

Causes for Changing Performance of Firms with Diverse Types of Ownership in China

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We analyze the longitudinal changes in the performance of firms with different ownership types using the China enterprises database for the period 2000 to 2009. The results reveal an upward trend in the relative performance of private firms in China. These firms have caught up with foreign-invested rivals in terms of labor productivity and even surpassed them after the mid-2000s. More importantly, private enterprises (PEs) have a higher propensity to invest than firms with other ownership types, and such investment preference leads to the faster labor productivity growth of PEs compared with foreign-invested enterprises (FIEs) and state-owned enterprises (SOEs). The size effect from “economies of growth” in the later period primarily contributes to the increasing productivity of PEs. By contrast, FIEs neither have an active investment activity nor an increase in size effect, thereby resulting in stagnant labor productivity. State-owned enterprises have enjoyed increasing size effect and productivity in the later period. However, such improvement comes from the government policy and not from economies of growth because the government has weeded out small and inefficient SOEs during this period.

Keywords: Chinese economy, Firm performance, Investment, Labor Productivity, Ownership

JEL Classification: D24, F23, L25, G32

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I. Introduction

The ownership type (*i.e.*, state-owned, private, and foreign-owned) and performance of firms have long been considered important research topics in the firm performance literature. This paper estimates how different ownership types contribute to the varying performances of firms and identifies the factors that drive such performance differences. We check the performance trends of firms with various ownership types and then determine their major causes. We specifically examine investment and firm size as factors that are related to firm performance.

We select China, a unique and ideal place to obtain data, as the study area. In contrast with most developed countries in which the domestic private sector dominates the entire economy, China has a unique industrial structure in which private, foreign-invested enterprises (FIEs),¹ and state-owned enterprises (SOEs)² co-exist and compete with one another. These enterprises comprise a substantial portion of the economy in the 21st century (Bai *et al.* 2009). A recent report from the National Bureau of Statistics of China (NBSC) revealed that in 2012, private enterprises (PEs), FIEs, and SOEs produced 49.7%, 23.9%, and 26.4% of the total industrial outputs of the country, respectively (NBSC 2014). The coexistence of these firms is an important outcome of the gradual economic reform of China and its active induction policy for foreign capital (Naughton 2007).

Such distinct feature of the Chinese economy has raised several interesting questions from researchers. The different effects of these ownership types on the efficiency or productivity of firms in China have also attracted the attention of researchers from the economics and business management fields (Dollar, and Wei 2007; Bai *et al.* 2009; Dougherty *et al.* 2007; Li *et al.* 2012). Dougherty *et al.* (2007) analyzed a database of a quarter million industrial companies from 1998 to 2003 and reported that the private sector demonstrated a more efficient operation, higher productivity, and higher profitability than the public

¹ In this paper, foreign-invested enterprises include Hong Kong, Macao, Taiwan, and other foreign-invested firms (China Statistical Yearbook 2014).

² In this paper, SOEs not only refer to those enterprises whose assets are completely owned by the state but also to state-holding firms. State-holding enterprises belong to a sub-classification of enterprises with mixed ownership types and whose percentage of state asset (or shares by the state) is larger than any other single shareholder of the same enterprise (China Statistical Yearbook 2014).

sector. Bai *et al.* (2009) investigated the effects of privatization on firm performance indicators using a panel dataset of Chinese SOEs and reported that the privatization of SOEs increased labor productivity. Privatization also has a highly extensive positive effect. Li *et al.* (2012) investigated the performance of SOEs following share-issue privatization and found that their output and operating efficiency increased after privatization. By conducting a survey among a stratified random sample of 12,400 firms in 120 Chinese cities and using firm-level accounting information from 2002 to 2004, Dollar, and Wei (2007) revealed that, on average, PEs obtained significantly higher returns of invested capital than SOEs even after a quarter-century of reforms. All of these studies consistently suggest that PEs are more efficient than SOEs in China.

By contrast, this paper adopts a dynamic approach that focuses on the “changing” performances of firms with various ownership types. We aim to reveal the major driving factors for such change, particularly in terms of investment and firm size for attracting higher labor productivity. Therefore, we investigate how investment and firm size affect the labor productivity of firms.

We adopt Penrose’s theory of “economies of growth” to understand how the size of Chinese firms influences their productivity.³ Penrose (1959) defined economies of growth as “the internal economies available to an individual firm which make expansion profitable in particular directions.” During the growth process, new productive resources are continually piled up within the firm, thereby driving economies of growth, which are derived from the increasing unique collection of unused productive services,⁴ to demonstrate a better performance over other firms in terms of introducing new products in the market or increasing the amount of old products (Penrose 1959). In other words, economies of growth indicate that a growing firm can enjoy improvements in its productivity and profitability by incorporating new productive resources into its production process. Matthews (2002) explained that compared

³A similar concept exists in economics, namely, economies of scale or economies of size. The concept contends that the average cost curve of a firm does not change, thereby creating a minimum efficient scale. However, in “economies of growth” the average cost curve can move downward, that is, the efficiency can be increased regardless of corporate size (Penrose 1959).

⁴According to Penrose (1959), resources include those physical things that a firm buys or produces for its own use and the employers who are hired to effectively manage such things. By contrast, services pertain to the contributions of these resources to the productive operations of the firm. Therefore, a resource can be regarded as a bundle of possible services.

with those in developed countries, the firms in developing economies, such as China, lack the necessary resources for corporate management; therefore, these firms demonstrate a higher propensity to depend on active investment to acquire new resources and expand their resources. Through this process, the firms in developing countries can improve their labor productivity over a short period. Based on the above arguments, Chinese firms, which are experiencing recent growth, increase in size by actively investing in critical resources that they lack. This paper posits that this theory can explain how expanding the sizes of firms in China can increase their productivity. We verify this insight by conducting econometric analysis using data from Chinese firms.

The rest of this paper is organized as follows. Section II measures the longitudinal performances of firms in China with various types of ownership. Section III develops the theoretical perspectives and main hypotheses. Section IV tests the hypotheses using regression models and reports the results. Section V offers the conclusions and implications.

II. Measuring the Performance of Firms with Different Ownership Types

A. Data Source

This empirical work utilizes the China Enterprises Database that is designed and developed by GTA information Technology Company Limited. Given that this database includes a large number of Chinese enterprises, we believe that this tool can accurately reflect the reality of Chinese firms. The data cover the years 1998 to 2009⁵ and include all industrial enterprises with annual sales (in current yuan) of 5 million or higher. The original dataset covers more than two million unique firms that report their principal financial and economic results to the government every year. In contrast to those of other countries, the set of available variables in the Chinese dataset is unusually extensive (Dougherty *et al.* 2007; Brandt *et al.* 2014). The dataset provides both the balance sheet data and basic information of each firm, including ownership structure, industry, location, and employment. Therefore, the dataset presents detailed insights into the development of Chinese enterprises. However, as a result of firm exit and entry, the dataset includes a small number of firms that are operating for consecutive

⁵We focus on years 2000 to 2009 to examine the most current trends.

TABLE 1
SAMPLE FIRMS BY OWNERSHIP TYPE

Ownership type	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
State	6,689 19.4%	5,811 14.3%	4,533 11.3%	3,496 8.2%	2,819 4.5%	2,630 3.4%	2,285 2.7%	1,520 1.9%	769 1.5%	460 1.3%
Private	20,928 60.8%	26,223 64.7%	26,743 66.9%	29,483 69.2%	46,405 73.7%	59,253 75.8%	66,065 77.4%	62,782 78.9%	40,228 79.6%	28,354 80.2%
Foreign	6,782 19.7%	8,516 21.0%	8,718 21.8%	9,618 22.6%	13,720 21.8%	16,268 20.8%	17,015 19.9%	15,287 19.2%	9,510 18.8%	6,551 18.5%
Total	34,399	40,550	39,994	42,597	62,944	78,151	85,365	79,589	50,507	35,365

years. In this case, we only select those firms that have reported for more than three consecutive years and exclude those firms with incomplete data or extreme values to remove the effect of outliers and utilize the proper dataset. Based on the collected data, we reclassify firms and their data items based on their types of ownership, thereby allowing us to appraise the dynamic effect of various ownership types in China.

Table 1 shows the number and percentage of sample firms with various ownership types from 2000 to 2009. The share of PEs rapidly increased from 60.8% to 80.2%, whereas that of SOEs significantly decreased from 19.4% to 1.3%. The total shares of FIEs remained stable at approximately 20% for the same period. This trend shows the rapidly growing proportion of private ownership, the sharp decrease in state ownership, and the stagnation of foreign ownership. Therefore, the sample favorably reflects the reality of the Chinese economy.

B. Time Trends of the Labor Productivity of Firms by Ownership Type

To compare the longitudinal performance trends of firms with different ownership types, Table 2 shows the labor productivity trends of these firms measured as sales per worker.⁶ The differences reveal that PEs have significantly outperformed the other firms on average. Table 2 shows that the sales per worker of PEs in the sample have doubled from 191.2 in 2001 to 440.2 in 2009, whereas those of FIEs have

⁶Labor productivity is estimated by sales per worker. Although value added per worker or value added per worker hour is generally used to measure labor productivity (Kim, and Park 2003), calculating the exact value added from the data is difficult because of missing data and other data problems.

TABLE 2
LABOR PRODUCTIVITY BY OWNERSHIP TYPE: SALES PER WORKER

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sales Per Worker (1,000 yuan)	Full	n/a	195.3	218.0	241.9	256.2	282.7	322.8	353.0	372.8	425.0
	① State	n/a	99.1	110.8	124.3	145.8	174.8	202.0	249.8	273.9	320.0
	② Private	n/a	191.2	213.3	236.5	251.5	281.5	323.8	356.7	380.2	440.2
	③ Foreign	n/a	275.6	290.1	303.2	295.8	305.8	336.4	348.9	350.9	369.7
	②-①	n/a	92.14	102.5	112.2	105.7	106.7	121.8	106.9	106.3	120.2
	T-test	n/a	***	***	***	***	***	***	***	***	***
	②-③	n/a	-84.3	-76.8	-66.7	-44.3	-24.2	-12.6	7.8	29.4	70.5
	T-test	n/a	***	***	***	***	***	***	**	***	***

increased minimally from 275.6 to 369.7 during the same period. The labor productivity of PEs eventually surpassed that of FIEs in 2007. Consequently, the productivity difference between PEs and FIEs becomes positive in 2007 from a gap of -84.3 in 2001. In recent years, PEs have achieved significant improvements in their economic performance.

A robust econometric analysis must be performed to determine why the performances of firms with different ownership types have changed over time. Given that PEs are on performance bound forward in China, the mechanism behind their performance must be investigated. The following section describes the econometric analysis.

III. Theoretical Perspectives on Performance Change Based on Ownership Type

Following the previous section in which the upward trend in the relative performance of PEs is confirmed, this section explores the factors that drive such trend. Hypotheses are formulated and developed based on the nature and business goals of firms in China.

Ownership type influences the performance of a firm for several reasons. First, the differences in identity and resource endowment determine the incentives and ability of a firm to achieve its economic goals. Second, the divergent goals of owners have different effects on firm performance (Douma *et al.* 2006). Ownership type affects the distribution of profits among stakeholders and investment for profits for further growth (Coase 1960). These different economic behaviors of firms with various ownership types can exert varying influences at the firm level. The following sections use investment and firm size as key

variables for improving labor productivity as well as develop several hypotheses based on the resource-based view (RBV) and multinational corporations (MNCs) theory.

A. Ownership and Investment

Investment is essential for improving labor productivity. Investment in physical capital, specifically machinery and equipment, is associated with the adoption of the latest technologies, which is a key element of labor productivity growth. By investing in machinery and equipment, workers are equipped with the latest technologies, thereby allowing them to improve their business processes and produce higher-quality goods and services. Capital accumulation improves labor productivity by increasing the capital-labor ratio (substituting capital for labor).

The RBV emphasizes that the competitive advantage of a firm primarily depends on its application of valuable tangible or intangible resources at its disposal (Wernerfelt 1984; Penrose 1959). However, the RBV of firm growth indicates certain differences between PEs in developing countries, such as China, and FIEs from developed countries in terms of their investment behavior. Matthews (2002) stated that diverse critical resources for business were not easily available for firms in developing countries either within the firm or from other neighboring firms. Therefore, these firms eagerly acquire their critically lacking resources and enhance their availability, thereby increasing their propensity to invest. Firms primarily use their profits to expand their resources and not simply to distribute back to their shareholders (Lee, and Temesgen 2008). A considerable proportion of accounting profit may be reinvested for additional growth. Through this process, the firms in developing countries that have started at a low productivity level can rapidly improve their labor productivity over time.

By contrast, FIEs from advanced economies can easily access diverse resources from their parent corporations. Foreign subsidiaries share technical and managerial knowledge with their parent corporations that transfer their capabilities to their host country subsidiaries (Javorcik *et al.* 2004). Therefore, the major tasks of foreign subsidiaries in China are to utilize the transferred resources and to seek profits. In contrast to PEs, FIEs lack a strong incentive to invest for the further expansion of internal resources. Given that parent corporations can maximize their profits “on a global basis,” they are extremely cautious when entering long-term major investments in a host country yet welcome

domestic capital from their home countries. These corporations tend to repatriate more profits over time and do not expand their investments after successfully settling in a host country (Seabra, and Flach 2005). Dunning (1981) suggested that multinational corporations tend to withdraw from their host countries or refuse to expand their international investment over time if they lost their location advantage because of increasing prices or absence of tax breaks in the long run. Therefore, the investments in FIEs tend to be stagnant or to decrease in the long run. The low investment of FIEs can result in the stagnation of capital-labor ratio and productivity.

SOEs differ significantly from PEs and FIEs. Given that the business resources of these firms are largely supplied by the government, SOEs are not as eager to acquire resources as PEs. These enterprises aim to promote public interest rather than maximize profits. Therefore, SOEs traditionally tend to invest in areas of nationwide priority, such as natural resources, utilities, telecommunication services, and defense without serious consideration on profit. SOEs are not expected to effectively use their resources without a strong profit motive under government control. In other words, SOEs invest under government instructions and utilize their investment-acquired resources less effectively than PEs. Therefore, SOEs invest inefficiently and do not achieve high productivity through investment in the long run.

B. Ownership and Firm Size Effect

The previous section reveals the meaningful implications of the relationship between firm size and labor productivity. If the main goal of PEs in China is to acquire and expand their critically lacking resources as suggested by the RBV, these enterprises can quickly improve their productivity and growth by investing for the further expansion of their resources and exploiting their added resources, thereby forming “economies of growth” (Penrose 1959). PEs pay “growth costs” to improve their capabilities, such as machinery and equipment, workers, managers, R&D team, and brand power (Lee, and Temesgen 2008), which are new and lacking resources for these firms. Acquiring new advanced resources allow PEs not only to improve their productivity but also to increase their size, thereby forming “economies of growth.” When “economies of growth” are formed, the size of a firm becomes significantly and positively related with labor productivity.

By contrast, those FIEs that obtain advanced resources from their

parent corporations have no need to search actively for new additional resources in their host countries. They can easily access diverse resources from within the firm or from a parent corporation (Mathews 2002). FIEs can incorporate a significant amount of resources from their parent companies into their production process. Therefore, their investments for resources are primarily intended to replenish their exhausted resources or increase the same resources for additional production. "Economies of scale" can also be achieved in such cases to increase productivity. However, in the case of PEs in developing countries, the increased productivity through economies of scale without changing the average cost function is less than the increased productivity through economies of growth with a reduced average cost. The size of an FIE is less positively related with labor productivity than that of a PE.

SOEs are not as eager as PEs in acquiring new advanced resources because they have no incentive to maximize their profits by improving their productivity under government control. Consequently, SOEs are not expected to simultaneously achieve productivity and size growth through investment as suggested by the "economies of growth." Therefore, the size of an SOE is less positively related with labor productivity than that of a private firm.

These theoretical discussions suggest that the investment behaviors and the effects of investment and firm size differ among PEs, FIEs, and SOEs. We derive and test the following hypotheses:

Hypothesis 1: Given their higher propensity to invest, PEs can achieve labor productivity growth much faster than the other firms.

Hypothesis 2: Compared with those of the other firms, the investments of SOEs are less related with their labor productivity.

Hypothesis 3: The size of a firm is positively related with its labor productivity; however, the size effect of a private enterprise is larger than that of a foreign (or state-owned) enterprise.

IV. Testing the Hypotheses

A. Key Variables Description: Investment and Firm Size

Investment and size are two of the most important explanatory variables that are used in this section. These variables are expected to

TABLE 3
TIME-TREND OF INVESTMENT AND SIZE BY OWNERSHIP TYPE

Variable	Owner	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
(A)	Full	0.2	2.6	3.6	2.5	1.2	2.3	2.3	2.3	1.9	5.2	
	State	-1.4	4.4	5.6	1.6	-3.8	-2.1	0.5	1.0	-2.1	9.9	
	Private	1.1	2.7	3.8	3.0	1.9	2.8	2.6	2.7	2.4	5.6	
	Foreign	-1.1	1.7	2.5	1.4	0.4	1.3	1.2	1.1	0.3	3.3	
	Investment (%: $\frac{\Delta \text{Tangible Fixed Assets}_{it}}{\text{Sales}_{it-1}}$)	Private- Foreign	2.2	1.0	1.3	1.6	1.5	1.5	1.4	1.6	2.1	2.3
	T-test	***	***	***	***	***	***	***	***	***	***	***
	Private- State	2.5	-1.7	-1.8	1.4	5.7	4.9	2.1	1.7	4.5	-4.3	
	T-test	***	***	***	***	***	***	***	***	***	***	***
	(B)	Full	39,206	36,623	39,028	41,154	36,200	41,335	44,751	48,328	45,808	53,860
		State	53,315	48,180	52,609	58,409	59,538	68,267	73,577	82,086	83,080	95,864
Private		31,002	29,743	32,214	34,381	30,070	34,911	38,106	41,560	39,913	48,463	
Foreign		54,323	53,176	56,178	59,888	54,629	61,055	67,277	72,210	69,061	75,359	

highlight the differences in labor productivity based on ownership type as proposed in the hypotheses. H1 notes that private ownership has a higher propensity to invest than other ownership types, which allows PEs to obtain a faster labor productivity growth than the other firms. Therefore, investment by ownership type is examined using descriptive data from each year within the sample period. The question of whether PEs invest more actively than SOEs and FIEs is analyzed by conducting a two-group mean comparison test (t-test). The annual trends of firm size are analyzed based on ownership types as measured by average sales, which is related with H3.

Panel A in Table 3 shows the longitudinal changes of investment ratio between PEs and FIEs (or SOEs). The difference is the average of capital expenditures relative to the sales ($\frac{\Delta \text{Tangible Fixed Assets}_{it}}{\text{Sales}_{it-1}}$) of PEs minus FIEs (or SOEs). The positive values in panel A indicate that on average, PEs tend to have a higher propensity to invest than the other firms during the sample period. The t-test shows that the findings are significant at the 1% level, thereby strongly supporting H1, that is, private ownership has a higher propensity to invest than other ownership types.

Panel B shows the time-trend of average sales by ownership type and

indicates how the size of a firm changes over time. The sizes of PEs and SOEs increase more significantly than that of FIEs in the later period (2004 to 2009). During this period, the sizes of PEs and SOEs rapidly increased by more than 60%, whereas that of FIEs increased by approximately 40%. This finding contradicts the fact that the increasing sizes of both PEs and FIEs stagnated during the early period (2000 to 2004).

B. Estimation Methodology

This paper utilizes the following regression methods to test the hypothesis that explains how the investment and size of a firm influence the changing labor productivity by ownership type. Panel regression method is also adopted in this section.

$$\begin{aligned}
 LP_{i,t} = & \beta_0 + \beta_1 \begin{bmatrix} size \\ inv \end{bmatrix} + \beta_2 \begin{bmatrix} size \\ inv \end{bmatrix} O_P + \beta_3 \begin{bmatrix} size \\ inv \end{bmatrix} O_S \\
 & + \beta_4 O_P + \beta_5 O_S + \alpha F_{i,t-1} + \mu_i + \mu_t + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

where subscript t refers to time, $LP_{i,t}$ denotes the labor productivity of firm i at time t , and $F_{i,t-1}$ is a vector of variables that include firm characteristics, such as age, leverage, and liquidity (one-year lagged values are employed in the regression to prevent a possible simultaneity bias). These variables are measured using the log of age, total debt ratio, and current ratio. $size$ is a key variable representing firm size and is measured by the log of the total sales of a firm; inv is another key variable that shows investment propensity as measured by capital expenditures relative to sales ($(\Delta Tangible\ Fixed\ Assets_{i,t})/Sales_{i,t-1}$); and O_S and O_P are dummy variables for state and private ownership, respectively. Therefore, $\begin{bmatrix} size \\ inv \end{bmatrix} O_S$ and $\begin{bmatrix} size \\ inv \end{bmatrix} O_P$ are the interacting terms of the $size$ (and inv) and ownership dummy variables. μ_i denotes the time-invariant heterogeneity across firms, that is, specific to firm i yet not included in the explanatory variables, μ_t is a full set of year dummies, and $\varepsilon_{i,t}$ is the error term.

Given that FIEs are the baseline firms, the coefficient on the interacting terms of $size$ (and inv) and PEs, β_2 , indicates the differences in the effect between PEs and FIEs. Similarly, β_3 shows the difference in the effect between SOEs and FIEs. The panel FE model that is selected through the Hausman test is adopted as the estimation method for analyzing Equation (1). The results are reported in the subsequent

section.

As previously discussed, PEs obtain greater improvements in their performance compared with the other firms. Table 3 shows that compared with those of FIEs, the average sales of PEs and SOEs have begun to rapidly increase around the mid-2000s. Therefore, a structural change or turning point on the effect of key variables is likely to exist. The effect of investment and size by ownership, which results in performance improvement, may also change over time. Therefore, empirical analyses are performed on two different periods, namely, 2000 to 2004 and 2005 to 2009, to investigate the changing effect on economic performance.

C. Regression Results

Table 4 reports the regression results. Results (1)-(3), (4)-(6), and (7)-(9) demonstrate the effects of investment and size by ownership types in the periods 2000 to 2004, 2005 to 2009, and the entire study period, respectively. The regression focuses on the coefficients of interaction terms, such as the key variables that interact with the ownership dummies.

First, with regard to the changing effect of investment by ownership type on labor productivity, *inv* has positive and significant estimators across all regressions except for regression (6). The investment of an FE results in labor productivity growth. The interaction term between O_p and *inv* has no significant estimate except in regression (6). Therefore, the investment efficiency of a PE on productivity is not statistically different from that of an FIE. However, private ownership has a higher propensity to invest than other ownerships as confirmed in the previous section. Therefore, H1 is supported. In contrast to the other firms, the additional investments of PEs have contributed to the rapid growth of their labor productivity. The coefficient of the interaction term between O_s and *inv* is negative and statistically significant in regressions (5), (8), and (9), which implies that the investment efficiency of a SOE may be lower than that of an FIE (or a PE) in the later period. To test H2, we performed F-test on the values of $(\beta_1 + \beta_3)$ in the later period to determine the investment effect of an SOE on productivity. The values are significantly negative, which indicates that the investments of SOEs are inefficient during that period. The same result is obtained from the robustness test as reported in the next section. Therefore, H2 is supported in the later period.

Size effect by ownership is estimated as the coefficients of the inter-

TABLE 4
ESTIMATION RESULTS: EFFECTS OF SIZE AND INVESTMENT ON LABOR
PRODUCTIVITY

FE Model	Early Period			Later Period			Whole Period		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Inv</i>	15.39 (4.43)***	18.85 (2.82)***	19.28 (2.88)***	14.45 (4.46)***	11.31 (1.79)*	1.69 (0.22)	35.38 (16.88)***	43.9 (9.74)***	34.22 (7.56)***
<i>State*Inv</i>		-3.7 (-0.34)	-2.59 (-0.24)		-26.03 (-1.95)*	-16.92 (-1.01)		-34.77 (-3.96)***	-25.44 (-2.89)***
<i>Private*Inv</i>		-5.1 (-0.64)	-5.92 (-0.74)		6.39 (0.77)	17.13 (2.05)**		-7.15 (-1.41)	4.2 (0.82)
<i>Size</i>	53.1 (17.97)***	51.52 (28.61)***	53.25 (17.97)***	31.46 (9.14)***	74.34 (46.37)***	30.93 (8.96)***	75.93 (45.19)***	105.36 (116.74)***	75.91 (44.99)***
<i>State*Size</i>	10.13 (1.33)		10.07 (1.30)	57.78 (4.05)***		59.1 (4.14)***	27.51 (5.10)***		26.57 (4.92)***
<i>Private*Size</i>	-3.31 (-0.95)		-3.57 (-1.02)	52.58 (14.03)***		53.26 (14.15)***	38.82 (20.81)***		38.96 (20.77)***
<i>Age_{t-1}</i>	-7.71 (-3.45)***	-7.85 (-3.52)***	-7.71 (-3.45)***	8.18 (3.54)***	8.06 (3.49)***	8.1 (3.51)***	-6.04 (-5.12)***	-6.48 (-5.50)***	-6.01 (-5.10)***
<i>Debt ratio_{t-1}</i>	-1.68 (-0.29)	-1.37 (-0.24)	-1.55 (-0.27)	-2.31 (-0.46)	-0.83 (-0.17)	-2.14 (-0.43)	-8.33 (-2.66)***	-10.13 (-3.24)***	-8.5 (-2.72)***
<i>Current ratio_{t-1}</i>	-3.45 (-1.94)*	-3.35 (-1.88)*	-3.41 (-1.91)*	1.06 (0.74)	0.99 (0.69)	1.05 (0.73)	0.1 (0.1)	-0.21 (-0.22)	0.06 (0.06)
Constant	-296.13 (-9.85)***	-293.44 (-9.82)***	-295.78 (-9.83)***	-295.01 (-9.62)***	-308.9 (-10.09)***	-295.38 (-9.63)***	-684.15 (-37.39)***	-681.42 (-37.28)***	-684.87 (-37.43)***
R ²	0.06	0.06	0.06	0.06	0.06	0.06	0.11	0.11	0.11
N	161,534	161,534	161,534	361,997	361,997	361,997	603,148	603,148	603,148
F-value	5.01***	5.01***	5.01***	4.94***	4.94***	4.94***	4.74***	4.74***	4.74***
Hausman Test	142.1***	139.2***	158.5***	121.5***	119.4***	131.5***	98.4***	97.4***	106.3***

Note: 1. The t-value is enclosed in parentheses. 2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively. 3. Year, industry, and region dummies are included, but the results are not reported.

action term between the size and ownership dummies, namely, O_s and O_p . The coefficient of *size* is significant, positive, and robust in all specifications, which suggests that the size of an FE results in labor productivity growth. The interaction term between O_p and *size* generates a significantly positive estimate in the later period. In other words, the size effect of a PE on productivity is larger than that of an FIE at least in the late 2000s. Therefore, H3 is supported between PEs and FIEs in the later period. In contrast to H3, the coefficient of the interaction

TABLE 5
 ROBUSTNESS TEST: EFFECTS OF SIZE AND INVESTMENT ON LABOR
 PRODUCTIVITY

FE Model	State			Private			Foreign		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Period	-300.09 (-10.71)***	-16.09 (-4.9)***	-300.37 (-10.7)***	-203.98 (-15.7)***	0.53 (0.38)	-203.09 (-15.7)***	-15.5 (-0.9)	-11.98 (-5.6)***	-14.67 (-0.85)
<i>Inv</i>	7.08 (1.43)	22.24 (3.28)***	20.83 (3.08)***	34.46 (13.60)***	43.54 (8.60)***	41.2 (8.14)***	28.19 (6.43)***	38.02 (5.32)***	38.01 (5.32)***
<i>Inv</i> [*]		-28.18 (-2.93)***	-28.57 (-2.99)***		-11.88 (-2.07)**	-8.83 (-1.54)		-15.43 (-1.74)*	-15.39 (-1.54)
Period									
Size	73.74 (18.76)***	92.75 (26.1)***	74.78 (18.9)***	83.66 (55.8)***	101.04 (98.0)***	83.78 (55.8)***	87.66 (41.7)***	88.03 (50.9)***	87.84 (41.7)***
Size [*]									
Period	27.26 (10.20)***		27.3 (10.21)***	20.64 (15.89)***		20.58 (15.83)***	0.33 (0.2)		0.26 (0.16)
Age _(t-1)	-4.64 (-1.07)	-6.29 (-1.44)	-4.37 (-1.01)	-7.89 (-6.65)***	-8.17 (-6.88)***	-7.88 (-6.64)***	-47.22 (-19.2)***	-47.17 (-19.2)***	-47.16 (-19.2)***
Debt Ratio _(t-1)	24.8 (2.36)**	21.13 (2.00)**	24.7 (2.35)**	-15.94 (-4.33)***	-16.27 (-4.42)***	-15.98 (-4.34)***	22.09 (3.31)***	22.12 (3.31)***	22.14 (3.31)***
Constant	-764.01 (-18.43)***	-954.25 (-25.09)***	-776.47 (-18.64)***	-701.15 (-48.21)***	-871.97 (-88.11)***	-702.57 (-48.21)***	-700.91 (-33.31)***	-704.97 (-41.14)***	-703.04 (-33.35)***
R ²	0.08	0.07	0.08	0.05	0.05	0.05	0.04	0.04	0.04
N	24,218	24,218	24,218	450,567	450,567	450,567	128,363	128,363	128,363
F-value	5.24***	5.24***	5.24***	4.27***	4.27***	4.27***	6.43***	6.43***	6.43***
Hausman test	121.3***	119.0***	124.5***	91.8***	96.7***	100.3***	77.4***	82.7***	89.7***

Note: 1. The t-value is enclosed in parentheses. 2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively. 3. Year, industry, and region dummies are included, but the results are not reported.

term between O_s and *size* is positive and statistically significant in the later period, which is similar to the interaction term between O_p and *size*. Therefore, H3 is not supported between PEs and SOEs. Similar to PEs, SOEs enjoy a positive size effect on labor productivity. Overall, the regression results confirm that the positive effects of investment and size are similar among all ownership types, but the size of effects differs among these firms.

D. Robustness Test

$$LP_{i,t} = \beta_0 + \beta_1 \begin{bmatrix} size \\ inv \end{bmatrix} + \beta_2 \begin{bmatrix} size \\ inv \end{bmatrix} T + \beta_3 T + \alpha F_{i,t-1} + \mu_i + \mu_t + \varepsilon_{i,t} \quad (2)$$

Equation (1) is transformed into Equation (2), which includes time-period dummy T to check for robustness. The key variables *size* and *inv* interact with the time-period dummy to check the changing effects of size and investment on productivity as shown in Table 5. The interacting term of time and key variables indicates their time-varying tendency. The firm samples of PEs, FIEs, and SOEs will be run separately in the regressions.

The estimated coefficients and significances in Table 5 are in line with the results in the previous section. The investment of a firm has positive and significant estimators across all regressions except for regression (1). The investment effect of an SOE has been reduced in the later period with significance across all regressions; the investment effects of a PE and FIE also decrease over time, but are not consistently significant across all regressions. Firm size is positively related with labor productivity at the 1% significance level across all regressions. The size effects of a PE and SOE increase over time, whereas that of an FIE remains stagnant.

V. Conclusion

Using the 10-year period (2000 to 2009) data of companies in China, this paper investigates the longitudinal changes in the performance of firms based on their ownership type. Utilizing labor productivity as a performance measure, this paper demonstrates the upward trend in the relative performance of PEs, which demonstrates a more powerful growth in terms of labor productivity than the other firms. Three hypotheses are developed to explain such performance change. These hypotheses are dependent on the RBV and MNCs theory. Investment and firm size are used as key variables that change labor productivity. The hypotheses are tested to determine the different effects of investment and firm size based on ownership type.

The statistical and empirical analyses confirm the hypotheses. First, with regard to the effect of investment on productivity, PEs have a

higher propensity to invest than the other ownership types, thereby allowing PEs to obtain a faster labor productivity growth than FIEs and SOEs. By analyzing the investment trend via t-test, we confirm that PEs constantly display higher investment ratios than the other firms. The regression results indicate that investment contributes to the growth of labor productivity. No significant difference in investment efficiency is observed between PEs and FIEs. However, the investment of an SOE has a lower efficiency than those of PEs and FIEs in the later period. Overall, the higher propensity of PEs to invest makes these firms to achieve a faster labor productivity growth than the other firms.

The size effect of a firm is observed regardless of ownership type. However, as proposed in H3, the effect of a PE increases more significantly over time compared with that of FIEs in the later period. The size effect on the productivity of SOEs also increases during the same period. Therefore, size effect differs across these firms.

The active investments during the entire period and the size effect from “economies of growth” during the later period primarily contribute to the increased productivity of PEs. Consequently, the labor productivity of PEs eventually exceeded that of FIEs in 2007. FIEs do not have active investment activities and do not demonstrate an increase in size effect, thereby stagnating their labor productivity. Although SOEs have enjoyed a growing size effect in the later period and have enjoyed an improved productivity since 2000, such improvements have stemmed from the government policy that terminates small and inefficient SOEs during the period as shown in Table 1 and not from economies of growth. This study confirms that SOEs still suffer from inefficient investments.

In sum, PEs outperform the other firms over time. Private firms in China increase their productivity by exploiting their resources and actively investing for the further expansion of their resources, which eventually contribute to their rapid performance growth by expanding their size. This conclusion is consistent with the successful catch-up stories of Chinese firms in recent years (Lee, Jee, and Eun 2011; Xu Jin 2012).

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