Managerial Ownership Matters for Firm Performance:
Evidence from China[*]

Yifan Hu[a]
University of Hong Kong

Xianming Zhou[b]
University of Hong Kong

January 2006

[a] Hong Kong Institute of Economics and Business Strategy, School of Business and Economics, University of Hong Kong, Pokfulam Road, Hong Kong. Tel: (852) 2857 8514; Fax: (852) 2548 3223; E-mail: huyf@hku.hk.

[b] Corresponding author: School of Economics and Finance, University of Hong Kong, Pokfulam Road, Hong Kong. Tel: (852) 2857 8564; Fax: (852) 2548 1152; E-mail: xianming.zhou@hku.hk.

Managerial Ownership Matters for Firm Performance: Evidence from China

Abstract

We study the managerial ownership-performance relationship by examining a unique sample of non-listed Chinese firms, of which the ownership structure is essentially exogenously determined subject to government policies irrelevant to incentive contracting. In matching-sample comparisons, we find that firms of significant managerial ownership performed superiorly relative to those whose managers do not own equity shares. Our results indicate a strong and robust positive effect of managerial ownership on company performance. In contrast to existing studies, our results are not likely to suffer from an endogeneity problem that is often difficult to resolve with conventional data of publicly traded companies.

1. Introduction

The diffuseness of shareholdings of the modern corporation determines the separation of ownership and control, and hence causes a conflict-of-interest problem between shareholders and the management (Berle and Means, 1932). Agency theory contends that incentive schemes are implemented to mitigate this problem (Mirrlees, 1976, Jensen and Meckling, 1976, Holmstrom, 1979). A number of empirical studies have been conducted in the past two decades, by a wide range of researchers, to examine various incentive schemes and their impacts on performance. Studies of executive compensation tend to conclude that direct compensation – the conventional incentive scheme – plays a negligible role in providing incentives to managers.[3] On the other hand, as a natural scheme tying the interests of shareholders and managers, executive equity holdings have attracted increasing attention of researchers. In terms of the pay-performance sensitivity, equity holdings including stock options have become the dominating component of managerial incentives (Jensen and Murphy, 1990, Hall and Liebman, 1998, Murphy, 1999). There is a growing belief that equity ownership alone determines the essential incentives for corporate managers.

Then an important question is: does managerial ownership matter for performance? If the answer is yes, as agency theory predicts, one should observe superior performance for firms of high managerial ownership. A number of recent studies have examined the relationship between the firm's ownership structure and its performance. The extensive investigation, however, has only generated mixed results. Morck et al. (1988), McConnell and Servaes (1990), Hermalin and

---

[3] Kole (1997) points out complicated issues regarding compensation contracts that remain to be understood.

Weisbach (1991), and Core and Larcker (2002) document a significant effect of insider ownership on corporate performance. On the other hand, others, including Demsetz and Lehn (1985), Loderer and Martin (1997), Cho (1998), Himmelberg et al. (1999), and Demsetz and Villalonga (2003), do not identify a meaningful association between ownership and performance.

A main concern with these conflicting findings is that the often observed ownership-performance relations could be a spurious correlation resulting from a serious endogeneity problem. Endogeneity occurs when ownership and performance are interdependent (a causality problem), or when unobserved firm characteristics affecting both variables present (a missing-variable problem). Indeed, in a simultaneous equations framework, which mitigates causality problems, Loderer and Martin (1997) and Cho (1998) document that firm value affects ownership structure, but not vice versa. In panel data, Himmelberge et al. (1999) find that a managerial ownership-performance relation is observed in OLS regressions but it disappears when firm fixed effects that control for constant firm heterogeneity are included. These findings cast doubts on the proposition that managerial ownership affects firm performance.

The results from existing studies are clearly far from conclusive. On one hand, theory does not give an unambiguous prediction of the empirical regularity. On the other hand, since existing studies exclusively examine publicly held firms, of which insider ownership itself is a complex function of stock price performance, incentive contracts, and governance variables, it is difficult to ideally control endogeneity in conventional data of publicly traded companies.

In this paper, we study the performance effect of managerial ownership by examining a unique dataset of Chinese non-listed companies. Our sample contains ownership data for a transition period of China's economic reform, in which the firm's ownership structure was largely determined by exogenous government policies unrelated to incentive contracting.

2

Therefore, thanks to the lack of a secondary equity market, managerial ownership of such companies was essentially exogenous.

The original sample is obtained form a World Bank's survey on enterprise production and innovation in China. The survey contains 1,500 firms selected from ten industries and five cities, covering the three-year period of 1998-2000. The survey contains information on key performance measures and, importantly, managerial ownership. Among the total sample, we are able to identify a sub-sample of 83 firms whose managers own an average of 70 percent of the firm's equity. These companies are essentially manager-controlled firms. By constructing a group of control firms, we conduct matching-sample comparisons for company performance. The control firms are those whose managers did not own equity shares and which were matched with the manager-controlled firms in size and industry.

We document large differences in performance between the manager-controlled firms and the matching firms. We estimate an average return on assets of 1.40 percent for the manager-controlled firms during the years 1998-2000, but only 0.66 percent for the matching group in this period. From a Cobb-Douglas production function estimation, we obtain an average value-added per year of 11.67 million RMB for the manager-controlled firms, and 5.64 million RMB for the matching firms. These differences are statistically and economically significant, and are robust, indicating a strong positive impact of managerial ownership on company performance.

Our findings differ from existing studies in three significant ways. First, given the unique market and institutional environment in China during the economic reform period and the non-listing nature of the sample, our managerial ownership data are unlikely to suffer from an endogeneity problem. Second, because the managers of the ownership group typically own a significant percentage of the firm's equity, a potential entrenchment effect of managerial

ownership is minimized, for any costs arising from mismanagement are mostly born by the managers. In other words, our results should present a *clean* incentive effect. Third, with our control firms, the roles of important incentive schemes and governance mechanisms that are common in a developed economy are either non-existent or negligible. Therefore, the differences we document between the manager-controlled firms and the matching firms should present an estimate close to the agency cost arising from the separation of ownership and control.

The rest of the paper is organized as follows. In Section 2, we outline the debate on the ownership-performance relationship, and highlight the main issue we address in this study. Section 3 briefly discusses the institutional background of the ownership reform in China. Section 4 describes the data. Section 5 presents our main results for the test of the managerial ownership-performance relationship. Section 6 discusses robustness checks. The final section concludes.

2. The Debate on the Ownership-Performance Relationship

Standard agency theory models ownership as an incentive scheme that, by tying the interests of shareholders and the manager, mitigates agency costs. Hence, agency theory predicts a positive ownership-performance relationship. On the other hand, insider entrenchment theory contends that ownership facilitates entrenchment and hence, because firms run by entrenched managers incur high agency costs, ownership adversely affects company performance. As the theories offer no guidance to the relative strengths of the two offsetting effects, the ownership-performance relation is theoretically ambiguous.

The debate in the literature does not question the economic rationale for the incentive effect or the entrenchment effect of ownership; it questions the validity of existing empirical findings. An

important issue central to the debate is whether the often observed ownership-performance relation is a spurious correlation due to an endogeneity problem.

There are two sources of endogeneity in ownership and performance data. One source is the causality between ownership and performance variables. While it is common to take an ownership variable to be exogenous and use it as a regressor in the regression of a performance variable, the ownership structure *per se* can be endogenously determined upon the firm's performance. Consider managerial ownership as an example. A manager's equity holding depends on his investment strategies in managing his personal wealth, which in turn depend on the performance of the stock. The manager's share ownership increases when he exercises previously granted options, which also is dependent on the stock price. This causality problem is unavoidable in conventional data of publicly traded companies, of which the ownership structure directly changes with open market transactions. Simultaneous equations estimators are often used to deal with the causality-endogeneity problem (e.g., Loderer and Martin, 1997, Cho, 1998). However, the simultaneous equations approach has its own potential problems, for the estimation is sensitive to model specification errors.

The other source of endogeneity is unobserved firm characteristics that affect both ownership and performance. Being unobservable to econometricians, such firm characteristics cannot be quantified and thus cannot be explicitly controlled in an empirical model. Examples of such factors include internal monitoring and implicit contracts. Both factors are a substitute for ownership as an incentive scheme though none is measurable. However, the presence of such heterogeneity factors alone may define an association between ownership and performance regardless of a performance effect of ownership. Himmelberge et al. (1999) argue that unobserved firm heterogeneity is largely constant and can be captured by firm fixed effects in a panel data

regression. Zhou (2001) points out, however, that the fixed-effects estimator may not distinguish between the effect of firm heterogeneity and that of ownership. Therefore, while one may use fixed effects to remove firm heterogeneity, he could also remove an ownership effect on firm performance.

Interpretations of existing empirical findings differ dramatically. One school of thoughts argues that the variation in ownership reflects differing managerial incentives and internal monitoring and hence firm performance data should reveal the effect of ownership. We call this *the performance-effect argument*. Representative studies of this school include Morck et al. (1988) and McConnell and Servaes (1990). In a cross-sectional analysis, both studies identify a non-monotonic relation between insider ownership and firm performance; the relation is positive at low levels of insider ownership and becomes negative for insider ownership beyond a certain level. This observation is interpreted as evidence of a complex role of ownership: while it enhances performance by aligning the interests of managers and shareholders, it facilitates management entrenchment and, when the control right of insiders is sufficiently large, reduces firm performance.

A question challenging this argument is why firms do not adjust their ownership structure so that the optimal ones are achieved and shareholder values are maximized. One possible answer to this question is that firms often face exogenous constraints that prevent some firms from achieving the optimal structure in the short run or the long run. For instance, a manager's personal wealth is a necessary condition for him to have a significant holding of his firm's equity. In the mid-1990s, Bill Gates owned a quarter of Microsoft's total shares while the median stock ownership for S&P 500 CEOs was less than 0.2%. If equity holdings really matter, such a huge difference in managerial ownership would necessarily have a notable influence on corporate

6

decisions and thus on performance.

The performance-effect argument makes two implicit assumptions: (i) the firm's ownership structure is suboptimal in the sense that it is constrained by exogenous conditions, and (ii) firm heterogeneity can be controlled by observable firm variables. As such, the link between ownership and performance can be illustrated by the case of "homogenous firms with constrained ownership" shown in Figure 1. After controlling for firm heterogeneity, the cross-sectional data are indicative of constrained ownership, of which the performance effects, such as $P(\mu)$, are empirically observable.

Demsetz and Lehn (1985) and others represents another school of thoughts, which argues that the firm's ownership structure is endogenously determined. As an equilibrium outcome, the ownership structure is optimally chosen so that the firm's performance can not be further improved by altering the structure. We call this *the optimal-ownership argument*. In this argument, any variation in ownership data should reflect firm heterogeneity but should have no meaningful association with the variation in performance data.

Figure 2 illustrates ownership-performance relations for "heterogeneous firms with unconstrained ownership," and explains this argument. Consider two hypothetical firms, A and B. Because firm A has superior monitoring technology that firm B does not have, the role of managerial ownership is different between the two firms, as shown by $P_A(\mu)$ and $P_B(\mu)$, respectively. Without any constraints on share ownership, however, both firms can freely choose managerial stock holdings such that their values are maximized. In this case, the difference in the ownership levels, $\mu_A - \mu_B$, arises from monitoring heterogeneity, but it has no implication to a performance effect of ownership. In fact, if one runs a regression with the cross-sectional data, he

would obtain a spurious correlation linking points A and B.

The optimal-ownership argument makes an implicit assumption: there exist no exogenous constraints on the determination of an ownership structure. Clearly, this assumption may not hold for all firms or at all times. To illustrate, consider another firm, C, which is the same as firm B except that its manager's share holding is constrained to a less-than-efficient level, μ_C. In this case, the performance differential between B and C, $P(\mu_B) - P(\mu_C)$, is a consequence of insufficient ownership of firm C's manager. However, with real world data, econometricians would be unable to distinguish such a performance differential between a firm-heterogeneity effect and a constrained-ownership effect.

Therefore, the key issue in the debate is how to address the endogeneity problem. Core and Lacker (2002) overcome this problem by identifying "exogenous intertemporal variations" in managerial ownership. They examine a sample of firms that adopt target ownership plans, under which managers are required to own a minimum amount of stock, and find that both managerial equity ownership and firm performance increased after the plan was adopted. In our study, we examine a sample of non-listed Chinese firms, which, due to the non-listing feature and the unique market and institutional environment in China, contains largely "exogenous cross-sectional variations" in managerial ownership.

3. The Ownership Structure of Chinese Firms

China began its decades-long economic reform in the late 1970s. The main objective of the reform is to introduce market-economy mechanisms into the old system of central planning to enhance resources-allocation efficiency and increase productivity. Ever since the start of the reform, it has remained a key and challenging task for the Chinese government to reform its

state-owned enterprises (SOEs) – those are legally owned by the state and administered by central, provincial, or local governments. Early measures of reforming SOEs included increasing managerial decision autonomy (in company operations, profit retention, and employee compensation), implementing incentive-based corporate tax schemes, and introducing performance contracts for management and employees. While these measures seemed to improve productivity of SOEs in the 1980s (Groves et al., 1994; Jefferson et al., 1996; Li, 1997), they encountered problems due to complex institutional and market constraints and did not generate sustained performance (Lardy, 1998; Sun and Tong, 2003). In the early 1990s, the Chinese government introduced more drastic reform measures, aiming at ownership restructuring of SOEs. The implementation of *share ownership scheme* initiated the process of corporatization, in which SOEs were allowed to be privatized or partially privatized. Small SOEs were allowed to be privatized through restructuring, selling, or mergers, and middle-sized and large enterprises were also allowed to be partially privatized through *share issue privatization* (i.e., by listing on the two national stock exchanges, the Shanghai Stock Exchange and the Shenzhen Stock Exchange).

The wave of corporatization has substantially changed the ownership structure of SOEs. After restructuring or public listing, a Chinese firm typically has five types of shares, based on owners' background: state shares, legal-person shares, employee shares, domestic individual shares, and foreign shares. State shares are directly held by central, provincial, or local governments, or by solely government-owned enterprises. Legal-person shares are those owned by domestic institutions, including government agencies, insurance companies, mutual funds, and other enterprises, of which many are partially owned by governments at different levels. For listed companies, state shares and legal-person shares each, on average, presents about 30% of total

shares. While both state shares and legal-person shares are typically concentrated, the other three types of shares are diffusely distributed. Recent studies have examined the impact of the ownership reform on the performance of Chinese SOEs (e.g., Qi et al., 2000; Sun and Tong, 2003; Wang et al., 2004; Wei et al., 2005). Since such studies exclusively investigate publicly traded companies, they focus on the roles of state shares and legal-person shares.

Managerial ownership falls into the type of employee shares or domestic individual shares, which is typically tiny in listed companies, and in large non-listed and state-controlled enterprises. For a large sample of 5,284 partially privatized former SOEs, Wei et al. (2005) report an average holding of merely 0.015% by senior managers and directors. Given such typically negligible managerial equity holdings, existing studies on ownership structure of Chinese firms have unanimously ignored the roles of managerial shares.

However, for small and middle-sized non-listed companies, managerial equity holdings can be substantive. There are two main cases in which the manager of a Chinese firm may own a large portion of his firm's equity. In the first case, the firm started as a small company, originally solely or substantially owned by the manager. Since China began its economic reform in the late 1970s, there has been a sustained growth of such entrepreneur-owned companies. In the second case, the manager of a previously-state-owned enterprise became a major shareholder after the company was privatized, in which the company's shares were sold, wholly or partially, to legal persons or individuals. In either case, the manager's personal wealth imposes a constraint to his capacity of equity ownership, because of which such companies are typically small. Without a secondary market for equity shares of non-listed companies, the ownership structure of such firms remains unchanged or changes little over time, unless substantial restructuring occurs.

4. Data

The dataset is constructed from the World Bank survey on enterprise production and innovation in China.[4] A sample of 1,500 Chinese firms was drawn from five cities and all ten industries for the period of 1998-2000. As shown in Table 1, the five cities are Beijing, Chengdu, Guangzhou, Shanghai, and Tianjin, which are representative in terms of economic development. The fast-growing and most-developed regions in economic liberation and financial development (Beijing, Guangzhou, and Shanghai) contrast with the less-developed regions of relatively high concentration of state-owned enterprises (Tianjin and Chengu). The ten sectors are five manufacturing sectors (apparel and leather goods, consumer goods, electronic components, electronic equipment, and vehicles and vehicle parts) and five service sectors (accounting and related services, advertising and marketing, business logistics, communication services, and information technology services).[5] The chosen sectors represent relatively fast-growing and technologically advanced portions of China's industry.

The survey consists of two parts. The first part was completed by a firm's accountant, which contains information on the firm's production and performance, including production, revenues, costs, assets, and labor force. This part also provides information on the firm's ownership structure including managerial shareholdings. The second part was filled out by the firm's senior manager, which contains information on the firm's innovation and external relations with clients,

---

[4] The survey was designed by Development and Economic Research Department at the World Bank and conducted by China's National Bureau of Statistics (NBS).

[5] The ten sectors were chosen by the World Bank following China's industrial classification, GB/T 4754, initially published in 1984 and revised in 1994 and 2002. GB/T 4754 is similar to ISIC/Rev.3 announced by United Nation in 1989. Detailed information on China's industry classification can be found on the website: http://www.stats.gov.cn/tjbz/hyflbz/.

supplies, government, and research institutions. Most variables in the first part cover the three-year period of 1998-2000, while those in the second part are mostly for year 2000 only. The variables we use in this study are mostly from the first part of the survey data.

Of the total sample, 83 firms have managerial ownership, which accounts for only 5.5 percent of the total sample. Such a very small percentage of firms having managerial ownership appears to be surprising. It, however, reflects the fact that managerial presence in ownership structure was not yet a widely applied mechanism in China, although the government has encouraged diversified ownership as a compliment to state shares by privatizing the former state-owned firms and establishing new privately involved firms since China's economic reform began in 1978.

Table 2 shows the distribution of managerial ownership across industry and over the ownership level for the 83 firms. The distribution of managerial ownership is highly concentrated among these firms; managers of 34 firms were sole proprietors and the average managerial ownership of the 83 firms was as high as 70 percent. For discussion convenience, we loosely call these firms manager-controlled firms.

In terms of industrial distribution, 54 firms in the manufacturing industry have managerial ownership, which is well overweighs the number of the service industry (29 firms). The apparel and leather goods sector has most firms (16 firms) while the business logistics sector does not have any firms with managerial shares, and other sectors lie between.

We note that the manager-controlled firms are notably smaller than those without managerial ownership. The manager-controlled firms had average assets of 40.7 million RMB and average sales of 105.9 million RMB, while the rest of the sample had average assets of 182.8 million RMB and average sales of 181.6 million RMB. This observation reflects the fact that manager-

controlled firms are either small firms, which were allowed to be privatized and subsequently owned by individuals including the managers, or relatively new companies that were set up during the economic reform period in which government policies encouraged the development of non-state supported, private enterprises. Therefore, it is not surprising that the 34 firms solely owned by managers had an average of assets of only 13.5 million RMB. These firms were mostly set up around the mid 1990s and had been run by the owners.

The main objective of our study is to compare performance between manager-controlled firms and other firms. However, with such a large difference in size between the two groups of firms, it is difficult to perform the comparison by simply pooling all firms in one regression and using a variable to control for firm size. It is well observed that firm size is associated with both managerial incentive parameters and firm performance measures, and the association can be in complex nonlinear relations. We deal with this problem by constructing matching samples. Specifically, we first determine our treatment sample, which are manager-controlled firms, and then identify matching firms, which are those whose managers do not own equity shares and which are of a similar size. Tables 1 and 2 also show a difference in industry composition between the manager-controlled firms and other firms. Therefore we also match the firms for industry sector. We then compare performance between manager-controlled firms and their matching firms, controlling for various firm characteristics.

From the original 83 manager-controlled firms, we exclude two publicly traded companies, since their organization structure could be very different from those unlisted and we don not want these unobserved effects to disturb our results. Similarly we also exclude five companies with foreign shares, since foreign partners bring not only the capital but also advanced technology and management to the firms which consequently might improve firm performance. Positive impact

of foreign investment on firm performance in China have been well documented, thus we take these five foreign involved companies out of our treatment group in order to better study the impact of managerial shares. We further exclude two firms that appear to be obvious outliners: one had incredible high returns on assets (ROA) (48 in Year 2000 and 38 as average); and the other's size was too large to find any matching firms within its sector (533.3 million RMB assets in electronic equipment sector). For each of the 74 remaining firms, we identify two matching firms from the rest of the sample, which have no managerial ownership. A matching firm must be in the same sector and have a similar size as that of the manager-controlled firm. Firm size is measured as the firm's total assets, which is considered to be similar if it is not 30 percent greater or smaller than that of the manager-controlled firm. We did the one-to-two matching, instead of a one-to-one matching, so that the matched sample is larger and the efficiency of estimation is higher. With one manager-controlled firm being unable to find a match, the final sample consists of 74 manager-controlled firms and 148 matching firms.

The first two panels of Table 3 present summarized statistics for selected ownership structure and firm characteristics variables for the matched sample, where the matched control firms are indicated as "matching group A".

The distribution of the treatment group across cities and sectors is similar to that of 83 firms but with fewer firms in each group. Specifically, Chengdu has 41 firms with managerial ownership, Guangzhou has 15 firms, Beijing has 12 firms, and both Shanghai and Tianjin have 3 firm each. And the manufacturing industry has 50 firms with managerial ownership, while the number is 24 for the service industry. The managerial ownership shares of the base group on average are 69.0 percent, with a standard deviation of 33.5. The distribution of matching group A is the same as that of the treatment group as designed.

14

The summary statistics of treatment group and matching group A are presented in Table 3. Three observations stand out. First, the mean of assets in matching group A is 27.09 million RMB which is close to the means of the treatment group as designed. This method can help mitigate the effects of size on firm performance. The labor and sales revenues are quite different in two groups: the treatment group averagely has 300 workers and 56.9 million RMB sales revenue, in comparison with 365 workers and 31.58 sales revenue on average in matching group A. The statistics reflects the labor productivity (estimated as the ratio of sales revenue to workers) of the treatment group on average is two times higher than that of matching group A.

Second, all firms but one in treatment group are controlled by non-state shares averaging 97%; while the ownership structure in matching group A is more diversified, where state shares range from 0 to 100 percent. The variable for legal person shares is used in the later regression as a control variable. We notice the legal person shares in the treatment group (17.6%) is much lower than that in matching group A (44.9%), because most shares in the treatment are held in the hand of managers.

Lastly, the average age of the treatment group is as low as 7.48 years old with minimum of 1 year and maximum of 30 years, which is relatively young in comparison with those in matching group A with the average age of 15.37 years spanning from with 1 year old to 78 years old.

Prior studies on Chinese firms suggest a significantly negative effect of state shares relative to legal-person shares on company performance (e.g., Qi et al., 2000; Sun and Tong, 2003; Wei et al., 2005). Such an effect is typically captured by a variable for the percentage of state shares or legal-person shares. This approach, however, would not work with our data, because state shares were negligible in the 74 manager-controlled firms, which, on average, were merely three percent. For this reason, we also construct two separated groups of matching firms, one using

SOEs (which we call "matching group B"), of which the shares are 100 percent owned by the state at different government levels, and one using non-SOEs (which we call "matching group C"), of which no shares were directly owned by the state. With the same matching method as above, the matching firms were in the same industries as, and had assets close to, those of the manager-controlled firms. Because there are fewer firms available for such separated matching, we can only obtain one-to-one matches for both control-firm groups. As a result, we have 74 firms each in both matching group B and C.

Some selected statistics are also shown in Table 3. We can see, as designed, that the assets in matching group B and C is 26.5 and 26.4 million RMB individually, which is close to the average in the treatment group of 25.8 million RMB. The averaged labor and sales revenue are 369 workers and 26.5 million RMB in matching group B and 364 workers and 42.9 million RMB in matching group C, which suggests the labor productivity in two matching groups is respectively about 2.6 times and 1.6 times less than that in the treatment group and matching group B is 1.6 times less efficient than matching group C. On the other hand, matching group B is older than matching group C (19.4 years versus 11.3 years).

5. Main Empirical Results

5.1. Univariate Analysis

Two performance measures will be used for our examination. The first measure is the firm's return on assets (ROA), which is the firm's profits estimated as sales revenue less total costs divided by its total assets. The second measure is the value added, which is estimated as the sales revenue less intermediate goods. Both ROA and the value added are accounting measures of performance. An advantage of these measures is that they are a proxy for managerial efficiency,

which are not strongly affected by factors beyond the manager's control, such as stock market fluctuations. On the other hand, because all the firms are non-listed and thus are not subject to disclosure regulations, their managers are not motivated to manipulate the performance measures to influence the opinion of the public. Because the information on debt is only available for year 2000, we are unable to examine the firm's return on equity.

Table 4 presents a brief comparison of firm performance between the manager-controlled firms and each of the matching groups. Together with ROA and the value added, we also report the firm's accounting profits in the table. The value added and profit of the treatment group are respectively 16.75 and 8.67 million RMB, which are over twice those in matching group A. ROA of the treatment group is 1.34, in comparison with 0.59 in matching group A. The t-values on the difference of three performance measures between the treatment group and matching group A are above 3, which suggests the difference between the two groups is statistically significant at 1% level.

Taking a further look at matching group B and C, we find the value added and profits in the treatment group are respectively almost 3 times and 3.5 times those in matching group B; and almost 1.5 times and twice those in matching group C. The ROA in matching group B and C are similar which is only one third those in the treatment group. And all these difference between the treatment group and matching groups are statistically significant. We also note that firm performance in matching group C is consistently better than that in matching group B, given that other firm characteristics in the two groups are similar except for the state shares, in other words, agency costs are different (SOEs are supposed to have much higher agency costs than non SOEs). The simple comparison on performance measures between the treatment group and the matching groups as well as the comparison between matching group B and C supports our prior

that firm performance is associated with a firm's ownership structure, i.e., a firm associated with relatively low agency costs, for example, the group with positive managerial shares, or the matching group C in comparison with matching group B, is able to operate more profitably and efficiently.

5.2. Multivariate Analysis

We then examine the impact of managerial ownership on firm performance using regression models. The first model estimates the firm's ROA, which is described as follows:

$$\text{ROA}_{it} = \alpha + \beta \times (\text{Managerial\_Ownership\_Dummy}_{it}) + \sum_{j} \gamma_j X_{it}^j + \delta D + \varepsilon_{it} \qquad (1)$$

where i and t denote firm i and period t respectively. Y represents ROA estimated as the ratio of profit to total assets. Managerial_Share_Dummy is a dummy variable, which takes 1 if a firm has positive managerial ownership; and take 0 otherwise. X is a vector of control variables for firm characteristics including the percent of legal person shares, the age of the firm, debt-equity ratio and transparency proxied by whether a firm has external auditor. We also use the assets to control the size of the firm. D is a vector of sector, city and year dummies to control the variation among sectors, cities and years respectively. And ε is the standard error term.

The second regression model estimates the firm's total factor productivity (TFP), using the logistic Cobb-Douglas function:

$$\ln(\text{Value Added}_{it}) = \alpha + \beta_1 \times (\text{Managerial Share Dummy}_{it})$$
$$+ \beta_2 \times \ln(\text{Capital}_{it}) + \beta_3 \times \ln(\text{Labor}_{it}) + \sum_{j} \gamma_j X_{it}^j + \delta D + \varepsilon_{it} \qquad (2)$$

where i and t denote firm i and period t respectively. Y is the value-added estimated as the sale revenue less intermediate goods, K is the stock value of total fixed cost and L is labor proxied by

18

total employees. Similar to the definition in equation (1),_Managerial_Share_Dummy is a dummy variable. X is a vector of variables for firm characteristics including the percent of legal person shares, the age of the firm, debt-equity ratio, and transparency dummy. And ε is the standard error term.

We estimate both models using the robust-OLS estimator (Huber, 1964). The robust-OLS estimator has an advantage in mitigating the effect of sample outliers and making the estimation less sensitive to measurement errors. We also use White-corrected standard errors to deal with potential heteroskedasticity.

Table 5 presents our base-regression results, which compares the performance between the manager-controlled firms and the firms of matching group A. Specifically, Model 1 and 2 use ROA as the dependent variables and Model 3 and 4 use the value-added as the dependent variables. Model 2 and 4 add more firm characteristics variables to Model 1 and 3 respectively. All four models have good fitness: the adjusted squared are around 0.18 in model 1 and 2 and 0.56 in model 3 and 4. It is observed in Table 5 that the dummy for managerial ownership is significantly positive in all models, which implies that the introduction of managerial ownership can evidently improve ROA as well as total factor productivity. The finding is consistent with our key assumption that the managers have high incentives to improve firm performance if they can benefit from firm development through holding firm shares. In terms of control variables, the assets and labor as important inputs in Cobb-Douglas functions (model (2) and (4)) are significant while others are insignificant.

Table 6 presents the regressions for the comparison between the treatment group with managerial shares and matching group B, and between the treatment group and matching group C, respectively. Because the regressions without the control variables add little insights, we do

not report them in this table.

Similar to the results in Table 5, we again find the significant and positive coefficient of managerial ownership in all four models, that is, the performance of the firms with managerial ownership stand out even in comparison with non state firms. In other words, a good incentive scheme such as managerial ownership can play an important role in further enhancing firm performance even if the ownership structure is no longer a handicap of firm performance after economic reform in transition economies.

6.   Robustness Analyses

There are two potential factors unaddressed in the above discussions that could have an effect on our results. One factor is firm restructuring, which could result in changes in ownership structure, and the other factor is equity shares held by other individuals. We first discuss the potential effect of restructuring. A SOE in China can be restructured in several different ways: (1) hybrid auction and lease of assets, (2) merger and acquisition, (3) absorption of foreign direct investment, (4) restructuring after bankruptcy, (5) sell-off of assets to employees, legal persons, and other business operators, and (6) trust. Most restructuring cases have involved the first four ways. Since the early 1990s, many SOEs also restructured their ownership as a consequence of corporatization or partial privatization. For our purposes, we will focus on restructuring cases that resulted in changes in the firm's ownership structure. The predominating pattern of ownership structure changes is a shift of state shares to non-state shares.

The World Bank survey contains an item in which firms indicated whether or not they experienced restructuring during the past three years. Among the 74 manager-controlled firms, six claimed to have been restructured accompanied with ownership structure changes.

Managerial shares increased in all six firms after restructuring. Four out of the six firms were previously fully state-owned, and became fully non-state-owned together with significant managerial buy-outs after restructuring. The other two firms were started as privately controlled before restructuring, and became fully privately owned and managerial shareholdings increased after restructuring. As a quick check, we eliminated these six firms and their matching firms and rerun the regressions in Tables 5 and 6. But we found no meaningful difference in the main parameter estimates regarding the effect of managerial ownership on performance.

However, because the survey questionnaire focus on changes occurred during the three-year period, 1998-2000, the information does not tell us whether any changes occurred earlier. Clearly, if restructuring had a performance effect and if some firms in our sample was restructured in years before and close to the sample period, our results could still be subject to a restructuring effect even though the six firms restructured during the sample period are excluded. To clarify, we need to examine whether firm restructuring had an effect on performance with our sample. Following the same approach of matching-sample comparison, we first identify a sample of firms that experienced restructuring and incurred changes in ownership structure during the years 1998-2000, and then determine a sample of control firms. The control firms, which were matched with the restructured firms in industry and size, did not experience restructuring during the sample period.

In our sample, there are 71 firms self-claimed be restructured accompanying ownership structure changes. Among these 71 firms, two firms have too large value of the assets to match in their corresponding industries. We therefore excluded these two firms and called the rest 69 firms restructured group. We then matched each firm in the restructured group with one firm in the rest sample by industry and size, and obtained another 69 firms to form the unrestructured

group.

Summary statistics of selected variables for the restructured firms and their control firms are shown in Table 7. As designed the value of the assets in the restructured and unrestructured groups are similar (146.9 million versus 132.9 million RMB). We first notice most firms in the restructured groups lessened their state shares after firm restructuring. Specifically, the mean of the state shares dropped sharply from 83.7% to 26.9%, the median of the state shares moved from 100% to 14%. In terms of the labor and sales, the restructured firms have larger mean for both variables (1229 workers and 188.6 million RMB) than that of the unrestructured group (782 workers and 136.2 million RMB), therefore there is not much difference in labor productivity in two groups. Furthermore, the age of the two groups is close as well (19. 2 years versus 16.2 years). In summary, we do not observe evident gap between two groups through simple statistics.

We then run regressions on ROA and the value added to examine whether there exist significant effect of restructuring on firm performance. We therefore constructed a dummy variable called restructuring dummy, which takes 1 if a firm in the restructured group and 0 otherwise. As the regression results are presented in Table 8, we notice the coefficient of the restructuring dummy is positive but insignificant in all models, in other words, restructuring itself does not make the difference in performance in our sample.[6] It probably can be explained as follows. SOEs in general serve multiple objectives such as social stability (employment) and tax

---

[6] The empirical findings in the literature are mixed. For example, La Porta and Lopez-de-Silanes (1999) examined a sample of 218 SOEs privatized in Mexico between 1983 and 1991and found that the output and profits of privatized firms increased, Frydman *et al. (*1999) found that privatization has significant performance effects for transitional economies of Central Europe. However, for example, Black, Kraakman, and Tarassova (2000) showed the failure of restructuring in Russia.

revenues in China (e.g. Bai etl. 2000). On one hand, government might choose well performing and efficient firms restructuring first, since their impact on social instability is relatively small and at the same time they can set a role model for enterprise reform. On the other hand, however, it is also possible for the government to dump poor performing firms in order to increase tax revenues and cut subsidies to profit-loss SOEs. Therefore it is not necessarily for the restructuring firms perform better than those unrestructured. Our empirical results find no significant impact of firm restructuring, so the restructuring effect should not be a major concern in our regressions.

We now turn to the other factor – shareholdings by individuals other than the manager. The World Bank survey also contains the information on the ownership of other individuals, which we call *individual shares*, in addition to that on state shares, institutional shares, and managerial shares. Individual shares present those held by individual investors or the firm's employees. Employee shares in Chinese firms are subject to government regulations and, on average, account for less than 2 percent of the firm's total shares (Sun and Tong, 2003; and Wei et al., 2005). With such a small percentage of shares being allocated to all employees, each employee's ownership is negligibly small and hence is unlikely to have any meaningful effect on firm value. The individual shares in our sample, however, are typically significant, and may be concentrated. Of the total 1,500 firms, 359 firms have individual shares and 312 firms have other individual shares equal or above 20%. But the mean and median individual shares of the 312 firms are as high as 80.9 percent and 100 percent, respectively. This observation has two implications. First, the individual shares in our sample should mainly present the ownership of individual investors (other than the manager). Second, without a liquid secondary market, the shares of such non-listed firms are unlikely to be diffusely distributed but be owned by a small number of individual

23

investors.

The possibility of concentrated shareholdings by individual investors can complicate our results. Because such investors may have strong incentives to monitor the manager, our results may not spell out the role of managerial ownership, for managerial shares and individual shares both presented in some of the sample firms. A convenient way to disentangle a managerial-ownership effect from an effect of individual investors' monitoring is to add a control variable of individual shares in models (1) and (2). Specifically, we created two new variables: one was the percent of other individual shares which is the total individually held shares less manager shares; and the other was other individual share dummy, which took 1 if a firm had individual shares excluding manager shares and 0 otherwise. We then added these two variables alternaterly into model 2 and model 4 in Table 5 and re-ran regressions. The regression results are shown in Table 9.

As shown in Table 9, the coefficient of managerial ownership dummy keeps significantly positive in all four regressions, though the significance level drops slightly (from 1% level to 5%) in model 1 and 2 in comparison with those in Table 5. The coefficients of two variables for other individual shares are insignificant, which suggests other types of individual shares have limited impact on firm performance. The possible explanation could be that the other individual shares are held by a large number of shareholders, each of which only has a small portion of the shares and consequently has limited impact on firm. It is a good guess since we do not have information on the concentration of other individual shares in the dataset. Furthermore, even if the individual shares are concentrated in the hands of one or several shareholders, their impact on firm might not be as direct and effective as the managers with managerial ownership who have direct involvement in firm daily operation and development. The coefficients of all other variables

remain unchanged.

7. Conclusion

The ownership-performance relationship has recently been under debate in the finance literature. At the heart of the debate is the complex endogeneuity problem, which arises with ownership and performance variables in the presence of reversed causality and uncontrolled firm heterogeneity. The endogeneuity problem is unavoidable with data of publicly traded firms, and is often difficult to address. In this paper, we analyze a sample of non-listed Chinese firms, of which managerial ownership is largely exogenously determined. Our data have two distinct advantages. First, without a secondary market, managerial equity holdings of such companies do not change with the companies' performance and hence do not suffer from a causality problem. Second, given the background of central planning and in the early stage of market-mechanisms development, managerial ownership was essentially determined by exogenous factors, such as managers' personal wealth and government policies motivated by political considerations irrelevant to incentive contracting. Therefore, the ownership of managers of such companies is unlikely to suffer from a firm-heterogeneity problem as in an equilibrium outcome for the optimal contract.

By control-sample comparisons, we document a strong positive effect of managerial ownership on firm performance. In particular, we compare a group of firms controlled by the manager with a group of size- and industry-matched firms whose managers do not own equity. We estimate an average return on assets of 1.40 percent for the manager-controlled firms over the years 1998-2000, but only 0.66 percent for the matching firms in this period. From the Cobb-Douglas production function estimation, we obtain an average value-added per year of 11.67

million RMB for the manager-controlled firms, and 5.64 million RMB for the matching group. These differences are statistically highly significant and robust, and are not likely to suffer from an endogeniety problem.

There is a limitation of our data, however. Of our sample most firms have zero managerial ownership while a small number of firms have very concentrated managerial equity holdings. Hence, without a sufficient variation in managerial ownership, we are unable to examine the sensitivity of performance to managerial ownership and its change with the ownership level. Because of this problem, we have not addressed issues regarding the trade off between the incentive effect and the entrenchment effect of ownership, which has attracted considerable attention in the existing literature.

References

Bai, C., Li, D., Tao, Z., Wang, Y., 2000. A Multitask Theory of State Enterprise Reform. Journal of Comparative Economics 28 (4), 716-738.

Berle, A., and G. Means, 1932. The Modern Corporation and Private Property. Macmillan, New York.

Black, B., Kraakman, R., and Tarassova, A., 2000. "Russian Privatization and Corporate Governance: What Went Wrong?," Stanford Law Review, 52(7), 1731-1808.

Cho, M., 1998. Ownership structure, investment, and the corporate value: an empirical analysis. *Journal of Financial Economics* 47, 103-121.

Core, J. E., D. F. Larcker, 2002, Performance consequences of mandatory increases in executive stock ownership. Journal of Financial Economics 64, 317-340.

Demsetz, H., and K. Lehn, 1985, The structure of corporate ownership: causes and consequences. Journal of Political Economy 93, 1155-1177.

Demsetz, H., and B. Villalonga, 2001. Ownership structure and corporate performance. Journal of Corporate Finance 7, 209-233.

Frydman, R., Gray, C., Hessel, G., and Rapaczynski A., 1999. "When Does Privatization Work: The Impact of Private Ownership on Corporate Performance in the Transition Economies." Quarterly Journal of Economics, 114(4), 1153-91.

Gibbons, R., Murphy, K., 1992. Optimal incentive contracts in the presence of career concerns: theory and evidence. Journal of Political Economy 100, 468-505.

Groves, T., Hond, Y., McMillan, J. and Naughton, B., 1994. Autonomy and incentives in Chinese state enterprises. Quarterly Journal of Economics 109, 183-209.

Hall, B., and J. Liebman, 1998. Are CEOs really paid like bureaucrats? Quarterly Journal of Economics 113, 653-691.

Hermalin, B., and M. Weisbach, 1991. The effects of board composition and direct incentives on firm performance. Financial Management 20, 101-112.

Himmelberg, C., R. Hubbard, and D. Palia, 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. Journal of Financial Economics 53, 353-384.

Holmstrom, B., 1979. Moral hazard and observability. Bell Journal of Economics 10, 74-91.

Huber, P. J. 1964. Robust Estimation of a Location Parameter. Analysis of Mathematical Statistics 35, 73-101.

Mirrlees, J. A., 1976. The Optimal structure of incentives and authority within an organization. Bell Journal of Economics 7, 105-31.

27

Jefferson, G. H., T. G. Rawski, and Y. Zheng, 1996. Chinese industrial productivity: Trends, measurement issues, and recent developments. Journal of Comparative Economics 23, 146-180.

Jensen, Michael, and William Meckling, 1976. Theory of the firm: managerial behaviour, agency costs and ownership structure. Journal of Financial Economics 3, 305-360.

Kole, S. R., 1997. The complexity of compensation contracts. Journal of Financial Economics 43, 79-104.

La Porta, R. and Lopez-de-Silanes, F., 1999. Benefits of Privatization—Evidence from Mexico. Quarterly Journal of Economics 114(4), 1193-242.

Lardy, N. R., 1998. China's Unfinished Economic Revolution, Washington, D. C.: Brookings Institutions.

Li, W., 1997. The impact of economic reform on the performance of Chinese state enterprises, 1980-1989. Journal of Political Economy 105, 1080-1106.

Lin, Yi-min, Tian, Z., 2001. Ownership restructuring in Chinese state industry: An analysis of evidence on initial organizational changes. China Quarterly 166, 305-341.

Loderer, C., and K. Martin, 1997. Executive stock ownership and performance: Tracking faint traces. Journal of Financial Economics 45, 223-255.

McConnell, J., and H. Servaes, 1990. Additional evidence on equity ownership and corporate value. Journal of Financial Economics 27, 595-612.

Morck, R., A. Shleifer, and R. Vishny, 1988. Management ownership and market valuation. Journal of Financial Economics 20, 293-315.

Murphy, K., 1985. Corporate performance and managerial remuneration: an empirical analysis. Journal of Accounting and Economics 7, 11-42.

Murphy, Kevin J., 1999. Executive compensation, Ashenfelter, O., and D. Card, eds: Handbook of Labor Economics 3. Amsterdam: North Holland.

Ofek, E., Yermack, D., 2000. Taking stock: equity-based compensation and the evolution of managerial ownership. Journal of Finance 55, 1367-1384.

Qi, D., Wu, W., and Zhang, H., 2000. Shareholding structure and corporate performance of partially privatized firms: Evidence from listed Chinese companies. Pacific-Basin Finance Journal 8, 587-610.

Sun, Q., and Tong, W., 2003. China share issue privatization: the extent of its success. Journal of Financial Economics 70: 183-222.

Wei, Z., Xie, F., and Zhang, S., 2005. Ownership structure and firm value in China's privatized firms: 1991-2001. Journal of Financial and Quantitative Analysis 40: 87-108.

Wang, X., Xu, L., and Zhu, T., 2004. State-owned enterprises going public: The case of China. Economics of Transition 12, 467-488.

Xu, L., Zhu, T., and Lin, Y., 2001. "Politician Control, Agency Problems, and Firm Performance: Evidence from China." Economics of Transition.

Zhou, X., 2001. Understanding the determinants of managerial ownership and the link between ownership and performance: Comment. Journal of Financial Economics 62: 559-571

Table 1

The World Bank Survey Sample

This table shows the sampling of the World Bank survey on enterprise production and innovation in China. A total of 1,500 Chinese firms were drawn from five cities and ten industry sectors for the period of 1998-2000. The five cities are representative in terms of economic development and reform progress, and the ten sectors represent relatively fast-growing and technologically advanced industries in China during the survey period. The categories of the industry sectors follow China's industrial classification, GB/T 4754, which was initially published in 1984 and revised in 1994 and 2002. GB/T 4754 is similar to ISIC/Rev.3 announced by United Nation in 1989.

	Beijing	Chenngdu	Guangzhou	Shanghai	Tianjin	Total
Service sectors:						
Accounting services	23	20	18	20	23	104
Advertising & marketing	20	19	11	20	19	89
Business logistics services	23	20	29	20	18	110
Communication services	11	17	12	20	11	71
IT services	25	24	30	20	29	128
Manufacturing Sectors:						
Apparel & leather goods	49	45	46	40	42	222
Consumer products	21	36	33	40	35	165
Electronic components	43	40	39	40	41	203
Electronic equipment	41	35	40	40	36	192
Vehicles & vehicle parts	44	44	42	40	46	216
Total	300	300	300	300	300	1,500

Table 2

Distribution of Firms with Managerial Ownership

Among all 1500 Chinese firms surveyed by World Bank (summarized in Table 1), 83 firms' managers have equity shares. This table shows the distribution of these firms across industry and for managerial ownership. The left panel presents the distribution across industry, where the number in brackets is the percentage of firms in a sector with managerial ownership. The right panel presents the distribution of managerial ownership.

Industry	Number of firms	Ownership range (%)	Number of firms
Service sector:			
Accounting services	6 (5.8%)	2-10	4
Advertising & marketing	8 (9.0%)	10-20	9
Business logistics services	0 (0.0%)	20-30	9
Communication services	7 (9.9%)	30-40	1
IT services	8 (6.3%)	40-50	6
		50-60	4
Manufacturing sector:		60-70	5
Apparel & leather goods	16 (7.2%)	70-80	5
Consumer products	9 (5.5%)	80-90	4
Electronic components	8 (3.9%)	90-100	2
Electronic equipment	13 (6.8%)	100	34
Vehicles & vehicle parts	6 (2.8%)		
Total	83	Total	83

Table 3
Summary Statistics

This table presents summary statistics of ownership structure and firm variables for the sub-sample for regressions for models (1) and (2). The sub-sample is obtained by matching the 83 manager-controlled firms (Table 2) with firms without managerial ownership. After excluding two publicly traded firms, five firms with foreign shares, and one apparent outliner from the 83 manager-controlled firms, our 1-to-2 matching process results in 74 manager-controlled firms (the treatment group) and 148 matching firms (matching group A). Thus, for each manager-controlled firm, we have two matching firms, which were in the same industry and had a similar size, but of which the managers did not own equity shares. To address potential effects of state-owned shares, we also match manager-controlled firms with firms of 100 percent state shares (matching group B) and with firms of zero state shares (matching group C), respectively. Because the number of firms available for these two separated matches is substantially reduced, we use 1-to-1 matching and obtain 74 control firms for groups B and C, respectively. Firm age is the number of years a firm had been operating. External auditor is a dummy variable which equals one if the firm hired external auditing firms, and zero otherwise.

Variable	Unit	Mean	Median	Standard deviation	Minimum	Maximum
Treatment group: Firms with managerial ownership (74 firms)						
Manager-owned shares	Percent	69	80	33.47	2	100
State shares	Percent	3.03	0	11.57	0	60
Legal-person shares	Percent	17.63	0	27.16	0	98
Labor	Workers	300.31	105	514.23	5	2629
Assets	Million RMB	25.78	3	65.05	0.01	399.28
Sales	Million RMB	56.94	9.126	129.49	0.06	734.55
Age of the firm	Years	7.48	6	5.78	1	30
Debt-equity ratio	–	0.89	0.43	1.26	0	8.5
External auditor dummy	–	0.50	1	0.50	0	1
Matching group A: Firms without managerial ownership (148 firms)						
State shares	Percent	34.35	0	46.21	0	100
Legal-person shares	Percent	44.88	20	46.74	0	100
Labor	Workers	365.08	102	624.40	3	4890
Assets	Million RMB	27.09	3.372	68.46	0.03	457.46
Sales	Million RMB	31.58	6.5	74.84	0.01	555.32
Age of the firm	Years	15.37	10	14.64	1	78
Debt-equity ratio	–	1.22	0.11	3.00	0	19
External auditor dummy	–	0.53	1	0.50	0	1
Matching group B: SOEs without managerial ownership (74 firms)						
State shares	Percent	100	100	0	100	100
Legal-person shares	Percent	0.07	0	0.58	0	5
Labor	Workers	369.02	101	524.67	4	2661
Assets	Million RMB	25.87	3.9	55.95	0.0	316.3
Sales	Million RMB	26.47	6.261	62.46	0.1	399.4
Age of the firm	Years	19.40	12	17.31	1	75
Debt-equity ratio	–	1.31	0	3.19	0	19
External auditor dummy	–	0.60	1	0.49	0	1
Matching group C: Non-SOEs without managerial ownership (74 firms)						
State shares	Percent	0	0	0	0	0
Legal-person shares	Percent	64.98	100	45.11	0	100
Labor	Workers	364.21	100	701.52	3	5693
Assets	Million RMB	26.42	3.6775	61.36	0.03	423.03
Sales	Million RMB	42.95	7	90.27	0.01	555.32
Age of the firm	Years	11.32	7	11.56	1	51
Debt-equity ratio	–	1.62	0.11	6.25	0	49
External auditor dummy	–	0.51	1	0.50	0	1

Table 4

Differences in Performance: Manager-Controlled Firms vs. Matching Firms

This table presents our univariate analysis for the comparison of performance between manager-controlled firms and the three groups of matching firms (which are described in Table 3). Value added is estimated as sales less intermediate goods. Profits are sales less total costs including intermediate goods and labor compensation. Return on assets is the ratio of profits to the firm's assets. t-statistic for the difference in performance between the manager-controlled firms and a matching group is reported in the last column. ***, **, and * represent significance level at 1%, 5%, and 10%, respectively.

Variable	Mean	Median	Standard deviation	Difference between treatment and control	t-test
Treatment group: Firms with managerial ownership					
Value added (million RMB)	16.75	2.144	45.72		
Profits (million RMB)	8.67	1.44	24.92		
Return on assets (%)	1.34	0.47	3.61		
Matching group A: Firms without managerial ownership					
Value added (million RMB)	7.07	1.91	15.90	9.69	3.38***
Profits (million RMB)	3.99	0.67	12.78	4.68	3.01***
Return on assets (%)	0.59	0.20	1.68	0.75	3.45***
Matching group B: SOEs without managerial ownership					
Value added (million RMB)	5.97	2.15	12.21	10.79	2.77***
Profits (million RMB)	2.60	0.8	8.31	6.07	3.17***
Return on assets (%)	0.44	0.20	0.94	0.90	3.31***
Matching group C: non-SOEs without managerial ownership					
Value added (million RMB)	10.68	1.91	27.42	6.07	1.43*
Profits (million RMB)	4.27	0.67	20.04	4.40	1.93**
Return on assets (%)	0.43	0.20	0.89	0.91	3.45***

Table 5

The Effect of Ownership: Manager-Controlled Firms vs. Matching Group A

This table presents our base-regression results for the ownership effect on performance using matching group A as the control (the sample is described in Table 3). Columns 1 and 2 are the regressions for model (1), and columns 3 and 4 are the regressions for model (2). The performance measure of return on assets is calculated as the ratio of profits to assets, and value-added is estimated as sales less intermediate goods. The dummy variable of managerial ownership equals one for manager-controlled firms, and equals zero for matching firms. White-correct standard errors are reported in brackets. ***, **, and * represent significance level at 1%, 5%, and 10%, respectively.

Independent variables	Return on assets		ln(Value added)	
	(1)	(2)	(3)	(4)
Constant	3.936*** (1.054)	3.796*** (1.191)	2.206*** (0.413)	1.444*** (0.469)
Managerial ownership dummy	0.684*** (0.264)	0.830*** (0.312)	0.648*** (0.124)	0.664*** (0.131)
ln(Assets)	-0.363*** (0.089)	-0.417*** (0.096)	0.319*** (0.053)	0.376*** (0.056)
ln(Labor)			0.527*** (0.097)	0.560*** (0.101)
ln(Firm age)		0.139 (0.160)		-0.039 (0.078)
Debt-equity ratio		-0.007 (0.030)		-0.042* (0.023)
External auditor dummy		0.133 (0.257)		0.127 (0.144)
Legal-person shares (%)		0.003 (0.003)		0.004*** (0.002)
Year dummy	yes	yes	yes	yes
Industry dummy	yes	yes	yes	yes
City dummy	yes	yes	yes	yes
Adjusted R-square	0.18	0.19	0.56	0.59
Observations	586	509	454	404

The top spanning header reads: Dependent variables (spanning Return on assets and ln(Value added)).

Table 6

The Effect of Ownership: Manager-Controlled Firms vs. Matching Groups B and C

This table presents regressions for the ownership effect on performance using matching groups B and C as the control, respectively (the sample is described in Table 3). The performance measure of return on assets is calculated as the ratio of profits to assets, and value-added is estimated as sales less intermediate goods. The dummy variable of managerial ownership equals one for manager-controlled firms, and equals zero for matching firms. In this table, we do not report the regressions without control variables (as the ones reported in columns (1) and (3) in Table 5). White-correct standard errors are reported in brackets. ***, **, and * represent significance level at 1%, 5%, and 10%, respectively.

Independent variables	Dependent Variables			
	(Control group B)		(Control group C)	
	Return on assets	ln(Value added)	Return on assets	ln(Value added)
Constant	2.652*** (0.995)	0.541 (0.445)	2.503** (0.986)	1.438*** (0.520)
Managerial ownership dummy	1.122*** (0.359)	0.349*** (0.126)	0.992** (0.398)	0.884*** (0.216)
Ln (Assets)	-0.364*** (0.098)	0.350*** (0.053)	-0.395*** (0.094)	0.429*** (0.066)
Ln (Labor)		0.781*** (0.094)		0.406*** (0.120)
ln(Firm age)	0.139 (0.160)	0.139 (0.160)	0.139 (0.160)	-0.039 (0.078)
Debt-equity ratio	-0.007 (0.030)	-0.007 (0.030)	-0.007 (0.030)	-0.042* (0.023)
External auditor dummy	0.133 (0.257)	0.133 (0.257)	0.133 (0.257)	0.127 (0.144)
Legal-person shares (%)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.004*** (0.002)
Year dummy	yes	yes	yes	yes
Industry dummy	yes	yes	yes	yes
City dummy	yes	yes	yes	yes
Adjusted R-square	0.19	0.75	0.23	0.64
Observations	356	292	331	262

Table 7
Summary Statistics: Restructured firms and Non-Restructured Firms

This table presents summary statistics for restructured firms and their matching group. Among the total 1,500 firms surveyed by World Bank (Table 1), 71 firms claimed to be restructured, which were accompanied with changes in ownership structure. Taking the restructured firms as the treatment group, we identify their matching firms, which, while in the same industry and with similar size, did not restructure. Using a 1-to-1 matching process, we determine 69 restructured firms and their matched non-restructured counterpart. Firm age is the number of years a firm had been operating. External auditor is a dummy variable which equals one if the firm hired external auditing firms, and zero otherwise.

Variable	Unit	Mean	Median	Standard deviation	Minimum	Maximum
Panel A: Restructured Firms (69 firms)						
Post-structure state shares	Percent	26.96	14.00	31.68	0.00	100.00
Pre-structure state shares	Percent	83.75	100.00	31.93	0.00	100.00
Legal-person shares	Percent	29.94	8	36.51	0	100
Labor	Workers	1229	452	1691	7	7718
Assets	Million RMB	146.95	57.48	238.80	0.05	1336.47
Sales	Million RMB	188.60	40.72	501.10	0.90	3190.50
Age of the firm	Years	19.276	10	19.03	1	82
Debt-equity ratio	–	2.62	0.67	5.07	0	24.00
External auditor dummy	–	0.82	1.00	0.38	0	1
Panel B: Non-restructured matching firms (69 firms)						
State shares	Percent	35.87	0	47.16	0	100
Legal-person shares	Percent	27.10	0	36.55	0	100
Labor	Workers	782	377	1145	3	9596
Assets	Million RMB	132.93	48.04	227.39	0.07	1432.11
Sales	Million RMB	136.22	40.33	255.45	0.09	2050.90
Age of the firm	Years	16.22	8	16.22	1	69
Debt-equity ratio	–	1.04	0.28	1.99	0	9.00
External auditor dummy	–	0.77	1	0.42	0	1

Table 8

The Effect of Restructuring: Restructured Firms vs. Non-restructured Firms

This table presents regressions for the effect of restructuring. The sample consists of 69 pairs of restructured firms and non-restructured firms (the sample is described in Table 7). The performance measure of return on assets is calculated as the ratio of profits to assets, and value-added is estimated as sales less intermediate goods. The restructuring dummy variable equals one for restructured firms. White-correct standard errors are reported in brackets. ***, **, and * represent significance level at 1%, 5%, and 10%, respectively.

Independent variables	Dependent Variables			
	Return on assets		ln(Value added)	
	(1)	(2)	(3)	(4)
Constant	2.932*** (0.788)	3.585*** (0.797)	2.057*** (0.527)	2.343*** (0.655)
Restructuring dummy	0.107 (0.127)	0.024 (0.132)	0.132 (0.124)	0.122 (0.129)
Ln (Assets)	-0.258*** (0.066)	-0.327*** (0.081)	0.408*** (0.064)	0.417*** (0.071)
Ln (Labor)			0.392*** (0.084)	0.304*** (0.088)
Ln (Firm age)		-0.103 (0.112)		0.000 (0.092)
Debt-equity ratio		0.056*** (0.021)		-0.004 (0.024)
External auditor dummy		0.432 (0.318)		0.264 (0.192)
Legal-person share (%)		-0.006** (0.002)		-0.002 (0.002)
Year dummy	yes	yes	yes	yes
Industry dummy	yes	yes	yes	yes
City dummy	yes	yes	yes	yes
Adjusted R-square	0.21	0.29	0.69	0.71
Observations	380	332	300	268

Table 9
The Effect of Ownership: Manager-Controlled Firms vs. Matching Group A

    The regressions in this table are based on the second and forth regressions reported in Table 5. The sample consists of 74 manager-controlled firms and 148 matching firms (matching group A) as described in Table 3. A control variable for other-individual shares is included, which is either the percentage of other-individual shares (columns (1) and (3)) or a dummy variable for firms with other-individual shares higher than 20% (columns (2) and (4)). The performance measure of return on assets is calculated as the ratio of profits to assets, and value-added is estimated as sales less intermediate goods. The dummy variable of managerial ownership equals one for manager-controlled firms, and equals zero for matching firms. White-correct standard errors are reported in brackets. ***, **, and * represent significance level at 1%, 5%, and 10%, respectively.

Independent Variables	Dependent variables			
	Return on assets		ln(Value added)	
	(1)	(2)	(3)	(4)
Constant	4.049***	3.795***	0.912*	1.428***
	(1.354)	(1.201)	(0.496)	(0.475)
Managerial ownership dummy	0.719**	1.115**	0.877***	0.684***
	(0.321)	(0.510)	(0.156)	(0.240)
Ln (Assets)	-0.407***	-0.408***	0.388***	0.399***
	(0.099)	(0.098)	(0.057)	(0.059)
Ln (Labor)			0.576***	0.538***
			(0.104)	(0.107)
Ln (Firm age)	0.070	0.105	-0.012	-0.075
	(0.166)	(0.172)	(0.082)	(0.082)
Debt-equity ratio	-0.009	-0.008	-0.040*	-0.042*
	(0.030)	(0.030)	(0.023)	(0.023)
External auditor dummy	0.098	0.139	0.196	0.152
	(0.288)	(0.264)	(0.152)	(0.151)
Legal-person share (%)	0.002	0.003	0.007***	0.005***
	(0.003)	(0.003)	(0.002)	(0.002)
Other individual share (%)	-0.004		0.007***	
	(0.004)		(0.002)	
Other individual share dummy		-0.317		-0.002
		(0.578)		(0.271)
Year dummy	yes	yes	yes	yes
Industry dummy	yes	yes	yes	yes
City dummy	yes	yes	yes	yes
Adjusted R-square	0.19	0.19	0.61	0.60
Observations	491	491	386	386

Figure 1. Homogenous Firms with Constrained Ownership
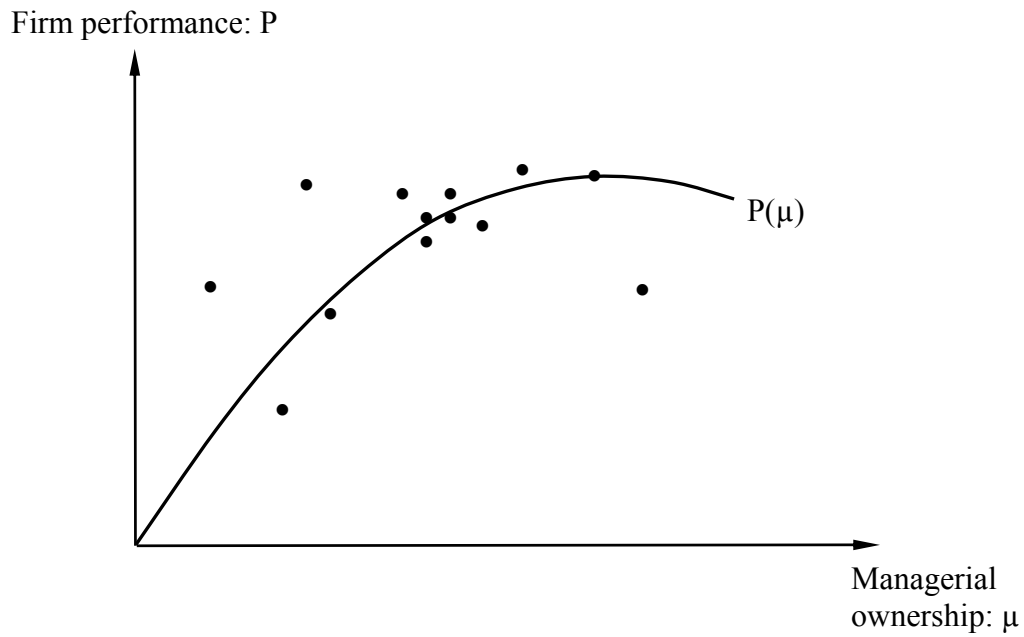
Firm performance: P

$P(\mu)$

Managerial ownership: μ

Figure 2. Heterogeneous Firms with Unconstrained Ownership

Firm performance: P

$P_A(\mu_A)$

$P_A(\mu)$

$P_B(\mu_B)$

$P_B(\mu_C)$

$P_B(\mu)$

A

B

C

μ_A μ_C μ_B

Managerial Ownership: μ

44