The Costs and Benefits of Government Ownership: Evidence from Privatization of China's Collectively-Owned Enterprises

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The rise and decline of China's collectively-owned enterprises, a hybrid of public and private ownership, has led to intensive debates about the costs and benefits of government ownership. It has been argued that government ownership may help firms gain access to production inputs and infrastructural services, but government officials may use public enterprises to pursue private benefits. From a panel dataset of 13,733 China's collectively-owned enterprises for the period of 1998-2003, it is found that collectively-owned enterprises, once privatized, encountered an increase in the *cost of goods sold to sales ratio* but had a decrease in the *managerial expenses to sales ratio*. These changes in the costs and benefits of government ownership are found to be most significant in the first privatization and take place immediately after the privatization.

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Abstract:

The rise and decline of China's collectively-owned enterprises, a hybrid of public and private ownership, has led to intensive debates about the costs and benefits of government ownership. It has been argued that government ownership may help firms gain access to production inputs and infrastructural services, but government officials may use public enterprises to pursue private benefits. From a panel dataset of 13,733 China's collectively-owned enterprises for the period of 1998-2003, it is found that collectively-owned enterprises, once privatized, encountered an increase in the *cost of goods sold to sales ratio* but had a decrease in the *managerial expenses to sales ratio*. These changes in the costs and benefits of government ownership are found to be most significant in the first privatization and take place immediately after the privatization.

1. Introduction

An unconventional type of enterprises known as collectively-owned enterprises (COE) rose

unexpectedly in importance in the early stage of China's economic reform and later declined

dramatically through privatization or acquisition by indigenous private enterprises and

foreign multinationals. The share of industrial output contributed by the collectively-owned

enterprises increased from 22.37% in 1978 to 39.39% in 1996 and then had a precipitous fall

to 6.65% by 2003 (China Statistical Yearbook, various years). It is possible that the rise of

collectively-owned enterprises could be partially explained by the 1984 expansion in the

survey scope, while the decrease in industrial output contribution by collectively-owned

enterprises might be due to the imposition of a minimal scale of operation (introduced in

1998) for firms to be covered in the surveys.[1] Nonetheless, the pattern of the rise and decline

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[1] Starting from 1984, collectively-owned enterprises at the village level or below – once counted as agricultural activity – became included in the annual survey of industrial firms. Since 1998, however, only collectively-owned enterprises with annual sales revenue of 5 million Yuan (about US$ 650,000) or more have been covered in the survey.

of China's collectively-owned enterprises is indisputable.

The life-cycle experience of this unconventional organization has provided fertile grounds for economic research. Earlier studies were focused at understanding the nature of collectively-owned enterprises and the rationale for their rise in the first two decades of China's economic reform. Collectively-owned enterprises are formally owned by the people of the regions where the enterprises are located, but they are effectively controlled by the local governments. The role of local governments in collectively-owned enterprises is to gain access to production inputs and infrastructure services, and offer protection against expropriation in every possible step of the production process. In the early stage of China's economic reform, government control over the input market remained significant and protection of private properties was not yet formally established, hence the benefits of government ownership and the rationale for the rise of collectively-owned enterprises. For studies of township-and-village enterprises (a major type of collectively-owned enterprises), please read Byrd (1990), Naughton (1994), Chang and Wang (1994), Weitzman and Xu (1994), Li (1996), Che and Qian (1998a, 1998b), Hsiao et al (1998), Chen and Rozelle (1999), Li and Rozelle (2000, 2004), Tian (2000), Che (2002, 2003) and Li (2003).

With the decline of collectively-owned enterprises in more recent years, however, research has shifted toward unraveling the costs of government ownership. From the political patronage theory of public firms (Shleifer and Vishny, 1994 and Boycko et al., 1996), it could be argued that local government officials – who have the residual rights of control over collectively-owned enterprises – may take actions to pursue private benefits at the expense of the enterprises' financial performance, hence the costs of government ownership. With China's deepening economic reform, the costs of government ownership are expected to outweigh the benefits, which may then explain the decline of collectively-owned enterprises

(Che, 2003).

The objective of this study is to empirically investigate the costs and benefits of government ownership using a panel dataset of China's 13,733 collectively-owned enterprises for the period of 1998 to 2003.[2] All of the 13,733 sample firms were 100% collectively-owned in 1998, but 3,769 of them had irreversible privatization of various extent and sequence in the remaining sample period, i.e., 1999 to 2003. For those sample firms that underwent privatization, both the costs and benefits of government ownership were expected to decrease with the extent of privatization. Our method of analysis is to examine the changes in the firm performance and its breakdowns around the time of privatization. This allows us to gain an understanding on the costs and benefits of government ownership.

Our dataset contains detailed information about firm operation and performance. Of particular interest to this study is the breakdown of firm performance. Operating income is decomposed into *gross profit* plus *profit from other businesses* minus *managerial expenses* and *financial expenses*, while the *gross profit* is further decomposed to *gross sales* minus *cost of goods sold*. There is also information about firm operation such as *size of employment*, *wage and welfare*, and information about firm tax contributions including both *value-added tax* and *corporate income tax*.

In the first part of the analysis, we examine the changes in firm operation and performance of privatized firms, either price-adjusted or with benchmark to un-privatized firms (the method used in La Porta and Lopze-de-Silanes, 1999). Our main findings are that privatization led to

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[2] With only a few exceptions (Jin and Qian, 1998; Chen and Rozelle, 1999; Li and Rozelle, 2000, 2004; Li, 2003), most of the existing work on China's collectively-owned enterprises is theoretical. We fill in the void by providing an empirical analysis on the costs and benefits of government ownership in collectively-owned enterprises.

a decrease in the ratio of managerial expenses to sales but an increase in the cost of goods sold to sales ratio.

China's privatization of collectively-owned enterprises has been a gradual and selective process. It is possible that privatized firms may have certain unobserved characteristics setting them apart from those that remained 100% collectively-owned. Thus, in the second part of the analysis, we focus on the sub-sample of 3,769 firms that were privatized in the sample period (i.e. from 1999 to 2003). We use those firms that were not privatized until 2003 as a benchmark, and investigate the changes in firm operation and performance of those firms that were privatized between 1999 and 2002 over the time period of 1998-2002 (the method used in Frydman et al., 1999). To account for some unobserved time-invariant variables, we also use a firm-specific fixed-effects estimation method. Our main findings reinforce what we found in the first part of the analysis., that is, the managerial expenses to sales ratio decreased with the extent of privatization, whereas the cost of goods sold to sales ratio increased.

As discussed earlier, the benefits of government ownership lie in easy and cheap access to production inputs and infrastructure, which directly translates into low cost of goods sold. Government ownership also helps lower down the cost of goods sold by shielding the business from various expropriation demands in the production process. The observed increase in the cost of goods sold to sales ratio can be attributed to the diminishing benefits of government ownership after the privatization of collectively-owned enterprises. Meanwhile the costs of government ownership arise when local government officials – who have the residual rights of control over collectively-owned enterprises – take actions to maximize private benefits instead of firm performance. In particular, without any formal rights to the cash flows of collectively-owned enterprises, local government officials may benefit

themselves directly or indirectly by having bloated management structures and pursuing extravagant corporate perks. The observed decrease in the managerial expenses to sales ratio can be explained as the diminishing cost of government ownership after privatization of collectively-owned enterprises.

Privatization of China's collectively-owned enterprises has proceeded gradually over time, and the process has moved forward in multiple stages. This provides an excellent opportunity to examine whether the sequence of privatization affects the costs and benefits of government ownership. We find that the first privatization, even if partial in scope, brought in the most significant changes in the costs and benefits of government ownership, and only limited additional effects could be found in the subsequent privatizations. We also find that the effects of privatization took place immediately afterwards, as opposed to a gradual effect over time.

Finally, the impacts of privatization on other stakeholders have also been examined. We find that *employment size* decreases with the extent of privatization but *wage and welfare per employee* increases with the extent of privatization. However, both *value-added tax* and *corporate income tax* are found to increase with the extent of privatization, suggesting that the impacts of privatization on tax contributions are not as worrisome as some in the literature have described.

The plan of the paper is as follows. In Section 2, we describe the dataset and key variables in the analysis. In Section 3, we compare the performance of privatized firms in relation to themselves (price-adjusted) and un-privatized firms (the method used in La Porta and Lopze-de-Silanes, 1999). In Section 4, we control for missing variable problems and selection biases, and re-examine the impacts of privatization on the costs and benefits of

government ownership. Section 5 concludes.

2. Data and Variables

Our analysis is based on a firm-level dataset from the annual survey of industrial firms

conducted by the National Bureau of Statistics (NBS) of China from 1998 to 2003, covering

all state-owned enterprises, and non-state-owned enterprises with an annual sales revenue of

5 million Yuan (about 650,000 US dollars) or above. The number of firms covered each year

ranges from 162,000 to 196,000. The dataset contains enterprises' identification information,

and their operation and performance information extracted from balance sheets and income

statements.[3] Using uniquely assigned firm identification codes, we are able to form a

balanced panel of 61,163 firms continuously covered during all the sample years.

According to the classifications by China's National Bureau of Statistics, a firm's capital can

be of the following five types: state, collectively-owned, private, foreign-owned including

those from Hong Kong, Macau and Taiwan, and finally, legal-person, which is further divided

into state legal-person and collective legal-person. Out of the balanced panel of 61,163 firms,

there were 13,733 enterprises whose ownership of capital was 100% collectively-owned at

the beginning of our sample period (1998).[4]

In this panel of 13,733 firms, 5,479 firms kept 100% collective ownership throughout the

sample period, while 8,254 firms had ownership changes during the sample period. As

pointed out in the Introduction, collective ownership is a hybrid ownership, and it is

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[3] As China has maintained its accounting standard for all types of enterprises since its major overhaul
in 1993, data used in this study for the period of 1998 to 2003 are believed to be consistent and
comparable.
[4] Here collective ownership refers to collectively-owned capital plus collective legal-person capital.

somewhere between state ownership and private ownership (including both China's indigenous private ownership and foreign ownership). In this paper, change of ownership from collective to private is called privatization, whereas that from collective to state is not. Of the 8,254 collective enterprises that had ownership changes during the sample period, 1,267 had its collective ownership replaced by state ownership, and they will not be studied in this paper. The other 6,987 privatized, of which 3,769 had its share of collective ownership steadily declining over the sample period and 3,218 had its collective ownership first decreased and then increased (called reversal cases). In this paper, we focus on the sub-sample of 3,769 steadily less collective firms.

The number of collective enterprises having first-time privatization was 899 in 1999, then decreased to 578 in 2000, 725 in 2001, and 654 in 2002, and finally increased significantly to 913 in 2003. As for the extent of privatization, 2,533 out of 3,769 firms became completely privatized in the first privatization, 435 firms had their collective ownership dropped below 50%, and 801 firms had their collective ownership greater than or equal to 50%. Some of those collective enterprises that had partial privatization had subsequent privatization, up to four times and to various degrees. Over time, we see more complete privatization and more firms whose collective ownership is below 50%. Table 1 presents these details.

< Insert Table 1 here>

The focus of this paper is to investigate the costs and benefits of government ownership. Specifically, we examine firm performance and its various components before and after privatization. The key explanatory variable for our analysis is the extent of privatization in a collective enterprise, which is defined by the percentage of private ownership in a firm's capital and denoted by *PRV* in the following analysis. Under China's accounting system, a

firm's operating income is equal to gross profit, plus profit from other businesses, minus managerial expenses and financial expenses.[5] The gross profit is in turn equal to sales revenue minus cost of goods sold and sales expenses.[6] Here cost of goods sold includes the cost of inputs and production costs.[7] Managerial expenses include salaries for management, and expenses for businesses (such as the expenses for "eating and drinking" as studied in Cai et al., 2005). As pointed out in the introduction, government ownership may affect the cost of goods sold and the managerial expenses. To measure firm performance and its various components, we thus have the following five variables: c*ost of goods sold to sales, gross profit to sales, managerial expenses to sales, financial expenses to sales,* and *operating income to sales.*

Collective enterprises in China are formally owned by the people residing in the areas where the enterprises are located. Specifically, local people may benefit from working in those enterprises, and share profits or losses of the enterprises. However, it is the local government officials who have the residual rights of control over those collective enterprises including appointment of management and allocation of profits and losses. Without any formal right to the cash flows of collective enterprises, local government officials may pursue their private benefits. Specifically, they may care about the taxes they could collect from collective enterprises and also employment opportunities that could be created for the local people. It is possible that collective enterprises, once privatized, may lay off these redundant workers and try to avoid paying taxes. We are thus interested in examining how privatization of collective enterprises affects labor welfare and firm tax contributions. *Logarithm of employment, wages per employee,* and *welfare per employee* are constructed to proxy for labor welfare, while

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[5] In contrast to the international accounting standard, operating income is net of financial expenses in China.
[6] Under China's accounting system, gross profit margin is net of sales expenses. While the survey data provides information on two breakdowns of gross profit margin – sales revenue and cost of goods sold, sales expenses can be readily calculated.
[7] There is no further breakdown information on the cost of inputs versus production cost.

value-added tax and *corporate income tax* are to measure the tax contributions made by the firms.[8] Finally, it is believed that privatized firms may expand their operations. *Logarithm of sales revenue* and *logarithm of assets* are constructed to measure changes in firm size and operation.

Logarithm of assets is also used to control for firm size. Other control variables used in the analysis include: *capital-labor ratio* for variations in production technologies, *share of output by state-owned enterprises* (calculated for each region in a given industry) to capture the extent of state control and market liberalization, *Herfindahl index* (constructed for a given industry) for the impacts of competition, and *industry gross output* for the impacts of macro changes in the concerned industries.

Table 2 gives the summary statistics of all the variables used in the analysis, and Table 3 has the correlation coefficients of independent variables.

< Insert Table 2 here>
< Insert Table 3 here>

3. Preliminary Results

In this section, we carry out some simple analysis regarding the impact of privatization. Our basic approach is to compare pre-privatization firm performance with that of post-privatization. For example, for a collective enterprise that underwent privatization in 1999, we compare its performance in 2000 with that in 1998. This method has been used by

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[8] In China, local governments share the value-added tax with the central government at a ratio of 1:3, but they capture almost all of the corporate income tax.

La Porta and Lopze-de-Silance (1999) in their analysis of privatization in Mexico. As prices may experience inflation or deflation during the sample period, we need to adjust all key variables using appropriate price deflators. In our dataset, each firm is required to report its output both in current-price value and constant-price (1990 price) value. So a price index for each firm can be constructed to adjust all sales-related variables. From China Statistical Yearbook (various years), we obtain the producer price index to deflate variables such as assets, cost of goods sold, gross profit, managerial expenses and financial expenses, and the consumer price index for adjusting wage and welfare. For ratios that involve nominal data in both numerator and denominator of comparable nature, however, there is no need for price adjustment.

Results for price-adjusted comparison of pre- and post-privatization performances are shown in Table 4. Following the method of La Porta and Lopze-de-Silance (1999), we report, for each performance indicator, the number of usable observations, the mean and median values both before and after privatization, and changes in both mean and median values. T-statistics and z-statistics (Wilcoxon rank sum) are also reported to test the significance of changes in mean and median values, respectively.

We can see that firm operation has experienced significant expansion after privatization. Both logarithm of assets and logarithm of sales revenue had statistically significant strong growth. Interestingly, the mean and median of the ratio of cost of goods sold to sales increased significantly by 0.0111 and 0.0112, and consequently the mean and median of the gross profit margin decreased significantly by 0.0067 and 0.0084. Meanwhile, the mean and median ratio of managerial expenses to sales and those of financial expenses to sales had statistically significant declines (0.0056 and 0.0036, and 0.0069 and 0.0038, respectively) after

privatization. These results suggest that, as the degree of government ownership decreases, privatized firms may encounter cost increases for input purchase and production, but they have better control of managerial and financial expenses. The empirical results show that the reduction in managerial and financial expenses outweighs the increase in the cost of goods sold, with the operating income to sales ratio increasing by 0.0053 and 0.0031 (mean and median respectively). Regarding the impact of privatization on labor welfare, we find no significant change in the size of employment, but an increase in wage and welfare per employee. Meanwhile, both value-added tax and corporate income tax increased after privatization. These results suggest that both labor welfare and firm tax contributions have not been compromised during the privatization.

< Insert Table 4 here>

Simple comparisons of pre- and post-privatization performance as reported above may overlook the effect of industry-wide changes. Indeed, in the late 1990s, the Chinese economy was experiencing a period of rapid transformation. Market competition was heightened by the massive entry of foreign multinationals and indigenous private enterprises. Meanwhile, there was privatization or restructuring of China's state-owned and collectively-owned enterprises. We choose to use un-privatized collectively-owned enterprises as the benchmark for comparison. That is, for a collectively-owned firm that had privatization in 1999, we compare its year 2000 performance benchmarked to un-privatized collective firms of year 2000 with its year 1998 performance also benchmarked to un-privatized collective firms of year 1998.[9]

Note that, in their analysis of privatization in Mexico, La Porta and Lopze-de-Silance (1999) compare the average performance in the four years preceding the privatization with that in

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[9] All variables have been price-adjusted as in our earlier comparisons.

1993, both of which are benchmarked to industry average. By comparing performance in the year immediately after privatization with that just before privatization, we may not be able to detect if there is any long-term impact of the ownership change. Nevertheless the time period is uniform and comparable. In view of dramatic changes in China's industries, the use of industry-average as a benchmark may compound the effect of ownership change with that of heightened competition. We thus use un-privatized collective firms as a benchmark to highlight the effect of ownership change.

< Insert Table 5 here>

Results using un-privatized collective firms as a benchmark are shown in Table 5. In contrast to the results reported in Table 4 where industry benchmarks are not used, we find that privatized firms experienced contraction in the scale of operation with both assets and sales revenue decreasing significantly. It is possible that all firms, including those un-privatized ones, were experiencing dramatic growth and privatized firms actually had slower growth as compared with un-privatized firms. We notice that privatization led to a decrease in the size of employment (a decrease of logarithm of employment by 0.0537 in mean and 0.0500 in median), but an increase in wage per employee. So there are contrasting impacts of privatization on laid-off workers and those who retained their jobs after privatization. Meanwhile, the impacts of privatization on firm tax contributions turn out to be quite negative, as both value-added tax and corporate income tax decreased after the privatization. However, the main results on the costs and benefits of government ownership remain robust after benchmark comparison to un-privatized firms. The mean and median of the ratio of cost of goods sold to sales increased by 0.0058 and 0.0044 after privatization. Consequently, the mean and median of gross profit margin decreased significantly by 0.0043 and 0.0070.

Nevertheless, the ratio of managerial expenses to sales was kept lower after privatization, with the overall effect of privatization on the mean value of firm's operating income to sales ratio becoming negative, albeit statistically insignificant.

Our preliminary analysis shows that there are costs and benefits of government ownership, as illustrated in the change of performance before and after privatization of collectively-owned enterprises. In particular, the managerial expenses to sales ratio is found to decrease after privatization, whereas the cost of goods sold to sales ratio had an increase after privatization.

The different results between Table 4 and Table 5 in terms of scale of firm operation, labor welfare and firm tax contributions, however, point to the difficulty of comparing firm performance when industries have undergone dramatic changes. In particular, there is a question of whether privatized firms have certain unobservable characteristics that set them apart from those un-privatized firms. This problem of selection bias needs to be addressed in order for us to reach an accurate assessment of the impacts of privatization.

4. Impacts of Privatization

Privatization of China's collectively-owned enterprises has been a gradual and selective process (Bai et al., 2000; Lau et al., 2000; Qian, 2000; Bai et al., 2006a). This naturally raises the question of whether there are some unobserved characteristics distinguishing those privatized collective enterprises from those that did not. So we need to carefully choose a control group and use an appropriate econometric approach to assess the true impacts of privatization. Our approach is to compare performance of collective enterprises that had

privatization during the period of 1999-2002 with those that had privatization in 2003 (the last year of the sample period). By taking this approach, we might be able to filter out some of the unobservable characteristics that are common to those privatized firms. In addition, we introduce firm-specific fixed effects to address possible problems of omitted time-invariant variables. This approach has been used successfully by Frydman et al. (1999) in their study of privatization in Eastern Europe.

Specifically, there were 3,769 collectively-owned enterprises that had privatization during the sample period, 1999-2003. Among them, 2,856 firms were privatized from 1999 to 2002, while 913 firms were privatized in 2003. We will examine the changes in performance of those 2,856 firms (the treatment group) before and after their privatization, using the 913 firms as the control group. The regression specification is as follows:

$$Y_{ijt} = \alpha_{ijt} + \beta_1 PRV_{ijt-1} + \beta_2 LASS_{ijt} + \beta_3 KL_{ijt} + \beta_4 HHI_{jt} + \beta_5 SOEshare_{jt} + \beta_6 IGO_{jt} + \varepsilon_{ijt}$$

………..(1)

Let i index individual firm, j index its industry, and t index time (year). Y_{ijt} stands for the performance indicators of the ith firm in the jth industry at time t. We are interested in the impacts of privatization on the performance indicators, i.e., coefficient β_1 of the extent of privatization (PRV). Here we use the one-year lag value of PRV to deal with the potential endogeneity problem. Meanwhile, controls are also made for time-variant firm differences: logarithm of assets ($LASS$) controlling for firm size difference, and capital-labor ratio (KL) controlling for the technological difference. Moreover, we use three variables controlling for time-variant industrial differences: Herfindahl index (HHI) of every 4-digit industry at time t, reflecting the degree of industrial concentration; SOE output share ($SOEshare$) in the total output of every 4-digit industry in the 2-digit region at time t, specially designed to measure

the extent of government intervention in businesses; and industrial gross output (*IGO*) of the

3-digit industry at time *t,* controlling for the macro change related to the concerned industries

over time.

Panel A of Table 6 summarizes the regression results regarding the impacts of privatization

on firm performance.[10] It is shown in columns 1 and 2 that collective enterprises, once

privatized, have expanded in terms of both assets and sales revenue (each with 1% statistical

significance), consistent with our earlier results of price-adjusted comparison (i.e., results

summarized in Table 4). More importantly, as shown in Panel A of Table 6, the ratio of cost

of goods sold to sales is found to increase with the extent of privatization, while both the

managerial expenses to sales ratio and the financial expenses to sales ratio decrease with the

extent of privatization. These results are consistent with the findings of our preliminary

analysis presented in Section 3. Figure 1 illustrates the estimated effects of privatization on

the cost of goods sold to sales, gross profit margin, managerial expenses to sales, financial

expenses to sales, and operating income to sales, with all other control variables each set to

the mean values in the sample.

< Insert Table 6 here>

< Insert Figure 1 here>

In transition economies like China, where governments still have significant control of the

economy, government ownership, as in the case of collectively-owned enterprises, helps

firms obtain access to production inputs and infrastructure services, which leads to lower

production costs and confers competitive advantage over other firms. The downside of

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[10] Results of the Hausman test to these regressions have shown that fixed-effect models are more appropriate
than random-effect models.

government ownership, however, is that government-controlled firms are often used by local government officials to pursue their private benefits, causing bloated management structures and increasing the managerial expenses (this is the political patronage theory proposed by Shleifer and Vishny, 1994 and Boycko et al., 1996). Indeed our empirical findings show that collective enterprises, once privatized, may encounter difficulties in securing production inputs and infrastructural services. The increase in the cost of goods sold relative to sales revenue represents the loss of the potential benefits of government ownership after privatization. On the other hand, privatized enterprises have better control of managerial and financial expenses relative to sales revenue, constituting a reduction of the costs associated with government ownership. It is interesting to note that during the process of privatizing collectively-owned enterprises, the saving of the costs related to government ownership outweighs the reduction of the benefits associated with government ownership, resulting in an improvement in the operating income to sales ratio after privatization.

While both the ratio of managerial expenses to sales and the ratio of financial expenses to sales have decreased after privatization, the underlying mechanisms could be different. This is due to the different nature of problems associated with high levels of these two expenses before the privatization: managerial expenses shoot up as local government officials take actions to benefit themselves and advance their political goals, while high financial expenses could be due to a lack of incentive for proper management. Collective enterprises, once privatized, would be more profit-oriented and also face less political resistance to trimming down the management structure and to reducing unnecessary managerial expenses. As for financial expenses, its relative decrease to sales could be due to more efficient use of financial resources after privatization. It may also be possible that the privatized firms face

difficulty in borrowing money from financial institutions.[11]

Panels B and C of Table 6 summarize the impacts of privatization on labor welfare and firm tax contributions, respectively. Total employment has been found to decrease with the extent of privatization, in contrast to the findings of Dong and Putterman (1996) and Ito (2006). Meanwhile both wage per employee and welfare per employee increased with the extent of privatization. These results are consistent with the predictions of the political patronage theory that public firms tend to hire more labor, presumably with lower wages and welfare benefits, as a way of securing political support for politicians. Such concerns, however, are no longer relevant when public firms privatize. Meanwhile, there are concerns manifested in public debates that collectively-owned enterprises, once privatized, may try to avoid paying taxes to both central and local governments (Cai et al. , 2004). However, we find that the both value-added tax and corporate income tax significantly increased with the extent of privatization (10% and 1% significance level, respectively), possibly due to the fact that collective firms have expanded after privatization.[12]

Given the gradual and selective privatization in China's collectively-owned enterprises, we would like to explore if there are different impacts associated with privatizations of different sequence. The regression specification (1) is modified by replacing the variable *PRV* (measuring the extent of privatization) by the sequencing dummies of privatization (denoted by First_PRV, Second _PRV, Third _PRV, or Fourth_PRV).

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[11] Interest rate liberalization has yet to be introduced into China's banking sector. Most banks are state-owned, and they have prejudices against privately-owned enterprises (Bai et al., 2006b).
[12] There is no noticeable change in the ratio of corporate income tax to sales, but a significant decrease in the ratio of value-added tax to sales.

$$Y_{ijt} = \alpha_{ijt} + \delta_1 First\_PRV + \delta_2 Second\_PRV + \delta_3 Third\_PRV + \delta_4 Fourth\_PRV$$
$$+ \beta_1 LASS_{ijt} + \beta_2 KL_{ijt} + \beta_3 HHI_{jt} + \beta_4 SOEshare_{jt} + \beta_5 IGO_{jt} + \varepsilon_{ijt}$$

……….(2)

As summarized in Table 7, the effects of privatization on the cost of goods to sales ratio and the managerial expenses to sales ratio were strongest after the first privatization, though impacts remain sizeable and statistically significant in the second privatization.

As the regression specification (1) presented above focuses on the comparison of firm performance immediately before and after privatization, one may ask whether the changes in the costs and benefits of government ownership take place immediately or gradually over time. To address this question, the estimation specification (1) is modified by adding interaction terms of year dummies after privatization with the extent of privatization. *Year_k_after* is equal to 1 for the year in which firm i has been in the kth year after the last privatization.

$$Y_{ijt} = \alpha_{ijt} + \lambda_k \sum_{k=1}^{4} Year\_k\_after * PRV_{ijt-1} + \beta_1 PRV_{ijt-1} + \beta_2 LASS_{ijt} + \beta_3 KL_{ijt} + \beta_4 HHI_{jt} + \beta_5 SOEshare_{jt} + \beta_6 IGO_{jt} + \varepsilon_{ijt}$$

… (3)

As shown in Table 8, the impacts of privatization on the cost of goods sold and the managerial expenses were immediate, and concentrated in the year right after the privatization. Given that the increase in the cost of goods (i.e., the loss of the benefits associated with government ownership) was one-time, there is hope that privatized firms shall be able to come up with efficient production methods to absorb the one-time shock. Our results also suggest that collective firms, once privatized, were able to seize the opportunity right away to adopt a leaner and more efficient management system, immediately enjoying a decrease in the costs of government ownership.

5. Conclusion

Organizational innovations and transformations have been prominent throughout China's economic reform since 1978. Collectively-owned enterprises are an excellent example. Despite their ambiguously defined property rights, collectively-owned enterprises had spectacular growth in the early years of China's economic reform. This has led to intensive debates on the costs and benefits of government ownership. It has been argued that when markets have yet to be developed and government control remains significant, collective enterprises may thrive as their local governments – which have the residual rights of control over the collective enterprises – could help the firms gain access to production inputs and infrastructure services, and provide them with protection against expropriation from various groups in the society. The assistance from the local governments confers collectively-owned enterprises with competitive advantages over their privately-owned competitors.

In more recent years, with the decline of collective enterprises, attention has been drawn towards the costs of government ownership associated with collective enterprises. From the general literature on the costs of public ownership, it is known that local government officials – who have the residual rights of control over the collective enterprises – may pursue their private benefits at the expenses of their firms' financial performance. Specifically, the management structure of collective enterprises could be unnecessarily large with excessive management staff, and management expenses could be excessively high. With the acceleration of market liberalization and shrinking role of government control in the economy, the benefits of government ownership diminished relative to the costs of government ownership, thereby leading to privatization/transformation of collectively-owned enterprises.

In this paper, using a large panel dataset of collective enterprises for the period of 1998-2003, we explore how the costs and benefits of government ownership evolved as collective enterprises underwent privatization of various extent and sequence. To deal with the problems of selection bias and omitted variables, we apply firm-specific fixed-effect model to the balanced panel of 3,769 collective enterprises that were privatized from 1998 to 2003, selecting the 2,856 firms privatized from 1999 to 2002 as the treatment group and 913 firms privatized in 2003 as the control group. We find that as privatization continued, enterprises experienced a decrease in the *benefits of government ownership (*i.e.*, low cost of goods sold to sales ratio)* but enjoyed a reduction in the *costs of government ownership (*i.e., *high managerial expenses to sales ratio)*. The impacts of privatization on the costs and benefits of government ownership are found to be most significant in the first privatization and take place immediately after the privatization. These results shed light on the logic behind organizational innovations and transformations in China's collective enterprises, and may have implications for the theory of organizations in rapidly changing environments.

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Figure 1.   The impacts of privatization on firm performance and its components
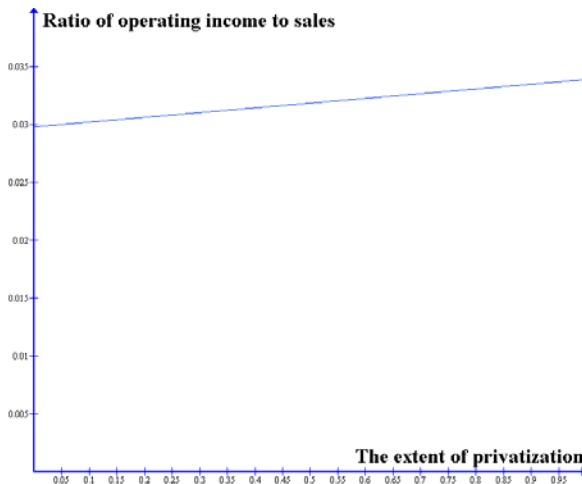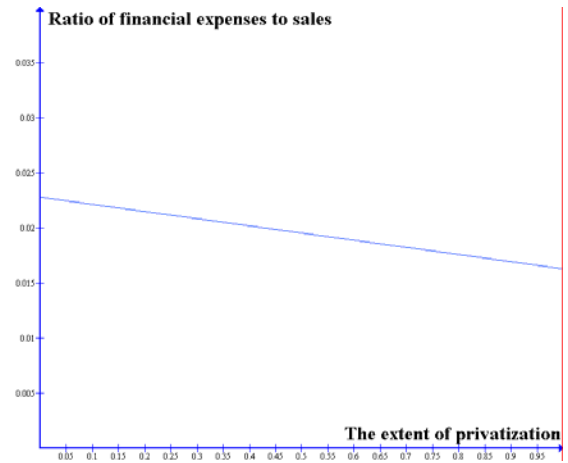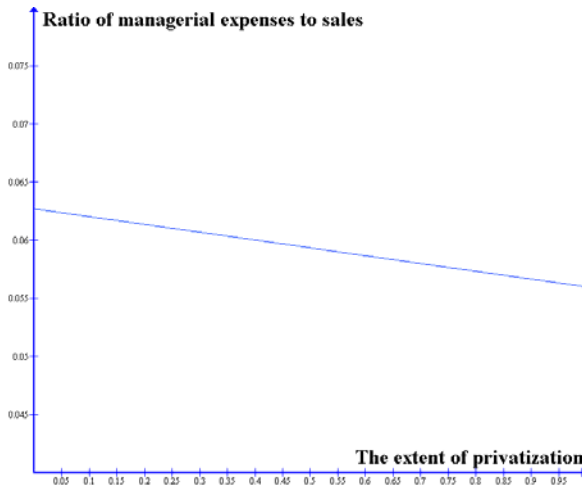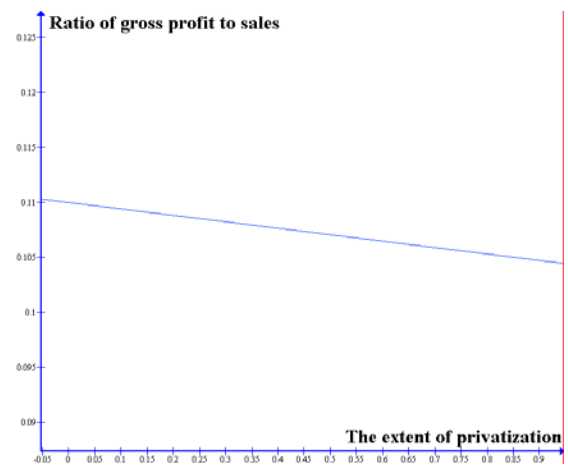
Table 1
Sequence and extent of privatization

First-time privatization

Type of change in ownership	1999	2000	2001	2002	2003	Total
100%→0%	590	355	488	450	650	2533
100%→(0%, 50%)	106	79	78	67	105	435
100%→[50%,100%)	203	144	159	137	158	801
Total	**899**	**578**	**725**	**654**	**913**	**3769**

Second-time privatization

Type of change in ownership	1999	2000	2001	2002	2003	Total
(0%,50%)→0%		30	43	37	41	151
(0%,50%)→(0%,50%)		17	16	20	16	69
[50%, 100%)→0%		52	52	51	51	206
[50%,100%)→(0%, 50%)		16	20	22	19	77
[50%,100%)→[50%, 100%)		43	29	45	45	162
Total		**158**	**160**	**175**	**172**	**665**

Third-time privatization

Type of change in ownership	1999	2000	2001	2002	2003	Total
(0%,50%)→0%			9	11	17	37
(0%,50%)→(0%, 50%)			15	11	15	41
[50%, 100%)→0%			10	3	11	24
[50%, 100%)→(0%, 50%)			5	3	5	13
[50%, 100%)→[50%, 100%)			14	12	13	39
Total			**53**	**40**	**61**	**154**

Fourth-time privatization

Type of change in ownership	1999	2000	2001	2002	2003	Total
(0%, 50%)→0%				8	4	12
(0%, 50%)→(0%, 50%)				8	4	12
[50%,100%)→0%				2	1	3
[50%,100%)→(0%,50%)				4	1	5
[50%,100%)→[50%,100%)				5	8	13
Total				**27**	**18**	**45**

Fifth-time privatization

Type of change in ownership	1999	2000	2001	2002	2003	Total
(0%, 50%)→0%					3	3
(0%, 50%)→(0%, 50%)					3	3
[50%, 100%)→0%					1	1
[50%, 100%)→(0%, 50%)					0	0
[50%,100%)→[50%, 100%)					3	3
Total					**10**	**10**

Notes.

100%: 100% collective ownership;

[50%, 100%): collective ownership greater than or equal to 50%, but less than 100%;

(0%, 50%): collective ownership greater than 0, but less than 50%;

0%: no collective ownership.

Table 2

Summary statistics of key variables

Variable	Obs	Mean	STD	MIN	MAX
Firm Performance Measures					
logarithm of sales revenue	18317	9.7186	0.9842	0.6931	15.383
Ratio of cost of goods sold to sales revenue	18837	0.8409	0.1282	0.0000	7.6297
Gross profit ratio	18837	0.1113	0.1012	-6.651	0.9458
Ratio of managerial expenses to sales revenue	18837	0.0620	0.0726	0.0000	1.8389
Ratio of financial expenses to sales revenue	18837	0.0234	0.0434	0.0000	2.8641
Ratio of operating income to sales revenue	18837	0.0306	0.105	-6.862	1.5250
Labor Welfare					
logarithm of employment	18836	4.9889	.9282	1.7918	8.9359
Salary per employee	18836	7.9651	7.5539	0.0000	407.3392
Welfare per employee	18836	1.0876	11.1704	-6.8104	1521.603
Firm Tax Contributions					
logarithm of value-added tax	18838	1050.251	2875.688	-7016.5	115515
logarithm of corporate income tax	18838	272.4097	1221.891	-1842.984	48854.13
Explanatory Variable					
Privatization	18845	0.3352	0.4524	0	1
Control Variables					
logarithm of assets	18838	9.4312	1.1125	4.9463	14.536
Capital/labor ratio	18836	47.141	87.303	0.0000	3223.764
SOE output share	18843	0.1154	0.1664	0.0000	0.9896
Herfindahl index	18845	0.0207	0.0328	0.0009	0.6770
Industry gross output	18845	8583.9	8305.6	21.228	57928.94

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Table 3
Correlation for independent variables

	1	2	3	4	5	6
Privatization$_{pre}$	1.0000					
Herfindahl Index	0.0231	1.0000				
SOE output share	-0.1330	-0.0135	1.0000			
Logarithm of assets	0.0117	0.0421	-0.0484	1.0000		
Capital/labor ratio	0.0171	0.0127	0.0418	0.3312	1.0000	
Industry gross output	0.0618	-0.1055	0.1413	0.0776	0.0271	1.0000

Note: *Privatization* is one-year lagged.

Table 4
The impacts of privatization on firm performance, labor welfare, and firm tax contributions (Price-adjusted)

Variable	N	Mean (before) [Median] (before)	Mean (after) [Median] (after)	Change In Mean Change In [Median]	T-statistic for change in mean	Z-statistic for change in median
Firm Performance						
Log of assets	2853	9.3890	9.5479	0.1589	15.7786***	
		[9.3279]	[9.4638]	[0.1359]		19.2510***
Log of sales revenue	2777	9.6773	9.8673	0.1900	16.3641***	
		[9.5399]	[9.7265]	[0.1866]		20.1740***
Ratio of cost of goods sold to sales	2849	0.8388	0.8499	0.0111	6.6666***	
		[0.8627]	[0.8739]	[0.0112]		7.2830***
Ratio of gross profit to sales	2849	0.1120	0.1053	-0.0067	-4.6765***	
		[0.0974]	[0.0890]	[-0.0084]		-5.4270***
Ratio of managerial expenses to sales	2849	0.0650	0.0594	-0.0056	-4.9908***	
		[0.0438]	[0.0401]	[-0.0036]		-7.5990***
Ratio of financial expenses to sales	2849	0.0257	0.0188	-0.0069	-6.5121***	
		[0.0137]	[0.0099]	[-0.0038]		-17.3570***
Ratio of operating income to sales	2849	0.0258	0.0311	0.0053	2.5474**	
		[0.0215]	[0.0246]	[0.0031]		4.6980***
Labor Welfare						
Log of employment	2851	4.9640	4.9711	0.0070	0.7472	
		[4.9053]	[4.9273]	[0.0220]		0.7090
Salary per employee	2851	7.9113	8.8509	0.9396	4.9183***	
		[6.7844]	[8.0108]	[1.2263]		19.0600***
Welfare per employee	2854	1.6397	1.1192	-0.5205	-0.7769	
		[0.8286]	[0.9810]	[0.1524]		10.553***
Firm Tax Contributions						
Value-added tax	2855	978.8402	1241.912	263.0713	6.1209***	
		[417.3658]	[519.0869]	[101.7211]		12.378***
Corporate income tax	2855	235.0467	379.9597	144.913	5.9797***	
		[10.4581]	[36.2500]	[25.7919]		12.305***

Note. ***,**,* ,+ represent the statistically significant level of 1%, 5%,10% and 15% respectively.

Table 5

The impacts of privatization on firm performance, labor welfare, and firm tax contributions (benchmarked to the un-privatized collectively-owned enterprises).

Variable	N	Mean (before) [Median] (before)	Mean (after) [Median] (after)	Change In Mean Change In [Median]	T-statistic for change in mean	Z-statistic for change in median
Firm performance						
Log of assets	2852	-0.8517	-0.9545	-0.1029	-7.0064***	
		[-0.8418]	[-0.9123]	[-0.0705]		-6.4780***
Log of sales revenue	2776	-0.9357	-1.0261	-0.0904	-5.8819***	
		[-0.9740]	[-1.0397]	[-0.0658]		-5.6030***
Ratio of cost of goods sold to sales	2848	-0.0032	0.0026	0.0058	3.2976***	
		[0.0133]	[0.0177]	[0.0044]		2.5970***
Ratio of gross profit to sales	2848	0.0043	0.0000	-0.0043	-2.8650***	
		[-0.0042]	[-0.0112]	[-0.0070]		-2.5240**
Ratio of managerial expenses to sales	2848	0.0081	0.0063	-0.0018	-1.5384+	
		[-0.0091]	[-0.0079]	[0.0012]		-0.5990
Ratio of financial expenses to sales	2848	0.0001	0.0007	0.0006	0.5474	
		[-0.0074]	[-0.0054]	[0.0019]		6.2940***
Ratio of operating income to sales	2848	-0.0052	-0.0074	-0.0022	-1.0036	
		[-0.0070]	[-0.0101]	[-0.0030]		-2.6910***
Labor Welfare						
Log of employment	2850	-0.5906	-0.6444	-0.0537	-4.3177***	
		[-0.5984]	[-0.6484]	[-0.0500]		-4.8750***
Salary per employee	2850	-1.9923	-1.3689	0.6234	2.2021**	
		[-1.4535]	[-1.4158]	[0.0378]		-0.4670
Welfare per employee	2854	0.4216	-0.2473	-0.6689	-0.9972	
		[-0.2338]	[-0.2431]	[0.4679]		0.1630
Firm Tax Contribution						
Value-added tax	2855	-3248.729	-6914.443	-3665.714	-4.5916***	
		[-1468.564]	[-1935.498]	[-466.934]		-14.507***
Corporate income tax	2855	-1184.084	-2404.572	-1220.488	-6.4942***	
		[-437.5382]	[-597.416]	[-159.8778]		-9.281***

Note. ***,**,* ,+ represent the statistically significant level of 1%, 5%,10% and 15% respectively.

Table 6

Regression analysis on the impacts of privatization

Panel A. Firm performance

	Log(sale)	Log(Assets)	Ratio of Cost of goods sold to sales	Ratio of Gross profit to sales	Ratio of Managerial expenses to sales	Ratio of Financial expenses to sales	Ratio of Operating income to sales
Privatization$_{pre}$	.1073***	.1445***	.0092***	-.0058***	-.0067***	-.0065***	.0041+
	(.0101)	(.0088)	(.0023)	(.0021)	(.0012)	(.0009)	(.0025)
Log(Assets)	.3980***	-	-.0071***	.0069***	.0004	.0035***	.0033
	(.0107)	-	(.0024)	(.0023)	(.0012)	(.0009)	(.0027)
Capital/Labor Ratio	-.0007***	.0014***	.0000	-.0000	.0001***	.0000+	-.0001***
	(.0001)	(.0001)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Herfindahl index	-.0774	.0806	-.0258	-.0013	.0125	-.0086	.0008
	(.2018)	(1762)	(.0461)	(.0422)	(.0233)	(.0170)	(.0498)
SOE output share	-.1235***	-.1348***	-.0068	.0060	-.0059	-.0011	.0072
	(.0412)	(.0361)	(.0095)	(.0087)	(.0048)	(.0035)	(.0102)
Industry Gross Output	6.69e-06***	8.16e-06***	5.45e-07**	-3.53e-07*	1.04e-07	-2.38e-07***	-1.76e-07
	(1.02e-06)	(8.92e-07)	(2.34e-07)	(2.14e-07)	(1.18e-07)	(8.62e-08)	(2.53e-07)
Number of Firms	3769	3769	3769	3769	3769	3769	3769
Number of Observations	15030	15062	15059	15059	15059	15059	15059
R²	0.1458	0.0839	0.0029	0.0018	0.0065	0.0079	0.0016
Pr>F(k, NT-k)[a]	0.0000	0.0000	0.0000	0.0026	0.0000	0.0000	0.0000
Pr>F[b]	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test[c] χ²	238.20	436.68	29.06	10.83	100.80	86.03	22.11

Notes.***,**,* ,+ denote statistical significance level at 1%, 5%,10% and 15% respectively. Standards errors are reported in parenthesis.

a. Joint significance test for all coefficients

b. Joint significance test for firm fixed effects, with F-statistic distribution having (N, N(T-1)-k-1) degree of freedom.

c. The null hypothesis of Hausman test is that the omitted variables are not correlated with independent variables, while the alternative hypothesis is that the omitted variables are not perpendicular to independent variables. When Hausman test rejects the null hypothesis, fixed-effects model is more appropriate than random-effects model

Panel B   Labor welfare

	Log (employment)	Salary per employee	Welfare per employee
Privatization $_{pre}$	-.0257***	.6831***	.0881***
	(.0077)	(.1712)	(.0326)
Log(Assets)	.3477***	-.4553**	-.0695**
	(.0081)	(.1812)	(.0345)
Capital/Labor Ratio	-.0028***	.0579***	.0070***
	(.0001)	(.0013)	(.0020)
Herfindahl index	-.0272	-1.6678	.0085
	(.1525)	(3.3919)	(.6455)
SOE output share	.0992***	-.8598	-.0504
	(.0313)	(.6965)	(.1325)
Industry Gross Output	-2.01e-06***	.0001***	4.58e-06
	(7.75e-07)	(.0000)	(3.28e-06)
Number of Firms	3769	3769	3769
Number of Observations	15062	15062	15062
R^2	0.2390	0.1631	0.0730
Pr>F(k, NT-k)^a	0.0000	0.0000	0.0000
Pr>F^b	0.0000	0.0000	0.0000
Hausman test^c χ^2	572.80	704.29	386.38

Notes.***,**,* ,+ denote statistical significance level at 1%, 5%,10% and 15% respectively. Standards errors are reported in parenthesis.

a. Joint significance test for all coefficients

b. Joint significance test for firm fixed effects, with F-statistic distribution having (N, N(T-1)-k-1) degree of freedom.

c. The null hypothesis of Hausman test is that the omitted variables are not correlated with independent variables, while the alternative hypothesis is that the omitted variables are not perpendicular to independent variables. When Hausman test rejects the null hypothesis, fixed-effects model is more appropriate than random-effects model

Panel C Firm tax contributions

	Log (Value-added Tax)	Log (Corporate Income Tax)
Privatization $_{pre}$	.0362*	.1889***
	(.0193)	(.0343)
Log(Assets)	.4099***	.4859***
	(.0211)	(.0400)
Capital/Labor Ratio	-.0006***	-.0004*
	(.0001)	(.0002)
Herfindahl index	.6521*	-.7761
	(.3804)	(.7115)
SOE output share	-.1400*	-.5122***
	(.0781)	(.1468)
Industry Gross Output	8.13e-06 ***	.0000***
	(1.90e-06)	(.3.28e-06)
Number of Firms	3672	2921
Number of Observations	14038	8766
R²	0.0438	0.0478
Pr>F(k, NT-k)ᵃ	0.0000	0.0000
Pr>Fᵇ	0.0000	0.0000
Hausman testᶜ χ²	183.96	19.67

Notes.***,**,* ,+ denote statistical significance level at 1%, 5%,10% and 15% respectively. Standards errors are reported in parenthesis.

a. Joint significance test for all coefficients

b. Joint significance test for firm fixed effects, with F-statistic distribution having (N, N(T-1)-k-1) degree of freedom.

c. The null hypothesis of Hausman test is that the omitted variables are not correlated with independent variables, while the alternative hypothesis is that the omitted variables are not perpendicular to independent variables. When Hausman test rejects the null hypothesis, fixed-effects model is more appropriate than random-effects model

Table 7
The impacts of sequential privatization

	Ratio of Cost of goods sold to sales	Ratio of Gross profit to sales	Ratio of Managerial expenses to sales	Ratio of Financial expenses to sales	Ratio of Operating income to sales
First privatization	.0141***	-.0094***	-.0051***	-.0074***	.0016
	(.0018)	(.0016)	(.0009)	(.0007)	(..0018)
Second privatization	.0119***	-.0083**	-.0017	-.0029*	-.0035
	(.0039)	(.0035)	(.0021)	(..0015)	(.0041)
Third privatization	.0035	-.0052	-.0081+	-.0049	.0099
	(.0095)	(.0085)	(.0050)	(.0037)	(.0098)
Fourth privatization	.0077	-.0215	-.0203**	.0024	-.0077
	(.0192)	(.0171)	(.0102)	(.0075)	(.0199)
Log(Assets)	-.0062***	.0058***	.0008	.0031***	.0031+
	(.0019)	(.0017)	(.0010)	(.0007)	(.0016)
Capital/Labor Ratio	.0000	-.0000	.0001***	.0000**	-.0001***
	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Herfindahl index	.0340	-.0129	.0099	-.0201	-.0016
	(.0400)	(.0354)	(.0211)	(.0155)	(.0412)
SOE output share	-.0039	-.0004	-.0026	.0088**	-.0071
	(.0079)	(.0070)	(.0042)	(.0031)	(.0081)
Industry Gross Output	.0000***	-.0000***	-.0000	-.0000***	.0000
	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
Number of Firms	3769	3769	3769	3769	3769
Number of Observations	18825	18825	18825	18825	18825
R^2	0.0087	0.0058	0.0064	0.0172	0.0012
Pr>F(k, NT-k)[a]	0.0000	0.0000	0.0000	0.0000	0.0339
Pr>F[b]	0.0000	0.0000	0.0000	0.0000	0.0000

Notes.***,**,* ,+ denote statistical significance level at 1%, 5%,10% and 15% respectively. Standards errors are reported in parenthesis.

a. Joint significance test for all coefficients

b. Joint significance test for firm fixed effects, with F-statistic distribution having (N, N(T-1)-k-1) degree of freedom.

Table 8

The long-term impacts of sequential privatization

	Ratio of Cost of goods sold to sales	Ratio of Gross profit to sales	Ratio of Managerial expenses to sales	Ratio of Financial expenses to sales	Ratio of Operating income to sales
Yr_1_after * Privatization $_{pre}$	-0.0150*	0.0072	0.0024	0.0020	0.0014
	(0.0084)	(0.0077)	(0.0042)	(0.0031)	(0.0091)
Yr_2_after* Privatization $_{pre}$	-0.0111	0.0070	0.0005	0.0003	0.0030
	(0.0087)	(0.0079)	(0.0044)	(0.0032)	(0.0094)
Yr_3_after * Privatization $_{pre}$	-0.0092	0.0056	-0.0028	-0.0006	0.0050
	(0.0091)	(0.0084)	(0.0046)	(0.0034)	(0.0099)
Privatization $_{pre}$	0.0223***	-0.0126	-0.0081*	-0.0078**	0.0020
	(0.0084)	(0.0077)	(0.0042)	(0.0031)	(0.0091)
Log(Assets)	-0.0074***	0.0069***	0.0006	0.0036***	0.0032
	(0.0025)	(0.0023)	(0.0012)	(0.0009)	(0.0027)
Capital/Labor Ratio	0.0000	-0.0000	0.0001***	0.0000	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Herfindahl index	-0.0258	-0.0011	0.0127	-0.0087	0.0008
	(0.0461)	(0.0422)	(0.0233)	(0.0170)	(0.0498)
SOE output share	-0.0063	0.0059	-0.0062	-0.0013	0.0074
	(0.0095)	(0.0087)	(0.0048)	(0.0035)	(0.0102)
Industry Gross Output	0.0000**	-0.0000	0.0000	-0.0000**	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observations	15059	15059	15059	15059	15059
Number of ID	3769	3769	3769	3769	3769
R-squared	0.0034	0.0019	0.0071	0.0083	0.0016

Notes.***,**,* ,+ denote statistical significance level at 1%, 5%,10% and 15% respectively. Standards errors are reported in parenthesis.

a. Joint significance test for all coefficients

b. Joint significance test for firm fixed effects, with F-statistic distribution having (N, N(T-1)-k-1) degree of freedom.