survey, and introduces the variables. Section 3 discusses the econometric issues, emphasizing those that concern the selection biases of privatization. Section 4 presents the main results regarding the impacts of privatization on firm performance. Section 5 studies the time trends. Section 6 then concludes the paper.

2. Data and measurements

Data issues

Data used in this study come from a 2002 International Finance Corporation survey conducted on 683 firms in 11 Chinese cities. These cities, from north to south, are Harbin, Fushun, Tangshan, Xining, Lanzhou, Chengdu, Guiyang, Weifang, Zhenjiang, Huangshi,

and Hengyang. Some of them are large provincial capitals, and the others are medium sized cities. The choice of these cities was not made on the basis of random sampling, but rather on their geographic and economic representation. Harbin, Fushun, Tanshan, Lanzhou, and Chengdu are important industrial bases and are suffering from the sluggish SOE sector and related unemployment problem. Xining and Guiyang are less important in China's industrial development, but also have a significant presence of SOEs. Weifang, Zhejiang, Huangshi, and Hengyang are medium-sized cities; they are more swift and flexible in implementing restructuring and privatization programs. The initial design of the survey was to survey all the SOEs managed by each city as of the end of 1995 and record data toward the end of 2001. The year 1995 was chosen because large-scale privatization started in 1996. Several problems arising in the implementation stage need to be addressed before we move on to discuss the variables.

The first problem is firm attrition due to bankruptcy. The current Chinese *Bankruptcy Law* only applies to SOEs, and bankruptcy does not necessarily lead to the liquidation of the bankrupt firm. It is often the case that the firm is reorganized and operates under a new name.² Therefore, the sample includes firms that have experienced bankruptcy. Nevertheless, there must be firms that had been actually liquidated and thus were not captured by the survey. Because those firms tended to be those with poor performance, our sample was potentially biased upward in terms of performance. However, this bias may not have a significant impact on our estimation of the effect of privatization because, should the dissolved firm remained in operation, it could have either remained as an SOE or been privatized.

The second problem is concerned with merger and split. It is usually the case that the less performing firm loses its name and the better performing firm retains its name in a merger. So there is a potential upward bias of performance in the sample. To avoid this problem, data were recorded from the year of the merger. That is, only the new firm was surveyed. In the case of a split, the largest of the new active firms was surveyed and data

² Bankruptcy is often used as a means to evade state bank debts. Because the banks are owned by the central government, local governments have an incentive to collude with local firms to use bankruptcy to evade bank debts (see Garnalt et al., 2003 for more discussion and Gao and Yao, 1999 for a theoretical treatment of the issue).

were recorded from the year of the split. It was often the case that splits took the form of spinning off, that is, the old firm spun off a new firm and moved all the production to this new firm, leaving the old firm only with a name, bank debts, and the burden of retirees (Garnaut, Song, Tenev, and Yao, 2003). As a result, the only active firm was the new firm. The estimate of the effect of privatization is not likely to be affected, though, because spinning off does not necessarily lead to more privatization.

The third problem is selection biases when the questionnaires were administered. Self-selection on the part of the firms in returning the questionnaire was one factor, and selection on the part of the city Economic and Trade Commissions (ETCs) — the local counterparts that implemented the survey — was another. The first is unavoidable in any voluntary survey, but hopefully the selection was not systematically related to the choice of privatization. However, the second factor may bring real concerns as local officials might press the firms that had closer ties with the government, usually the larger ones and non-privatized SOEs, to fill the questionnaire. This selection problem may cause over-sampling of non-privatized SOEs, so the sample could produce biased estimates if one were concerned with the effects of privatization. We have the number of firms that were fully owned or controlled by the government in each city in each year, so weighted regressions can be adopted to correct for this bias. To accommodate different methods of regression, however, we have adopted a different strategy to re-sample the SOEs in each city by the following method.

Let s_{it} stand for the share of fully state-owned and state-controlled SOEs (just called SOEs in this paragraph) in city i in year t in terms of the number of such SOEs in the city at the end of 1995. That is, s_{it} measures the extent of privatization in the city. Let \hat{s}_i be the share of those firms in the sample. Then the weight for the SOEs in city i in year t is defined as $w_{it} = s_{it} / \hat{s}_i$, which would be used if weighted regressions were performed. It would also be ideal to use these weights to re-sample the SOEs in each city in each year. To maintain the panel structure of the data, however, we first create a weighted weight for each city $\hat{w}_i = \sum_t w_{it} (N_{it} / N_i)$, where N_{it} is the number of SOEs for city i in year t in the sample, and N_i is the sum of those numbers in the period of 1995-2001. Then this weight is used to

sample the SOEs of 2001 in each city, and data of the earlier years are matched to this new sample accordingly.

The validity of the above re-sampling strategy relies on the assumption that randomness is preserved among the SOEs and among the privatized firms in each city, respectively. There is no doubt that this assumption does not hold strictly for the survey, but we contend that this is the farthest that we can go. The new sample is an unbalanced one of 608 firms with various data lengths in the period 1995-2001. By the end of 2001, 39.8 per cent of these firms had experienced some form of restructuring, 24.5 per cent had private shares, and 19.1 were controlled by private shares.

Performance indicators

Three indicators, profitability, unit cost, and labor productivity, are used in this study to measure firm performance. Profitability is defined as the return to assets, that is, the percentage of the pre-tax profit over the total value of assets. The total value, instead of the net value is used because many firms had negative net value of assets. Profitability is the most comprehensive measure of firm efficiency. Unit cost is the percentage of the material and operational cost over the revenue. Here the cost does not include wage payroll. So our definition of the unit cost is different from that defined by Frydman et al. (1999) who include both material and labor costs in the total cost. The unit cost would become the mirror indicator of profitability if we adopted their definition. That is why we have avoided it.³ Labor costs are partly reflected by labor productivity. Same as the definition of Frydman et al. (1999), our definition of the unit cost also serves the purpose to account for a firm's passive restructuring measures centered at cost reduction. Labor productivity is defined as the revenue contributed by an on-duty worker. A salient feature of the Chinese SOEs is their worker redundancy. A considerable portion of the workforce is not active although it is attached to a particular firm.⁴ So we use the number of on-duty workers in

³ Frydman et al. (1999) do not study profitability.

⁴ There are two categories of redundant workers. One is internal retirement, and the other is the so-called *xiagang*, i.e., a situation in which a worker is legally attached to a firm but nevertheless does not work in it. The first type of workers is fully supported by individual firms, and the second type is supported by both the firm and the local government.

model estimation. The revenue has been adjusted using China's overall GDP price deflator. Labor productivity captures the features of both passive adjustments and positive expansion by the firm. However, it may reflect more of the expansionary side in the Chinese context because of the rigidity in labor hiring.

Explanatory variables

We construct a set of explanatory variables along the line of private shares. Private shares can be owned by either insiders (managers and ordinary employees) or outsiders (mainly outside private firms). In addition to the percentage of private shares, we also construct two dummies for controlling shares. To be consistent with the official Chinese statistics, the threshold for controlling shares is set to be 50 per cent (inclusive). With the reference group defined as the old-style SOEs that are fully owned by the government, the first dummy is defined for firms that are not fully owned, but nevertheless controlled by government shares (state-controlled firms), and the second dummy is for firms that are controlled or fully owned by private shares (private controlled firms). We classify shares owned by another SOEs also as government shares. The percentage of private shares and the controlling dummies are widely used in the literature to capture the extent of privatization (Djankov and Murrell, 2002).

[Figure 2 here]

Figure 2 show the time trends of the three performance indicators by the controlling shares. Privatization is shown to have significant positive effects on all three measures of performance (weaker for labor productivity, though). However, these effects are only indicative because other factors are not controlled for in the comparison. In particular, there may be a selection bias in privatization in the sense that better performing firms are selected for privatization first. Other selection biases may also create a rosy picture for the effects of privatization. We will deal with the problem in our econometric analysis.

Control variables

The survey provided rich accounting data so we are able to control factors other than the two sets of explanatory variables. There is a high probability that privatization is

correlated with firm characteristics, so the missing variable problem would be serious if firm characteristics were not controlled for. Three sets of control variables are used in our regressions. The first contains several firm-level variables. Employment in SOEs is largely controlled by the government, so it can be regarded as an external factor that influences an SOE's performance. Two variables are adopted to measure this factor. One is the logarithmic of the number of on-duty workers that controls for the firm size, and the other is the rate of worker redundancy that controls for the firm's worker redundancy.⁵ The rate of worker redundancy is the percentage of the number of "burden" workers over the number of on-duty workers. "Burden" workers include official retirees, internal retirees, and *xiagang* workers. Official retirees are counted as a social burden because in many cases firms are still responsible to directly pay their retirement wages despite China has established a new pension system that in most cases maintains a centralized system up to the provincial level.⁶ While firm size may have either a positive or negative impact on firm performance, a higher rate of worker redundancy is likely to result in worsened performance.

We use debt/asset ratio to control for a firm's financial stance. Here debt is the total amount of debts owned by a firm, and asset is the gross amount of assets instead of the net amount of assets because quite a few firms had negative values of net assets. It is expected that a higher debt/asset ratio would reduce firm performance. In addition, we include three variables to measure a firm's budget constraints imposed by the bank and the government. They are the percentage of accumulated overdue bank loans and interests over the yearend stock of outstanding loans (bank arrears), the percentage of accumulated overdue taxes over the tax payment in a particular year (tax arrears), and the percentage of accumulated overdue social security over the social security payment in a particular year (social security arrears). While the first variable measures the soft budget constraint problem when a firm deals with the bank, the last two variables measures the same problem when a firm deals

⁵ See Lin and Tan (1999) for a discussion on the implications of social burdens of SOEs.

⁶ There are serious problems in the transition from the old pay-as-you-go system to the new hybrid system of public and individual accounts. The central issue is how to finance workers that will not have paid for enough years upon their retirement. One of the difficulties faced by SOEs in privatization is related to this issue (Garnaut et al., 2003).

with the government, but maybe with different implications because firms are likely to face a harder budget constraint in the case of taxes than in the case of paying for social security. Garnaut et al. (2003) find that firms are more likely to evade liabilities owned by the government than liabilities owned by the bank. It is interesting to find out whether the soft-budget constraint with the government is more damaging to efficiency than that with the bank.

There is an endogeneity problem with the three soft-budget constraint variables. Indeed, the same problem may happen to the other control variables too. To deal with this problem and smoothen time variations, we use the lagged three-year moving averages of the above control variables in the regressions. To save data, however, we use the data of 1995 and the averages of 1995 and 1996, respectively, for the years of 1996 and 1997 that do not have three years before them in our data set. Thus doing, our data loses the year of 1995 and covers only the period of 1996-2001. Table 1 reports the basic statistics of the transformed control variables as well as of the performance indicators and explanatory variables for the period of 1996-2001. Because of the elimination of cases with missing data, the total number of firms left for regressions is 587, and the total number of cases is 3290.

The second set of control variables is introduced to control the restructuring in the year of privatization. A privatized firm's bank and commercial debts may be reduced through legal or extra-legal channels such as spinning off, split, and bankruptcy. If this happens, its performance is automatically improved. In addition, local governments often give discounts to privatization prices in order to induce purchases or to exchange for the new owner's consent to hire more workers. This will reduce the new owner's cash payments in the privatization deal and potentially enables him to make more investment into the firm, so the firm's efficiency is improved. To control for these possibilities, we construct three dummy variables to denote respectively, whether a privatized firm had its total debts reduced, whether it had its overdue bank debts reduced, and whether it got discounts on privatization prices, all in the first year of the introduction of private shares. The following example indicates how those three dummy variables are constructed. Suppose that a firm introduced its first set of private shares in 1998 and its total debts were reduced. Then the dummy for total debts takes zero for the years before 1998 and one for the years since 1998.

The other two dummies are constructed in the same way. It is noteworthy that a firm's debts may be reduced for normal reasons (e.g., better performance in a particular year), so having debts reduced may not be an indicator for getting preferential treatments. However, our data do not allow us to make it more precise. Nevertheless, to the extent that better performance in a particular year is linked with better performance in other years, our lumpy treatment of the reduced debts will not lead to significant biases to our estimates of the effect of privatization. Dummy instead of continuous variables are used because the percentages of firms with reduction in total and bank debts or price discounts are small. Among the cases with private shares (14% of the 3290 cases), only 10% had total debts reduced, and 3% had bank debts reduced. The percentage of firms with discounts in privatization prices was higher, reaching 24%.

The third set of control variables is comprised of sectoral, city, and year dummies. Industrial concentration in the sample is considerable, so the two-digit classification system is inadequate. We aggregate the two-digit industries into ten sectors: primary; food, beverage, and tobacco; textile and garments; furniture, toys, and printing; chemicals; metal refinement and products; ordinary manufacturing; electronics; public utilities; and services. This aggregation has arbitrary elements in it, but hopefully ten sectors are fine enough for our purpose to control sectoral variations in performance. China's restructuring program varies from city to city. Adding city dummies in the regressions will control for differences in restructuring and privatization as well as for the regional disparities in economic and social conditions. Year dummies are added to control for time-wise restructuring variations and changes in macroeconomic conditions in general.

3. Econometric issues

The panel structure of our data allows us to deal with the selection problem frequently encountered in the literature. Using the same data set, Guo and Yao (2003) show that better performing firms are indeed privatized first in our sample. To the extent that privatization is correlated with the control variables introduced in the last section, we have already placed quite strong control over time-variant selection biases.⁷ Two control methods have

⁷ An alternative is to adopt the instrumental variable method. However, this method is confined by the

been proposed in the literature to deal with time-invariant selection biases.

The first method rests on the premise that selection is based on a firm's pre-privatization performance, so controlling for pre-privatization performance can effectively correct the bias. However, this method does not fully control the bias if the selection is not solely based on pre-privatization performance, but also relies on a firm's long-term profitability. In addition, it is not feasible to identify a pre-privatization date if privatization takes a gradual approach so private shares increase incrementally throughout the years. This is exactly the case for the two sets of explanatory variables in this study. The second method is to adopt the standard fixed-effect (FE) panel method (e.g., Frydman et al., 1999). This method is based on the premise that the selection is based on a firm's intrinsic and long-term time invariant properties. In effect, it also takes care of the possibility dealt with by the first method, that is, firms are only selected based on their pre-privatization performance.

However, the FE method may impose too much control if the selection is only based on pre-privatization performance. In addition, it may not be so effective in our case because for a considerable number of firms the explanatory variables do not have much change in the period covered by the data. For example, among the 144 firms that had private shares, 19 of them, or 13.2 per cent did not have any change in their holding of private shares in the period 1996-2001. If the FE method were used, these firms would be treated as the same as those that had no private shares at all.

The above discussion leads us to adopt a compromised approach to our baseline regressions that controls the lagged three-year moving averages of the three performance indicators. This approach takes a position between controlling the pre-privatization conditions and controlling intrinsic firm characteristics. It takes care of the problem of gradual privatization that cannot be handled by merely controlling the initial conditions and avoids the possible over-control of the FE model.

availability of the instruments. Often the researcher has to face "the spurious exclusion" problem — it is hard to justify the exclusion of the instruments from the performance equations. Therefore, except for a few studies (e.g., Anderson et al., 2000), most of the studies in the literature do not adopt this approach.

The method of generating the data on the lagged performance variables is the same as what we have adopted for the control variables. However, putting these lags directly into the regressions would suck up the significance of most other variables if strong time persistency exists in the performance indicators, which is indeed the case shown by preliminary tests. To deal with this problem, we extract two principal components from the three lagged average performance indicators by adopting the standard principal component method. The two components together explain 75.4 per cent of the total variance of the three variables. The correlation coefficients between the first component and profitability, unit cost, and labor productivity are 0.32, 0.58, and 0.84, respectively; and between the second component and the three performance indicators are 0.82, -0.65, and 0.13, respectively. We call the first component the “expansion factor” because it has relatively high correlation with labor productivity and unit cost and low correlation with profitability; conversely, we call the second component the “saving factor” because it has high correlation with profitability and strongly negative correlation with unit cost, but low correlation with labor productivity. These two factors will be used in our regressions to control for the selection bias. So our baseline regression specification is

$$Y_{it} = \mathbf{a}_0 + \mathbf{b}P_{it} + \bar{X}_{it-1}\mathbf{g} + \bar{Y}_{it-1}\mathbf{f} + \mathbf{a}_s + \mathbf{a}_c + \mathbf{a}_t + e_{it}, \quad (1)$$

where Y_{it} is a performance measure, P_{it} is an explanatory variable, \bar{X}_{it-1} is the set of the lagged three-year averages of the first set of control variables, \bar{Y}_{it-1} contains the expansion factor and the saving factor, a_0 is the constant term, a_s , a_c and a_t are the sectoral, city, and year dummies with proper omission of the reference groups, and e_{it} is the stochastic error term with the usual probabilistic properties.

Admittedly, the expansion and saving factors do not control for all the selection bias in an exact way. However, the direction of the discrepancy is hard to predict. If the selection bias were only related to pre-privatization performance, using the two factors might undermine the effect of privatization because too much of the performance would be attributed to their influences at the time after privatization was first introduced for three or more years. Conversely, the control would not be sufficient if the selection bias were based on intrinsic firm characteristics. To test the sensitivity of our estimates, we will also

estimate the following firm fixed-effect (FE) model:

$$Y_{it} = \mathbf{a}_0 + \mathbf{b}P_{it} + \bar{X}_{it-1}\mathbf{g} + \mathbf{a}_i + \mathbf{a}_t + e_{it}, \quad (2)$$

where a_i is the i th firm's fixed effect. The sectoral and city dummies have to be dropped because of adding the firm fixed effects. The FE model is likely to provide the lower bounds of estimates of the impacts of privatization, for two reasons, both were discussed before. First, it would put too much control on the data if the selection bias were only related to pre-privatization performance; and second, it only allows for within-firm comparison. However, the FE model may provide even stronger results if the firms that did not change their privatization measures just happened to be those that performed poorly. Therefore, the FE model of equation (2) is best viewed as an alternative specification to the baseline specification (1). More confidence should be put on the estimates that are significant in both specifications.

We perform two sets of robustness checks on the above regressions. One is to control for the impacts of restructuring in the first year of privatization. To do that, we add to the two models the second set of control variables that were introduced in the last section. The second set of robustness checks are performed regarding the performance record of privatization over time. Specifically, we are concerned with two kinds of time trends. One is related to post-privatization performance, and the other is related to the year of the introduction of the first privatization measures. While these two trends are interesting in their own right, we intend to use them as an extra robustness check on the baseline and FE results.

For the first kind of time trend, Frydman et al. (1999) point out two kinds of selection bias that may distort the estimation of the effects of privatization. First, the manager may under-report the firm's performance (or deliberately perform poorly) before privatization in order to get a better deal in privatization, so the better post-privatization performance may be artificial. Second, a firm may have taken efficiency-enhancing measures (such as installing a new set of equipment) just before privatization so their effects are only felt after privatization. Those two kinds of selection bias suggest that privatization would only have a significant effect in the early years of privatization. We test this post-privatization time trend by estimating the following equation

$$Y_{it} = \mathbf{a}_0 + \sum_{k=1}^6 \mathbf{b}_k P_{it} \times Year_after_{ikt} + \bar{X}_{it-1} \mathbf{g} + \bar{Y}_{it-1} \mathbf{f} + \mathbf{a}_s + \mathbf{a}_c + \mathbf{a}_t + e_{it}, \quad (3)$$

where $Year_after_{ikt}$ is a dummy variable indicates the k th year after privatization. It takes value one if in the t th year firm i has been privatized for k years.⁸ In this setup, \mathbf{b}_k stands for the effect of privatization in the k th year after privatization. We would expect the value and significance of \mathbf{b}_{1k} to decrease as k increases if the two selection biases proposed by Frydman et al. (1999) were the major factors driving the trend.

For the second kind of time trend, we notice that later privatized firms may not perform as well as early privatized firms because privatization may be determined by unobserved firm characteristics that have productive implications only after privatization and do not show up before privatization. These characteristics may include the competence of the management team working independently of the government, its ability to set up the right corporate governance structure, possible strife between the management and the workers after privatization, and so forth. Provided that the local governments were aware of these factors, they may postpone the privatization for some and choose better firms to be privatized first. As the saying goes: “the prettier daughters are married out first.” So we will call this effect the “prettier daughters” effect. If this effect were strong, the privatization effect would be under-estimated for the early privatized firms.⁹ To accommodate this possibility, we are again concerned about the year in which a firm first started its privatization. For that purpose, we create a set of dummy variables indicating that a firm was privatized in year k , $Year_priv_{ikt}$, $k = 1996, 1997, \dots, 2001$. The variable $Year_priv_{ikt}$ takes value one for all $t = k$, and zero for all $t < k$.¹⁰ Then we estimate the following equation

⁸ This means that firms that had not started privatization by 2001 take a value of zero for any year. There are a few firms that first began privatization before 1995. For those firms, we assume that their first privatization measures were as if introduced in 1995.

⁹ Conversely, the effect of the later privatized firms would be under-estimated if “the pretty daughters” were married out late.

¹⁰ We treat all the firms privatized before 1996 as if they were privatized in 1996.

$$Y_{it} = \mathbf{a}_0 + \sum_{k=1996}^{2001} \mathbf{b}_k P_{it} \times Year_priv_{ikt} + \bar{X}_{it-1} \mathbf{g} + \bar{Y}_{it-1} \mathbf{f} + \mathbf{a}_s + \mathbf{a}_c + \mathbf{a}_l + e_{it}. \quad (4)$$

So \mathbf{b}_1 measures the impact for firms privatized in 1996, \mathbf{b}_2 for firms privatized in 1997, and so on. If the “prettier aughters” effect existed, the magnitude and significance of \mathbf{b}_{1k} would decrease as k increases.

4. Impacts of privatization

The baseline and FE results

The baseline specification (1) and the FE model (2) are estimated separately for profitability, unit cost, and labor productivity. As we pointed out in the last section, the FE model is best seen as an alternative specification to the baseline model. Here we discuss its results together with the baseline results. We are especially interested in the estimates that are significant under both specifications.

[Table 2 here]

The results in Table 2 show the comparison between private and state shares under the baseline specification. For each performance indicator, two regressions are run. One uses the continuous variable of the percentage of private shares, and the other uses the two dummy variables indicating state controlled and private controlled firms, respectively. The results concerning the effects of privatization are mixed. While it significantly increases firm profitability, the percentage of private shares has no significant impact on unit cost and labor productivity. State controlled firms are only more efficient than fully government owned firms in terms of unit cost, and private controlled firms are only more efficient in terms of profitability.

The economic significance of private shares is not trivial in the case of profitability, though. By our point estimate, a fully privately owned firm (that has 100 per cent of private shares) has a profit rate 1.4 percentage points higher than that of a fully government owned firm (that has zero per cent of private shares). The average profit rate of the sample in each year in the period 1996-2001 was between -0.93 per cent to -1.17 per cent, so a gap of 1.4 percentage points is substantial. This gap is also verified by the estimate of the private

control dummy, which shows that the profit rate of a private controlled firm is 1.51 percentage points higher than that of a fully state owned firm. The economic significance of state controlled firms' cost advantage over fully state owned firms is not high if one compares it with the average unit cost in the sample, which had an average of 62.5 per cent for the whole sample. However, a reduction in unit cost implies an increase in profitability (in terms of sales), so the 2.46 percentage point advantage is still substantial.

Not surprisingly, the two performance control factors are highly significant in all the regressions apart from the fact that they have the expected signs. The expansion factor is positively correlated with all the three performance measures, and the saving factor is positively correlated with profitability and labor productivity, but negatively correlated with unit cost. Comparing the trends shown in Figure 2 and the regression results, one realizes that the two factors siphon off most of the advantages of the privatized firms. This means that selection biases indeed existed and the two factors are effective in controlling them.

The results of the FE model are presented in Table 3. It has a much higher R^2 , indicating that firm fixed-effects are strong. The F test shows that the firm dummies are jointly significant in all regressions. The number of significant variables, however, has declined considerably. Private shares now turn to have no significant impact on any of the three performance indicators. If the comparison is made among fully government owned, state controlled, and private controlled firms, however, the latter two types of firms are both shown to have significantly higher profitability. The economic significance of the differences is high. State controlled firms and privately controlled firms are estimated to outperform fully state owned firms by 2.69 and 1.21 percentage points, respectively. Nevertheless, they have no difference with fully government owned firms in the cases of unit cost and labor productivity.

Putting together the baseline results and the FE results, we have the following two conclusions regarding the effects of privatization. First, privatization only has a significant positive impact on profitability, but has a weak or insignificant impact on unit cost and labor productivity. This finding is consistent with the finding of Frydman et al. (1999) on three Eastern European countries. Second, while increasing private shares has a positive

effect on profitability, only the private control dummy is significant under both the baseline and the FE specifications. This result seems to suggest that the amount of private shares has to pass a certain threshold in order for them to have a significant effect on firm performance.

The reason that privatization does not have any significant impact on unit cost is related to the technological and managerial conditions of many SOEs before privatization. Garnaut et al. (2003) find that many SOEs had not spent on R&D or even buying new equipment for more than 10 years. SOEs were used to an expansionary business model to gain profits. This heritage has great impacts on privatized SOEs. In our sample, profit rate is positively correlated with unit cost, and the expansion factor is positively correlated with all the three performance indicators.

The failure of privatization to improve labor productivity has a great deal to do with the government's policy to maintain employment in the country. It is well known that the Chinese SOEs have a serious problem of disguised unemployment and a high level of worker redundancy. The survey found that all the sample cities set a limit, usually 10 per cent of a firm's workforce, for layoff in the privatization package. In practice, a privatized firm was often required to take all its employees, with concessions from the government in terms of cheaper privatization prices. Although firms could use internal retirement to deal with worker redundancy, there was a limit to this practice. It was commonly found that firms had to set up auxiliary branches (mostly engaged in services and producing low-skill products) just to digest the redundant workers. The function of these branches was more to provide welfare to the redundant workers (who usually were less skilled) than to produce marketable products, so their productivity was lower. As a result, the firm's overall efficiency was compromised.

The result that privatization has only significant impacts on return to assets suggests that the efficiency gains accrued to a privatized firm mainly come from technical advancements in new product development. In our sample, privatized firms have been way ahead of the old-style SOEs in investment and R&D. In 1995 the old-style SOEs spent on average 80 per cent of what privatized firms spent on fixed investment, but by 2001 their fixed investment was only 29 per cent that of the privatized firms. Throughout the period

1995-2001, old-style SOEs on average spent less than 20 per cent of what privatized firms spent on R&D.

To summarize the findings concerning the effects of privatization, we conclude that the effects of privatization vary among different aspects of performance. Privatization is more effective in raising the return to assets (profitability) than raising labor productivity and cutting costs. We attributed this finding to a privatized firm's keener incentive to engage in R&D activities, its not-so-free disposal capability regarding employment, and its expansionary business model inherited from its SOE predecessor.

The baseline and the FE models have also revealed interesting results concerning the control variables. While these results are deemed for an in-depth study, here we only briefly mention two of them.

Firm size and worker redundancy are shown to have strong negative impacts on profitability in both the baseline and FE models and have negative impacts on labor productivity in the baseline model. They do not have any significant impact on unit cost, though. The negative impacts of worker redundancy are expected as a larger number of redundant workers increases the firm's wage, social security, and healthcare burdens. The negative impacts of firm size show that larger firms are less efficient than smaller firms. Larger firms are usually found to have higher levels of technical efficiency but lower levels of allocative efficiency than smaller firms in China (Wang and Yao, 2002). Our results seem to support this finding. However, these results may also be caused by the rigidity in employment that forces the firms to keep a more than efficient size of the workforce. In other words, the firm size may be another indicator for worker redundancy.

Research on other transitional countries find mixed results on the efficiency implications of the soft-budget constraint. While Djankov and Murrell (2002) document several studies showing that the soft-budget constraint hurts firm efficiency, Frydman, Gray, Hessel, and Rapaczynski (2000) finds that hardening the budget constraint alone does not improve efficiency. In our study, none of the regressions under either the baseline specification or the FE model shows significant negative impacts of the three variables measuring soft-budget constraint (bank dues are even shown to have weakly significantly positive impacts on unit cost in the baseline model). Therefore, it seems that the

soft-budget constraint does not have an efficiency implication in our sample.¹¹

[Table 4 here]

Controlling restructuring measures

Since privatization only has significant impacts on profitability, we only test the impacts of the restructuring measures on profitability. Table 4 reports the key results obtained when the restructuring measures are controlled. In the baseline regressions, reduction in total debts is shown to substantially increase a privatized firm's profitability, but reduction in overdue bank debts and the discount in privatization prices do not have significant impacts. The coefficients for private shares and private control dummy become slightly smaller but remain significant. In the FE regressions, reduction in total debts and bank dues do not show significant impacts, but the discount in privatization prices shows a significant negative effect on firm profitability. Because of this, the effects of privatization have been enhanced. It is shown that the gaps between the old-style SOEs and state controlled firms and privately controlled firms are 3.26 and 1.29 percentage points, respectively, both are lightly larger than what we got from the original FE model (which are 2.70 and 1.21 percentage points, respectively). Judging by these results, we conclude that controlling debt reductions and discounts on privatization prices in the year of privatization do not qualitatively alter our results concerning the effects of privatization.

5. Time trends

¹¹ In plain OLS regressions without controlling the two performance factors, all the three variables of the soft-budget constraint are shown to have highly significantly negative impacts on profitability. Comparing with our baseline and FE results, this suggests that the soft budget constraint is endogenously determined by a firm's long-term performance potential. Other things being equal, a firm with a low potential is more likely to face a soft budget constraint. With a firm's long-term performance potential being controlled, the baseline and the FE results show that facing a soft budget does not lead a firm to perform less efficiently than it would otherwise do under a harder budget.

In this section, we test the post-privatization time trend and the “prettier daughters” effect. The test is only performed on profitability with respect to the amount of private shares and the private control dummy. Equations (3) and (4) are fit with both the baseline and the FE models. Tables 5 and 6 present the main results of the regressions.

[Table 5 here]

Post-privatization time trend

As shown in Table 5, both the baseline and the FE estimations show similar and strong time trends. The effect of privatization is insignificant in the first year after privatization, but becomes very strong in the second to the fourth year, yet dies out again beyond that year. It is noteworthy that the magnitude of the effect generally increases before the fifth year. This means that the selection biases proposed by Frydman et al. (1999) either do not exist or do not even play a significant role in our sample. What it does show are two things. The first is that it takes one year or two for privatization to take effect on profitability. This is an understandable result for it takes time for the privatized firm to adjust to the new ownership structure and to make necessary efficiency-enhancing changes. The second is that privatization does not have a lasting effect. This result is worrisome. Privatization gives ownership to individual employees and other new owners, so it has a short-term effect to boost people’s work incentives. However, it may not automatically bring the firm sound corporate governance and management methods that are conducive to long-run growth of the firm. Another explanation is that the SOEs that have not been privatized have gradually learned lessons from their past experiences and improved their efficiency in more recent years. Indeed, the first graph in Figure 2 shows that there was a trend of convergence between the privatized firms and the old-style SOEs in recent years. However, the exact reasons for the declining effect of privatization need more careful studies to find out.

[Table 6 here]

The “prettier daughters” effect

The results for the test of this effect are presented in Table 6. Before 1998, the effect of

privatization increases, but it decreases after that year. SOEs privatized in 1998 have the largest effect of privatization. If we start with that year, there is indeed the “prettier daughters” effect. The year of 2001 is particularly bad as all the four regressions show that firms privatized in that year have become significantly worse as a result of privatization. This shows that the governments’ attitude toward privatization has not been uniform over the years. They tended to privatize the “prettier daughters” in the early years, but as the privatization drive deepened, they began to deliberately keep some of the better performing SOEs in their own hand in recent years.

[Table 7 here]

The above results may be related to the major form of privatization adopted in each year. For example, the worse performance of recent privatized firms may be related to the inadequate forms of privatization adopted in recent years. However, a close look at the distribution of the forms of privatization renders this possibility unrealistic. Table 7 shows the distribution of the *gaizhi* cases in the sample. We categorize *gaizhi* into five types, internal restructuring, bankruptcy and reorganization, employee shareholding, sales and leases, and others. Internal restructuring includes corporatization, debt-equity swap, split, spinning off, and merger, all of which do not change the state ownership of the firm. Bankruptcy is often adopted as a means to evade debts, and a firm is often reorganized after bankruptcy. It may or may involve ownership changes. Employee shareholding is by far the most popular way of privatization, and sales and leases are the most radical way of privatization. Finally, the category of “others” includes public listing and joint venture with a foreign firm. What is relevant here is that privatization has become more radical in recent years. The percentages of employee shareholding and sales and leases were respectively, 21% and 12% in 1995, but increased to 30% and 37% in 2001. To the extent that more radical forms of privatization lead to more efficiency improvements, those figures show that the forms of privatization do not play a role in leading to the worse performance of privatization in more recent years. Indeed, when the types of *gaizhi* are controlled in the regressions of Table 6, the time trend does not change qualitatively. For example, In the baseline regression for private control, the coefficient for 1998 becomes 3.00, and the coefficient for 2001 becomes -4.926 , both remain significant. All the other coefficients are

insignificant, which agrees with the results of Table 6 except for the year 1997. But the significance of the coefficient for 1997 in Table 6 is not high either.¹²

6. Concluding remarks

Chinese privatization was not initiated by a conscious pursuit of efficiency. Nonetheless, our results show that it does have brought considerable efficiency gains in some important aspects for certain periods of time. In the meanwhile we have also revealed the complexity of the role of privatization in improving economic efficiency. We are able to provide robust results after we control the endogeneity of privatization and variables that are often missing in other studies. In addition, our study of the time trends of post-privatization performance provides unique results.

The lack of lasting effects for privatization shows that privatization alone is not enough to sustain continuous efficiency gains. While the old-style SOEs suffer from the lack of a real owner, privatization creates the problem of how to align the interests of the new owners in ways that are conducive for long-term firm growth. Corporate governance thus becomes very important. A natural extension of this paper is to study the corporate governance its impacts on efficiency in privatized firms. Another area that is worthy more studies is the role played by outsiders in privatization. Studies on other transition countries find that the presence of outside investors has strong positive effects on firm performance (Djankov and Murrell, 2002). It is interesting to find whether this is true in China.

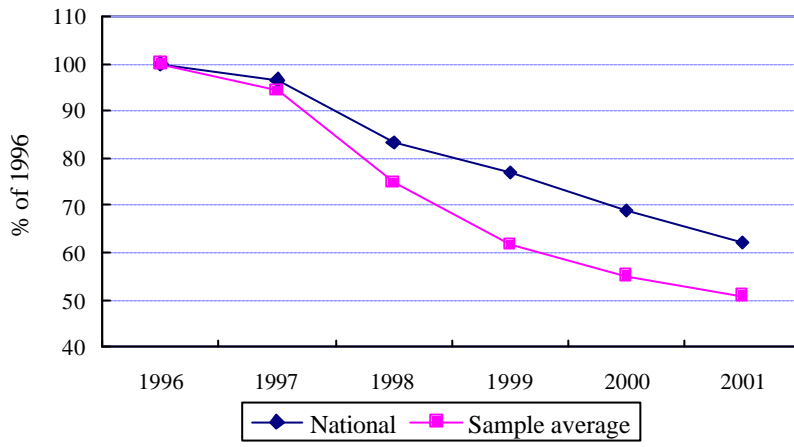
¹² The results of the time trends as well as the baseline and FE models may also be affected by the concentration of shares. Our data do provide information on the largest and second largest shareholders. However, most of the largest shareholders were local governments, and most second largest shareholders were private owners. The correlation coefficient between the amount of shares controlled by the largest shareholder and the amount of private shares is -0.62 , and the correlation coefficient between the amount of shares held by the second largest shareholder and the amount of private shares is 0.33 , both are significant at the 1% significance level. Therefore, controlling the largest and second largest shareholders will not add much information to our regression results.

References:

- Anderson, James, Young Lee and Peter Murrell, 2000. "Competition and Privatization amidst Weak Institutions: Evidence from Mongolia." *Economic Inquiry*, Vol. 38(4): 527-546.
- Cao, Yuanzheng, Yingyi Qian, and Barry Weingast (1999). "From Federalism, Chinese Style to Privatization, Chinese Style." *Economics of Transition*, 7(1): 103-131.
- Djankov, Simeon and Peter Murrell, 2002. "Enterprise Restructuring in Transition: A Quantitative Survey." *Journal of Economic Literature*, Vol. XL (3): 739-792.
- Frydman, Roman, Cheryl Gray, Marek Hessel, and Andrzej Rapaczynski, 1999. "When Does Privatization Work? The Impact of Private Ownership on Corporate Performance in the Transition Economies." *Quarterly Journal of Economics*, Vol. 114 (4): 1153-1191.
- Frydman, Roman, Cheryl Gray, Marek Hessel, and Andrzej Rapaczynski, 2000. "The Limits of Discipline: Ownership and Hard Budget Constraints in the Transition Economies." *Economics of Transition*, Vol. 8 (3): 577-601.
- Gao, Shanwen and Yang Yao, 1999. "Implementation of Socially Optimal Outcomes in the Process of Dissolving Public Enterprises in China." *China Economic Review*, Vol. 10 (2): 41-58.
- Garnaut, Ross, Ligang Song, Stoyan Tenev and Yang Yao, 2003. *A Study of Firm Restructuring in China*. Washington, D.C.: The World Bank.
- Groves, Theodore, Yongmiao Hong, John McMillan and Barry Naughton, 1994. "Autonomy and Incentives in Chinese State Enterprises." *Quarterly Journal of Economics*, Vol. 109 (1): 183-209.
- Groves, Theodore, Yongmiao Hong, John McMillan and Barry Naughton, 1995. "China's Evolving Managerial Labor Market." *Journal of Political Economy*, Vol. 103 (4): 873-892.
- Gordon, Roger and Wei Li, 1995. "The Change in Productivity of Chinese State Enterprises, 1983-1987." *Journal of Productivity Analysis*, Vol. 6 (1): 5-26.
- Guo, Kai and Yang Yao, 2003. "Causes of Privatization in China: Testing Several Hypotheses." Working paper, China Center for Economic Research, Peking University.

- Li, Shaomin, Shuhe Li, and Weiyang Zhang, 2000. "The Road to Capitalism: Competition and Institutional Change in China." *Journal of Comparative Economics*, Vol. 28 (2): 269-292.
- Li, Wei, 1997. "The Impact of Economic Reform on the Performance of Chinese State Enterprises, 1980-1989." *Journal of Political Economy*, Vol. 105(5): 1080-1106.
- Lin, Justin and Guofu Tan, 1999. "Policy Burdens, Accountability and the Soft Budget Constraint." *American Economic Review*, Vol. 89 (2): 426-431.
- Lu, Susan and Yang Yao, 2003. "The Effectiveness of the Law, Financial Development, and Economic Growth in an Economy of Financial Repression: Evidence from China." Working paper, Center for International Development, Stanford University.
- Meggison, William and Jeffrey Netter, 2001. "From State to Markets: A Survey of Empirical Studies on Privatization." *Journal of Economic Literature*, Vol. XXXIX (June): 321-389.
- Qian, Yingyi, 1994. "A Theory of Shortage in Socialist Economies Based on the Soft Budget Constraint." *American Economic Review*, Vol. 84 (1): 145-156
- Shleifer, Andrei and Larry Summers, 1987. "Breach of Trust in Hostile Takeovers." NBER Working Paper No. 2342.
- Su, Jian and Garry Jefferson, 2003. "A Theory of Decentralized Privatization: Evidence from China." Working paper, Department of Economics, Brandeis University.
- Tian, Guoqiang, 2001. "A Theory of Ownership Arrangements and Smooth Transition to a Free market Economy." *Journal of Institutional and Theoretical Economics*, Vol. 157 (3): 380-412.
- Wang, Yueping and Yang Yao, 2002. "Market Reforms, Technological Capabilities and the Performance of Small Enterprises in China." *Small Business Economics*, 18(1-3): 197-211.
- Xu, Lixin, Tian Zhu, and Yimin Lin (2003). "Politician Control, Agency Problems, and Ownership Reform: Evidence from China." Working paper, World Bank.

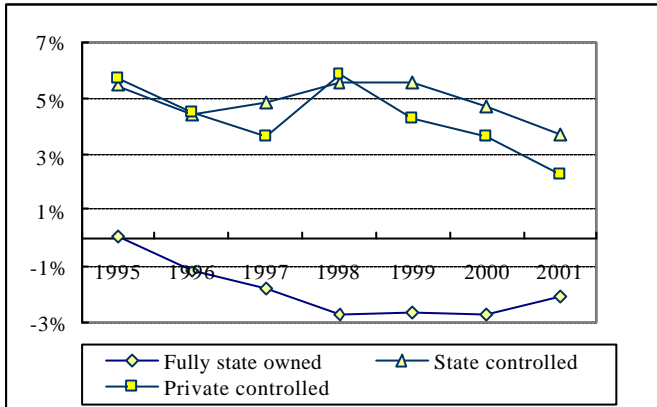
Figure 1 Industrial firms controlled by state shares



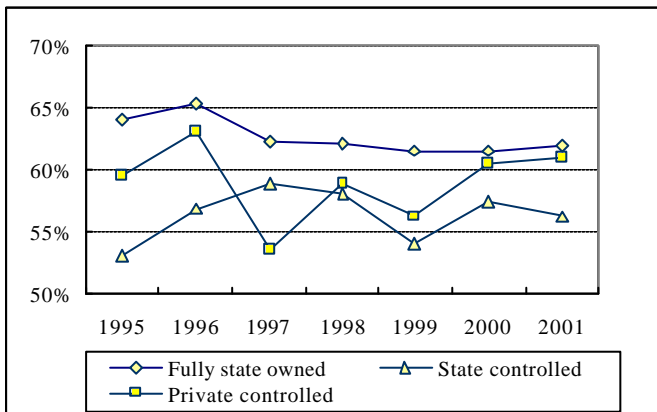
Sources: *China Financial Statistical Yearbook: 1997-2002* and the survey data.

Figure 2. Comparison of performance by private and state controlling shares

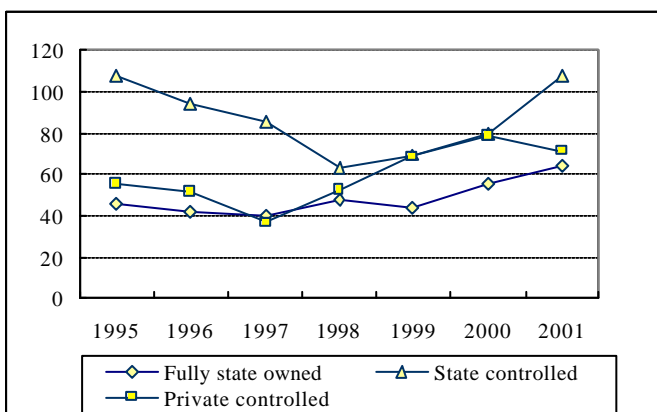
Profitability



Unit cost



Labor productivity (1,000 yuan)



Source: Calculated and plotted using the survey data.

Table 1. Descriptive Statistics of the variables in the re-drawn sample¹

	Minimum	Maximum	Mean	Std. Dev.
ROA (per cent)	-90.14	89.48	-1.04	10.27
Unit cost (per cent)	1.79	99.77	62.48	18.41
Labor productivity (1,000 RMB)	.00	888.31	53.45	81.11
Private shares (per cent)	.00	100.00	10.09	28.18
State controlled firms dummy	.00	1.00	0.04	.20
Private controlled firms dummy	.00	1.00	0.10	.30
Number of on-duty workers	.00	15245	632.81	1168.40
Worker redundancy (per cent)	.00	100.00	32.94	24.83
Debt/assets (per cent)	.00	992.92	61.44	69.76
Bank arrears (per cent)	.00	6332.76	85.62	224.26
Tax arrears (per cent)	.00	1940.23	3.46	51.66
Social security arrears (per cent) ²	-1.21	27.73	.30	1.28
Reduction in total debts	.00	1.00	.02	.15
Reduction in overdue bank debts	.00	1.00	.01	.11
Discounts in privatization prices	.00	1.00	.04	.21

¹ The year period is for 1996-2001. The total number of firms is 587, and the total number of cases is 3290.

² Negative values imply that the government owed the firm tax rebates.

Table 2. Baseline results (number of cases: 3290)

Variable	Profitability	Profitability	Unit cost	Unit cost	Productivity	Productivity
	I	II	I	II	I	II
Constant	1.269 (0.978)	1.307 (0.980)	60.481*** (1.554)	60.240*** (1.556)	67.514*** (6.990)	68.100*** (7.004)
Private shares	0.014*** (0.005)		0.004 (0.008)		-0.030 (0.037)	
State controlled firms		0.911 (0.712)		-2.461** (1.131)		5.072 (5.089)
Private controlled firms		1.512*** (0.488)		0.480 (0.775)		-2.442 (3.486)
Ln(on-duty workers)	-0.253** (0.126)	-0.277** (0.127)	0.272 (0.200)	0.317 (0.201)	-2.978*** (0.922)	-3.081*** (0.905)
Redundancy	-0.025*** (0.007)	-0.025*** (0.007)	-0.010 (0.010)	-0.010 (0.010)	-0.081* (0.047)	-0.080* (0.045)
Debt/asset ratio	-0.003 (0.002)	-0.003 (0.002)	0.004 (0.003)	0.003 (0.003)	0.002 (0.014)	-0.001 (0.014)
Bank arrears	0.000 (0.001)	0.000 (0.001)	-0.0017* (0.001)	-0.0018* (0.001)	0.002 (0.004)	0.002 (0.004)
Tax arrears	-0.001 (0.003)	-0.001 (0.003)	0.003 (0.004)	0.003 (0.004)	-0.004 (0.019)	-0.005 (0.019)
Social security arrears	-0.067 (0.110)	-0.070 (0.110)	0.018 (0.175)	0.038 (0.175)	0.146 (0.785)	0.106 (0.786)
Expansion factor	2.539*** (0.143)	2.533*** (0.143)	9.413*** (0.228)	9.431*** (0.228)	54.786*** (1.024)	54.738*** (1.057)
Saving factor	6.116*** (0.146)	6.100*** (0.110)	-10.205*** (0.232)	-10.162*** (0.233)	10.795*** (1.044)	10.689*** (1.048)
R ²	0.445	0.446	0.564	0.565	0.545	0.545

* Significant at the 10 per cent significance level; ** significant at the 5 per cent significance level; *** significant at the 1 per cent significance level.

Figures in parentheses are standard errors. Results of the city, year, and sectoral dummies are not reported to save space.

Table 3. FE results

Variable	Profitability		Unit cost		Productivity	
	I	II	I	II	I	II
Private shares	0.010 (0.007)		-0.010 (0.009)		-0.028 (0.041)	
State controlled firms		2.689** (1.239)		-1.931 (1.683)		5.375 (7.878)
Private controlled firms		1.214** (0.620)		-1.196 (0.843)		-2.695 (3.341)
Ln(on-duty workers)	-2.534*** (0.526)	-2.534*** (0.525)	0.135 (0.714)	0.135 (0.714)	-0.213 (3.341)	-0.202 (3.341)
Redundancy	-0.062*** (0.016)	-0.060*** (0.016)	-0.034 (0.021)	-0.035* (0.021)	-0.077 (0.100)	-0.074 (0.100)
Debt/asset ratio	0.004 (0.003)	0.004 (0.003)	0.012*** (0.005)	0.012*** (0.005)	0.013 (0.022)	0.012 (0.022)
Bank arrears	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.052)	-0.001 (0.010)
Tax arrears	0.000 (0.005)	0.000 (0.005)	-0.001 (0.007)	-0.001 (0.007)	-0.001 (0.034)	-0.002 (0.034)
Social security arrears	-0.096 (0.171)	-0.093 (0.171)	-0.047 (0.233)	-0.049 (0.233)	0.352 (1.088)	0.353 (1.088)
R ²	0.703	0.704	0.830	0.830	0.808	0.808

* Significant at the 10 per cent significance level; ** significant at the 5 per cent significance level; *** significant at the 1 per cent significance level.

Figures in parentheses are standard errors. . Results of the city, year, and sectoral dummies are not reported to save space.

Table 4. Baseline and FE results for profitability with restructuring measures controlled (number of cases: 3290)

Variable	Baseline I	Baseline II	FE I	FE II
Private shares	0.011** (0.005)		0.010 (0.007)	
State controlled firms		0.458 (0.747)		3.257*** (1.283)
Private controlled firms		1.280*** (0.506)		1.385** (0.645)
Reduction in total debts	2.189** (1.043)	2.131** (1.048)	1.046 (1.414)	0.817 (1.416)
Reduction in overdue bank debts	-1.342 (1.379)	-1.324 (1.379)	-0.409 (1.916)	-0.389 (1.914)
Discounts in Privatization prices	0.837 (0.745)	0.701 (0.765)	-1.723 (1.258)	-2.462* (1.289)
R ²	0.446	0.447	0.704	0.704

* Significant at the 10 per cent significance level; ** significant at the 5 per cent significance level; *** significant at the 1 per cent significance level.

Figures in parentheses are standard errors. Results for other variables are not shown in the table.

Table 5. Test results for the post-privatization time trend (number of cases: 3290)

Variable	Baseline model		FE model	
	Private shares	Private control	Private shares	Private control
Year after privatization				
First year	0.001 (0.008)	0.320 (0.677)	0.002 (0.007)	0.717 (0.665)
Second year	0.023*** (0.009)	2.160*** (0.756)	0.019** (0.009)	2.278*** (0.774)
Third year	0.022** (0.011)	1.794** (0.899)	0.021* (0.011)	2.331** (0.943)
Fourth year	0.026* (0.018)	2.051** (1.065)	0.017 (0.014)	2.486** (1.122)
Fifth year	0.026 (0.018)	1.237 (1.291)	0.021 (0.018)	1.839 (1.347)
Six year	-0.005 (0.020)	0.658 (1.463)	-0.060 (0.019)	1.267 (1.520)
R ²	0.446	0.447	0.704	0.704

* Significant at the 10 per cent significance level; ** significant at the 5 per cent significance level; *** significant at the 1 per cent significance level.

Figures in parentheses are standard errors. Results for other variables are not shown in the table.

Table 6. Test results for the “prettier daughters” effect (number of cases: 3290)

Variable	Baseline model		FE model	
	Private shares	Private control	Private shares	Private control
Year of privatization				
1996 and before	0.010 (0.008)	1.092 (0.978)	-0.060 (0.053)	-3.619 (4.691)
1997	0.034* (0.019)	1.092* (0.617)	-0.005 (0.037)	0.475 (2.274)
1998	0.050*** (0.011)	3.379*** (0.946)	0.040*** (0.0161)	3.586*** (1.303)
1999	0.006 (0.011)	1.489 (0.990)	0.025** (0.013)	2.975** (1.106)
2000	0.011 (0.010)	1.259 (0.978)	0.012 (0.009)	1.483 (0.945)
2001	-0.041*** (0.016)	-4.042*** (1.516)	-0.030** (0.014)	-2.518** (1.319)
R ²	0.449	0.447	0.705	0.705

* Significant at the 10 per cent significance level; ** significant at the 5 per cent significance level; *** significant at the 1 per cent significance level.

Figures in parentheses are standard errors. Results for other variables are not shown in the table.

Table 7. Distribution of *gaizhi* cases in the sample (% if not otherwise defined)

Year	# of <i>gaizhi</i> cases	Internal restructuring	Bankruptcy and reorganization	Employee shareholding	Sales and leases	Others
1995	42	0.21	0.10	0.21	0.12	0.36
1996	34	0.15	0.29	0.18	0.21	0.18
1997	32	0.38	0.13	0.25	0.06	0.19
1998	52	0.31	0.02	0.29	0.29	0.10
1999	47	0.32	0.02	0.30	0.17	0.19
2000	53	0.21	0.06	0.28	0.32	0.13
2001	60	0.08	0.17	0.30	0.37	0.08