



Performance Differential between Private and State-owned Enterprises: An Analysis of Profitability and Solvency

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ABSTRACT

Motivated by the rise of state capitalism, the paper investigates the relationship between ownership identity and the performance of firms in terms of profitability and solvency. Using cross-sectional data covering over 25,000 firms worldwide and by employing various empirical methods, we find robust evidence that state-owned enterprises (SOEs) tend to be less profitable than private-owned enterprises. However, they appear to use debt for their financial need and are, thus, better leveraged. SOEs are also more labor-intensive and have higher labor costs. In addition, an improvement in institutional quality could benefit both SOEs and POEs. Thus, evidence from this study could be interpreted to mean that privatization could improve the performance of public firms; however, this process should come with several prior-privatization approaches. A study over a more extended period is needed before these results can be considered conclusive.

KEYWORDS

Performance; ownership; solvency; state-owned enterprises; private-owned enterprises

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1. Introduction

In the last three decades, it has been taken as a truism that state-owned enterprises (SOEs) are on average, less efficient, and profitable than their private counterparts (see Megginson and Netter 2001). Despite this fact, government enterprises are still key players in the global economy (Borisova et al. 2015). Notably, in the wake of the global financial crisis 2007–2008, the notion of “state capitalism” has reemerged. Many governments have been taking on equity stakes as part of their rescue packages (Nash 2017). The economic rise of SOEs in many countries has featured the most important economic controversy of the last decade (Boubakri et al. 2018)

Thus, it comes as no surprise that the apparent “reverse privatization” has ignited a renewed debate about the efficiency of government ownership (Nash 2017). Based on the agency logic (Eisenhardt 1989), government ownership

could be detrimental to SOEs performance since governments may use it to pursue politically and socially desirable objectives (Grout and Stevens 2003) and benefit the ruling elite rather than enhance their corporations' efficiency (Goldeng, Grunfeld, and Benito 2008). However, state ownership may also bring benefits to firms (Nash 2017), such as providing guarantees to secure debt-financing (Faccio 2006), bailing out the firms in times of financial distress, thereby, minimizing the risk of default (Borisova and Megginson 2011). All in all, these facts raise important questions: whether the sources of performance disadvantage of SOEs have disappeared? If this is the case, which condition should improve the comparative performance of SOEs?

Prior studies aiming to answer these questions have two main constraints. First, earlier research has mostly relied on two different comparison approaches, both of which suffer from methodological problems. A primary concern associated with pre-/post-privatization comparisons is the difficulty in isolating the effects of ownership identity from the effects of other economics variables, such as changes in policies, an improvement in institutional quality, macro-economic environments etc., which usually accompany the privatization process (Frydman et al. 1999). Meanwhile, studies comparing SOEs and private-owned enterprises (POEs) may face accounting-based issues which can make comparisons less reliable since SOEs may use different accounting standards (Megginson and Netter 2001). Second, prior studies seem to be silent on the solvency differentials between SOEs and POEs. One may argue that the profitability only tells part of the performance story since SOEs tend to forgo profit maximization tasks in the pursuit of other social and political goals (Xu and Yano 2017). Instead, it is plausible to consider the solvency of these firms which is of no less critical than profitability.

Our study aims to fill these gaps. First, we re-investigate whether SOEs are inferior to POEs in terms of profitability and solvency. Besides, we additionally verify if labor force characteristics may impact these performance differentials and whether institutional quality factors matter for these differences. For such purposes, we employ a sample of 25,247 non-financial firms worldwide, of which about 12,742 are respond to SOEs. Second, this research compares the financial performance of SOEs and POEs rather than making the pre-/post-privatization comparisons. We use accounting-based data from the ORBIS database since they are not affected by "market moods" and do not suffer from an anticipation problem. In order to address accounting-based problems, we use only listed companies since data on their performance are readily available with superior reliability and consistency as listed companies in a country are subject to relatively uniform accounting standards.

Furthermore, we also use a number of methodologies to address the endogeneity-related problems in econometric research. To mitigate the impact of country-specific characteristics, country-fixed effects are included in all regressions. We also use propensity score matching (PSM) method which is robust

to alleviate the potential bias from the functional form misspecification and reduce bias caused by compounding variables (Rosenbaum and Rubin 1983). Precisely, using PSM, we can match SOEs and POEs from the same countries and having similar traits to isolate the effects of country and firm-specific characteristics on their performance differentials from the effects of other explanatory variables.

Our work harbors two contributions. First, we contribute to the “state capitalism” literature (i.e. Aguilera et al. 2020; Beuselinck et al. 2017; Boubakri et al. 2018) by providing novel empirical evidence for the observed variability in SOE financial performance across the globe after the financial crisis. We prove that SOEs are outperformed by POEs in terms of profitability. They also use more debt than equity. Additionally, our findings also provide further confirmation to the findings from Megginson, Nash, and Randenborgh (1994) and DeWenter and Malatesta (2001) that government firms tend to be more labor-intensive than non-government ones. Hence, we provide support for the view that public firms are less efficient than private firms, at least in terms of profitability. As such, our paper suggests that privatization could be considered as a driver for firm efficiency. Second, we enrich the corporate finance literature (i.e. DeWenter and Malatesta 2001; Omran 2004; Poczter 2016) by establishing the importance of country-level institutional quality to firm performance. We provide evidence that an improvement in institutional quality is important to enhance the profitability of both SOEs and POEs. However, POEs tend to benefit more from better institutional quality than SOEs. Thus, it follows that alongside with the privatization of SOEs, governments should proactively heighten the quality of institutions for the sake of enhancing SOEs performance. To the best of our knowledge, we are the first to investigate the impact of different aspects of institutional quality (i.e. control of corruption, government effectiveness, political stability, regulatory quality and the rule of law) on SOEs performance.

The remainder of the paper is structured as follows. [Section 2](#) reviews the related literature. [Section 3](#) discusses the methodology. [Section 4](#) reports our findings and [Section 5](#) concludes

2. Literature Review

Recent empirical studies have shown that ownership identity affects firms' performance. However, they remain skeptical of which ownership type consistently shows superior economic performance relative to the others. For some (i.e., Kole and Mulherin 1997; Omran 2004; Poczter 2016), government ownership is better than private ownership and SOE reforms fail to have any impacts on firms' performance. Kole and Mulherin (1997), when examining the postwar performance of 17 German and Japanese ownership firms, found no significant difference between government-owned and private-owned

enterprises. According to them, in a competitive environment, even SOEs are forced to operate efficiently, and factors other than ownership have the final say over firm performance. Similarly, Omran (2004) concludes that privatized firms do not exhibit a significant enhancement in performance relative to SOEs. Despite that, the author also adds that the privatization process could have substantial spillover effects on SOEs.

On the other hand, another group of researchers (i.e., Boardman and Vining 1989; DeWenter and Malatesta 2001; Megginson, Nash, and Randenborgh 1994) claim that government-owned enterprises are less efficient or at least less profitable than their private peers. Boardman and Vining (1989) documents that state-owned and even mixed-owned enterprises fall short of privately owned ones in terms of profitability and efficiency. However, public ownership may prevail in the markets where there are high entry barriers and externalities. Similarly, Megginson, Nash, and Randenborgh (1994) depict that privatization economically and significantly leads to an increase in output, operating efficiency, profitability, capital investment spending, dividend-paying, and a decrease in leverage, implying that private ownership is more advantageous. DeWenter and Malatesta (2001) find that an ownership switch from state to private ownership could raise the profitability of firms, supporting the idea that SOEs are less profitable.

3. Data and Methodology

3.1. Data and Sample Overview

Our firm-level dataset contains approximately 50,000 firms around the world and is derived from the ORBIS database. We remove from our sample firms with inadequate information and firms with lots of missing. To this end, our final sample is composed of a total 25,247 non-financial firms, of which about 12,742 respond to SOEs.

3.1.1. Measuring Profitability

We follow (Aivazian, Ge, and Qiu 2005; Boardman and Vining 1989) and choose to study firm performance in terms of the return on assets (ROA). The use of profitability, i.e., ROA, as a yardstick for examining the performance of firms is particularly popular in literature on corporate finance since it reflects the economic benefits for the owners (Goldeng, Grunfeld, and Benito 2008). Thus, ROA is believed to be a good proxy to measure firm performance.

3.1.2. Measuring Solvency

Literature on corporate finance has relied on several measures to assess a firm's solvency or leverage status (i.e. debt/equity, debt/assets, debt/EBITDA, assets/equity, total liabilities/total assets). In this study, we follow

DeWenter and Malatesta (2001) and Omran (2004) and use the solvency ratio as total liabilities to total assets. We also employ another leverage ratio, which is the long-term debt to total assets, as an alternative measure for a robustness test.

3.1.3. Classification of SOEs

There is no clear-cut definition of firm type in terms of the exact extent of ownership. One principal challenge facing SOEs, which may deter them from gaining profitability is the insufficiency of operational and management autonomy of boards and executives (EC 2016). Thus, it is plausible to make a performance comparison between groups of SOEs with ultimate state control and POEs with private sectors having voting rights. Therefore, in this research, firms are defined as SOEs when public authorities hold at least 50.01% of the shares.

3.2. Methodology

3.2.1. OLS Regressions

To empirically examine the effect of ownership identity on firm performance, we follow DeWenter and Malatesta (2001) and utilize a series of multivariate analyses. For each sub-sample group, the following regressions are run:

$$\text{Profitability}_i = \alpha + \delta \text{SOE}_i + \beta \text{Controlvariables}_i + \rho_i + \varepsilon_i \quad (1.1)$$

$$\text{Solvency}_i = \alpha + \delta \text{SOE}_i + \beta \text{Controlvariables}_i + \rho_i + \varepsilon_i \quad (1.2)$$

Where i indicates the firm, and profitability and solvency are measured by the ROA and the total liabilities to total assets ratio, respectively. SOE is a dummy variable, with 1 denoting SOEs and 0 otherwise. The following control variables are included: total assets (*SIZE_ASSET*), total sales (*SIZE_SALES*) and total capital (*SIZE_CAPITAL*) in logarithm form; firm age (*AGE*) (the number of years from the date of incorporation to 2018); labor size (*LABOR*) (the natural logarithm of the total number of employees); labor intensity (*LABOR/SALES*) (total employees divided by total sales and finally), firm leverage (*LEVERAGE*) (the total short-term debts to equity). ρ_i is country-fixed effects and ε_{it} is a standard error. Descriptive statistics for our main variables are reported in Table 1. A correlation matrix is provided in Table 2.

3.2.2. Propensity Score Matching (PSM)

We separate our full sample into two sub-groups comprising SOEs (treatment firms) and POEs (control firms). Matching starts with a probit regression based on the firms in these two groups using various characteristics (i.e., firm size in terms of total sales, leverage ratio, ROA, firm age, and labor

Table 1. Descriptive statistics.

Variable	Mean	Median	Sd. Dev.	Max	Min
ROA	6.147	4.219	11.164	99.446	-98.501
LABOR	5.680	5.704	1.848	14.648	0
SIZE_ASSET	11.633	11.437	1.867	22.111	3.241
SIZE_SALES	11.608	11.650	1.678	20.031	0.327
AGE	27.649	21	23.706	196	1
LABOR_SALES	0.034	0.003	1.566	150.678	-0.824
LABOR_ASSET	0.015	0.003	0.492	65.310	0
LEVERAGE	0.078	0.015	0.136	2.698	-0.001
SOLRATIO	39.288	36.238	24.389	100	0
IQ	0.705	0.892	0.849	1.972	-1.581

Table 2. Pairwise correlation of main independent variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. ROA	1								
2. LABOR	-0.028*	1							
3. SIZE_SALES	0.095*	0.581*	1						
4. AGE	-0.026*	0.130*	0.045*	1					
5. LABOR_SALES	0.000	0.002	-0.109*	-0.012	1				
6. LABOR_ASSET	0.004	0.025*	-0.153*	-0.013	0.010	1			
7. LEVERAGE	-0.084*	-0.025*	0.143*	-0.039*	-0.01	-0.010	1		
8. SOLRATIO	0.221*	0.040*	-0.094*	0.028*	0.006	-0.006	-0.281*	1	
9. IQ	0.016	-0.168*	-0.146*	0.163*	-0.016	-0.025*	-0.041*	-0.025*	1

size) as control variables. For the robustness of our results, we utilize various matching methods: nearest neighbors ($n = 1$), Mahalanobis, nearest neighbors ($n = 2$), Gaussian kernel, and radius (radius = 0.1). In the later stage, multivariate regressions are run using a matched sample.

4. Empirical Results

4.1. Does Ownership Identity Affect the Profitability of Firms?

Table 3 reports our mainstream results from the baseline regressions. In model (1) and (2), the coefficient for SOEs is negative and significant, indicating that SOEs have lower economic performance than non-SOE peers. Concerning the PSM test, findings of which are reported in Table 4, regardless of the matching methods, the results of the differences between groups show high consistency with each other and with previous tests. Between the two investigated groups of similar characteristics (i.e., total sales, leverage ratio, ROA, firm age, and labor size and Country of incorporation), the differences in the ROA are significantly negative, suggesting a lower profitability level for SOEs. Additionally, the results of the regression models after using different matching methods are in line with those from our baseline models, reinforcing our findings that POEs are superior to SOEs in terms of profitability.

This might be due to the fact that the secure connections of SOEs with the government mostly result in their board of directors being manipulated by the bureaucracy to pursue nonprofit objectives (Xu and Yano 2017). Managers

Table 3. Effects of ownership identity on the performance of firms.

<i>Dependent variable</i>	<i>ROA</i>		<i>SOLVENCY</i>	
	(1)	(2)	(3)	(4)
<i>SOE</i>	-3.760*** (0.206)	-3.947*** (0.226)	3.752*** (0.407)	3.685*** (0.432)
<i>LIQUIDITY</i>	0.100*** (0.034)	0.108*** (0.037)	1.175*** (0.147)	1.276*** (0.144)
<i>AGE</i>	-0.007** (0.003)	-0.004 (0.003)	0.011 (0.007)	0.021*** (0.007)
<i>COST_EMPLOYEE</i>	-0.048*** (0.007)	-0.037*** (0.008)	0.121*** (0.011)	0.137*** (0.011)
<i>LEVERAGE</i>	-14.060*** (0.721)	-14.952*** (0.743)		
<i>LABOR_SALES</i>	0.083 (0.060)	0.086 (0.058)		
<i>SIZE_SALES</i>	0.426*** (0.108)	0.446*** (0.116)		
<i>LABOR</i>	-0.389*** (0.098)	-0.473*** (0.112)		
<i>ROA</i>			0.580*** (0.021)	0.560*** (0.021)
<i>SIZE_ASSET</i>			0.566*** (0.140)	0.492*** (0.153)
<i>SIZE_CAPITAL</i>			1.142*** (0.078)	1.197*** (0.084)
<i>CONSTANT</i>	7.022*** (0.958)	3.455*** (1.335)	14.537*** (1.449)	6.285*** (2.345)
Country Fes	No	Yes	No	Yes
No. of Obs.	11,994	11,994	13,831	13,831
R-squared	0.0736	0.0933	0.1441	0.2041

Note: Robust standard errors are in parentheses. **, *, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

will concentrate on creating personal benefits over making firms profitable (Shleifer 1998). Furthermore, the managers and core figures of SOEs are not recruited based on merit but rather through kinships and clandestine exchange mechanisms (Krueger 1990), which might lead to inefficiency in managerial and operational practices. Thus, our results correspond well with many prior studies (i.e. Megginson, Nash, and Randenborgh 1994)

4.2. Does Ownership Identity Affect Firm Solvency?

As can be seen from Table 3, the coefficients on SOE in the model (3) and (4) are robustly positive depicting a higher level of leverage for SOEs compared to non-SOE firms. This reveals that they are more dependent on outside sources for their financial needs. The PSM method also provides similar outcomes. From Table 5, it is evident that the solvency ratios of the treatment group are significantly higher than those of the control group in all matching methods. The results of regression models after matching SOE and POE firms also provide similar findings with the coefficients on SOE in all five models being

Table 4. The impact of ownership identity on profitability: propensity score matching method.

Panel A: Matching Estimation: Differences in ROA between Treatment and Control Firms				
Matching Method	Treatment firms (1)	Control firms (2)	Difference (1) – (2)	t-Statistics
Near neighbor (n = 1)	4.053	8.083	-4.030**	-2.37
Mahalanobis	4.053	11.064	-7.012***	-6.08
Near neighbor (n = 2)	4.053	11.885	11.695***	-5.62
Kernel Gaussian	4.053	10.885	-6.832***	-10.66
Radius (0.1)	4.053	11.345	-7.292***	-8.29

Panel B: Regression Estimation: Based on Matching Samples					
	Dependent variable: ROA				
	Near neighbor (n = 1) (1)	Mahalanobis (2)	Near neighbor (n = 2) (3)	Kernel Gaussian (4)	Radius (0.1) (5)
SOE	-5.395*** (0.205)	-5.424*** (0.198)	-5.448*** (1.029)	-5.393*** (0.849)	-5.439*** (0.867)
SIZE_SALES	0.083 (0.085)	-0.612*** (0.109)	-0.010 (0.410)	-0.026 (0.386)	-0.041 (0.389)
AGE	-0.020*** (0.003)	-0.014*** (0.003)	-0.021* (0.012)	-0.019* (0.010)	-0.019* (0.010)
LEVERAGE	-13.350*** (0.890)	-13.680*** (1.067)	-13.740*** (2.170)	-14.84*** (1.766)	-14.990*** (1.814)
LABOR	-0.231*** (0.084)	0.213** (0.102)	-0.140 (0.220)	-0.140 (0.198)	-0.136 (0.200)
LIQUIDITY	0.036 (0.026)	0.162*** (0.029)	0.050 (0.052)	0.064 (0.041)	0.062 (0.042)
LABOR_SALES	0.047 (0.055)	-0.013 (0.050)	0.038 (0.065)	0.035 (0.063)	0.033 (0.063)
COST_EMPLOYEE	-0.044*** (0.004)	-0.075*** (0.007)	-0.045** (0.018)	-0.038** (0.015)	-0.038** (0.015)
CONSTANT	12.200*** (0.802)	18.240*** (0.982)	12.890** (5.109)	12.650*** (4.673)	12.870*** (4.731)
No. of Obs.	11,738	11,738	8,581	11,994	11,994
R-squared	0.072	0.089	0.072	0.074	0.074

Note: Matching starts with a probit regression based on firms in these two groups using various characteristics (i.e., firm size in terms of total sales, the leverage ratio, ROA, firm age, and Country of incorporation) as control variables. *, **, and *** denote significance at the 10%, 5% and 1% levels.

consistently positive. Thus, this ascertains our results from the baseline models.

The explanation for this, perhaps, lies in the fact that the state is unlikely to allow a large SOE to go bankrupt and SOEs can enjoy a “soft” budget constraint since they are backed by the government (Megginson and Netter 2001). They have the advantage of borrowing funds at a lower rate (Omran 2004). Thus, the discipline that capital markets impose on state-held firms and the threat of financial distress for them is less relevant than their private counterparts. However, it is worth noting that such “soft” budget constraints, to a certain extent, could also be a source of inefficiency in government firms (Frydman et al. 1999) when the board of management there might fail to use their funds righteously. Thus, our findings on solvency are largely in line with those of DeWenter and Malatesta (2001) and Omran (2004).

Table 5. The impact of ownership identity on solvency: propensity score matching method.

Panel A: Matching Estimation: Differences in ROA between Treatment and Control Firms				
Matching Method	Treatment firms (1)	Control firms (2)	Difference (1) – (2)	t-Statistics
Near neighbor (n = 1)	41.172	33.396	7.776***	4.62
Mahalanobis	41.172	32.755	8.417***	3.90
Near neighbor (n = 2)	41.172	32.628	8.544***	5.46
Kernel Gaussian	41.172	33.674	7.498***	7.60
Radius (0.1)	41.172	33.480	7.692***	7.23

Panel B: Regression Estimation: Based on Matching Samples					
	Dependent variable: SOLVENCY				
	Near neighbor (n = 1) (1)	Mahalanobis (2)	Near neighbor (n = 2) (3)	Kernel Gaussian (4)	Radius (0.1) (5)
SOE	5.802*** (0.395)	7.011*** (0.381)	5.616*** (0.572)	6.004*** (0.490)	6.007*** (0.492)
LIQUIDITY	0.650*** (0.061)	1.263*** (0.145)	0.551*** (0.157)	0.496*** (0.123)	0.497*** (0.123)
AGE	-0.003 (0.008)	0.015** (0.007)	-0.004 (0.012)	0.006 (0.010)	0.006 (0.010)
COST_EMPLOYEE	0.030*** (0.008)	0.038*** (0.010)	0.042*** (0.016)	0.047*** (0.014)	0.046*** (0.014)
ROA	0.443*** (0.022)	0.514*** (0.024)	0.474*** (0.041)	0.523*** (0.030)	0.522*** (0.030)
SIZE_ASSET	-0.279* (0.164)	-0.246 (0.150)	-0.171 (0.223)	-0.147 (0.192)	-0.155 (0.194)
SIZE_CAPITAL	1.694*** (0.101)	1.717*** (0.099)	1.712*** (0.132)	1.703*** (0.114)	1.704*** (0.115)
CONSTANT	21.510*** (1.665)	17.590*** (1.487)	20.10*** (2.444)	19.36*** (2.087)	19.44*** (2.109)
No. of Obs.	12,580	12,580	10,820	13,831	13,831
R-squared	0.110	0.151	0.106	0.112	0.112

Note: Matching starts with a probit regression based on firms in these two groups using various characteristics (i.e., firm size in terms of total sales, the leverage ratio, ROA, firm age, labor size; and Country of incorporation) as control variables. Robust standard errors are in parentheses *, **, and *** denote significance at the 10%, 5% and 1% levels.

4.3. Robustness Tests

To ensure the robustness of our results, we utilize an additional sensitivity check using different proxies for ROA and solvency which are ROE and long-term debt relative to total assets, respectively. We, then, re-estimate equations (1.1) and (1.2) using multivariate OLS regression. We also conduct univariate tests to further confirm our mainstream results. For the sake of brevity, we do not report our estimation outcomes here. The outcomes are generally similar with those presented in our mainstream analyses.

4.4. Additional Analyses

4.4.1. Ownership Identity, Labor Size, Labor Intensity, and Firm Performance

According to Boycko, Shleifer, and Vishny (1996), politicians cause SOEs to employ excess labor inputs. Furthermore, those recruited are chosen to perform the desired tasks based on political connections rather than based on merit (Krueger 1990), which is assumed to lower the productivity of SOEs.

Given the fact that human capital has a positive relationship with productivity and, thus, firms' performance (Mason, O'Leary, and Vecchi 2012), it is possible that the heterogeneity in labor force characteristics between public and private firms may impact their performance differential. Thus, in this section, we provide an additional investigation into how labor characteristics can influence the performance differential

For such purpose, we incorporate into our baseline specifications the interaction terms between *SOE* and labor size (*LABOR*), labor intensity (*LABOR/SALE*), and the average cost of an employee (*COST_EMPLOYEE*) separately. The results of these tests are presented in Table 6.

As can be seen from panels A of Table 6, government firms have significantly higher average labor-to-sales than private firms do, implying that they are more labor-intensive than their counterparts. Regarding panel B, as long as the interaction terms between SOEs and labor size, labor intensity, and labor cost are taken into consideration, it appears that labor size and labor cost impose opposing effects on the performance of government firms. The coefficient of *SOE*LABOR* is significantly positive, implying that SOEs perform worse than non-SOEs but tend to benefit more from an expansion of the labor size. In comparison, the robustly negative coefficient on *SOE*COSTEMPLOYEE* depicts that an increase in labor wage may lower their profitability at a more rapid pace than POEs since they tend to suffer more from the harmful effect of the labor cost. However, it is worth noting that since the coefficient on the interaction term of SOE and labor intensity is negative but insignificant, there is no robust evidence showing that the effects of labor intensity on firm performance differ between the groups of SOEs and non-SOEs.

4.4.2. Ownership Identity, Institutional Quality and Firm Performance

There is now a widespread consensus among academics and policymakers that competent institution plays a role in promoting business performance (Parker 2004; Yasar, Paul, and Ward 2011). However, some academics are of the view that institutions have different effects on the performance of SOEs and POEs. For instance, Nguyen and Dijk (2012) document that corruption may hamper the growth of POEs but is not detrimental to SOEs. In contrast, Kong, Wang, and Wang (2017) report that anti-corruption campaigns can boost the performance of central SOEs but may reduce the firm performance of non-SOEs. Thus, the impact of institutional quality on firm performance, while documented to be important, is still not conclusive and may vary upon different types of firms.

Therefore, this research aims to additionally evaluate the performance-enhancing effect of high-quality institutions on both state-owned and private firms. We employ a set of institutional quality characteristics, including control of corruption, government effectiveness, political stability, regulatory

Table 6. Ownership identity, labor size, labor intensity, labor cost, and firm performance.

Panel A: Propensity Score Matching – Labor/Sales				
Matching Method	Treatment firms (1)	Control firms (2)	Difference (1) – (2)	t-Statistics
Near neighbor (n = 1)	0.066	0.006	0.060**	2.43
Mahalanobis	0.066	0.007	0.059**	2.38
Near neighbor (n = 2)	0.066	0.006	0.060**	2.44
Kernel Gaussian	0.066	0.006	0.060**	2.44
Radius (0.1)	0.066	0.006	0.060**	2.44

Panel B: Regression Estimation: Based on Matching Samples			
	Dependent variable: ROA		
	LABOR SIZE	LABOR INTENSITY	LABOR COST
	(1)	(2)	(3)
SOE	-5.847*** (0.695)	-3.586*** (0.232)	-3.262*** (0.285)
LIQUIDITY	0.101*** (0.034)	0.102*** (0.034)	0.104*** (0.034)
SIZE_SALES	0.361*** (0.109)	0.475*** (0.111)	0.433*** (0.110)
AGE	-0.006* (0.003)	-0.006* (0.003)	-0.007** (0.003)
LEVERAGE	-14.420*** (0.737)	-14.040*** (0.721)	-13.860*** (0.726)
LABOR	-0.545*** (0.113)	-0.449*** (0.103)	-0.417*** (0.099)
SOE*LABOR	0.359*** (0.106)		
LABOR/SALES	0.076 (0.059)	42.420** (18.040)	0.086 (0.061)
SOE*LABORSALES		-42.330** (18.040)	
COST_EMPLOYEE	-0.050*** (0.007)	-0.048*** (0.007)	-0.028*** (0.009)
SOE*COSTEMPLOYEE			-0.029*** (0.010)
CONSTANT	8.628*** (1.124)	6.402*** (1.009)	6.563*** (0.993)
No. of Obs.	11,994	11,994	11,994
R-squared	0.075	0.074	0.074

Note: Matching starts with a probit regression based on firms in these two groups using various characteristics (i.e., firm size in terms of total sales, the leverage ratio, ROA, firm age, labor size; and Country of incorporation) as control variables. Robust standard errors are in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively

quality and the rule of law in the Worldwide Governance Indicators (WGI) database provided by the World Bank. We choose to use the WGI dataset since it is readily available for a wide range of countries and of high quality. This dataset summarizes the overall assessments of certain attributes of governance quality provided by a large number of enterprises, citizen and expert survey respondents in many countries; thus, is suitable to our research goal.

We construct an institutional quality variable by simply averaging five aforementioned indicators. To compare the impact of those factors on SOEs and non-SOEs groups, we create interaction terms between SOE and IQ ($SOE*IQ$) and its 5 constructs ($SOE*CC$; $SOE*GE$, $SOE*PS$, $SOE*RQ$ and $SOE*RL$) separately. We, then, incorporate those variables into our Eq. (1.1)

and rerun our baseline models. The nearest neighbor matching method is also used to match SOEs and POEs of the same country of incorporation and with similar total sales, the leverage ratio, ROA, firm age, labor size. The corresponding results are provided in [Table 7](#).

As can be seen from [Table 7](#), institutional quality and all its attributes have a significant positive impact on firm performance, indicating that an improvement in the quality of institutions can contribute to the growth of firms. Furthermore, the coefficients on the interaction terms of SOE and IQ and its constructs are consistently robustly negative reveals that non-SOEs seem to benefit more from an improved institutional quality than SOE counterparts. Thus, our findings partly confirm those in Nguyen and Dijk (2012) in the sense that better control of corruption is of more advantage to POEs than SOEs. Thus, our findings imply that policies to heighten the quality of institutions can help in boosting the efficiency of firms in general and SOEs after privatization.

5. Conclusion and Policy Implications

This study examines whether ownership identity is related to firm performance in terms of profitability and solvency and whether an improvement in productivity and institutional quality matter for the efficiency of SOEs performance. Our cross-sectional comparisons based on a large sample size and various empirical methods reveal several empirical regularities. We find significant evidence that SOEs are outperformed by their POEs counterparts in terms of profitability. SOEs are also more dependent on debt and financial support from outside sources rather than equity. The findings are consistent over different econometric approaches. Hence, we provide support for the view that public firms are less efficient than private firms, at least in terms of profitability. Government firms also tend to be more labor-intensive than non-government ones. Furthermore, an improvement in institutional quality could have performance-boosting effects in both SOEs and POEs; and POEs seem to benefit more from this process. Thus, our test results tend to confirm findings from prior studies (i.e. Nguyen and Dijk 2012).

To this end, this paper reveals important policy implications. First, our findings suggest that privatization could be considered as a driver for firm efficiency. Privatization as a policy could motivate private and public firms to cope with future changes in economic systems and encourage SOEs to shift their management toward maximizing profitability and efficiency to survive. However, it is worth noting that privatization cannot be the sole answer to the performance improvement of SOEs. Rather, governments should pay more attention to several prior-privatization approaches such as improving productivity in SOEs and heightening the quality of institution. This would help to create a market where both private and public firms can function efficiently.

Table 7. Ownership identity, institutional quality and firm performance.

<i>Dependent variable: ROA</i>						
	<i>IQ</i>	<i>CC</i>	<i>GE</i>	<i>PS</i>	<i>RQ</i>	<i>RL</i>
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SOE</i>	-2.534*** (0.367)	-3.060*** (0.304)	-2.370*** (0.407)	-3.290*** (0.273)	-1.780*** (0.421)	-2.552*** (0.364)
<i>SIZE_SALES</i>	0.509*** (0.111)	0.497*** (0.111)	0.499*** (0.112)	0.503*** (0.110)	0.515*** (0.111)	0.500*** (0.111)
<i>AGE</i>	-0.006** (0.003)	-0.006* (0.003)	-0.006** (0.003)	-0.007** (0.003)	-0.006** (0.003)	-0.006* (0.003)
<i>LEVERAGE</i>	-14.150*** (0.727)	-14.150*** (0.728)	-14.100*** (0.727)	-14.190*** (0.724)	-14.170*** (0.723)	-14.130*** (0.729)
<i>LABOR</i>	-0.494*** (0.103)	-0.476*** (0.103)	-0.479*** (0.103)	-0.479*** (0.101)	-0.508*** (0.103)	-0.487*** (0.103)
<i>LIQUIDITY</i>	0.100*** (0.034)	0.101*** (0.034)	0.10*** (0.034)	0.102*** (0.0340)	0.099*** (0.034)	0.100*** (0.034)
<i>LABOR_SALES</i>	0.084 (0.058)	0.084 (0.059)	0.084 (0.059)	0.085 (0.056)	0.084 (0.058)	0.084 (0.059)
<i>COST_EMPLOYEE</i>	-0.044*** (0.007)	-0.045*** (0.007)	-0.045*** (0.007)	-0.044*** (0.007)	-0.044*** (0.007)	-0.044*** (0.007)
<i>IQ</i>	0.470** (0.228)					
<i>SOE_IQ</i>	-1.195*** (0.302)					
<i>CC</i>		0.194 (0.157)				
<i>SOE_CC</i>		-0.631*** (0.210)				
<i>GE</i>			0.512** (0.220)			
<i>SOE_GE</i>			-1.149*** (0.294)			
<i>PS</i>				0.235 (0.290)		
<i>SOE_PS</i>				-1.032*** (0.391)		
<i>RQ</i>					0.754*** (0.237)	
<i>SOE_RQ</i>					-1.642*** (0.311)	
<i>RL</i>						0.427** (0.202)
<i>SOE_RL</i>						-1.056*** (0.267)
<i>CONSTANT</i>	5.912*** (1.014)	6.226*** (1.004)	5.806*** (1.023)	6.278*** (0.998)	5.480*** (1.027)	5.962*** (1.017)
No. of Obs.	11,992	11,992	11,992	11,994	11,992	11,992
R-squared	0.075	0.075	0.075	0.075	0.076	0.075

Note: IQ, CC, GE, PS, RQ, RL stand for Institutional quality, control of corruption, government effectiveness, political stability, regulatory quality and rule of law respectively. OLS regressions are based on matched sample from Propensity Score Matching method. The matching method is the nearest neighbor ($n = 1$). Matching starts with a probit regression based on firms in these two groups using firm size in terms of total sales, the leverage ratio, ROA, firm age, labor size; and Country of incorporation as control variables. Robust standard errors are in parentheses. *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively

Finally, it is essential to mention that although privatization can be one policy with other measures, SOE reforms without privatization are also possible depending on the specific situation. Therefore, future research on improving SOE performance (including the practical effects of privatization) is needed.

Although a large sample size allows us to investigate the ownership identity-performance linkage over a broader scope, it is not able to capture the changes in the performance of firms over the years. Indeed, a study over a more extended period is needed to support our study before our findings can be considered conclusive. Besides, due to the data availability problem, information on industry characteristics is missing in this paper. Since the critical influence of industry-variant traits may impose on performance, studies with industry-fixed effects are desirable. Finally, in this study, we try to consider the effect of institutional quality to assess the importance of better economic environments on firm performance. Institutional quality data are country-level by its nature. Therefore, it may underestimate the influence of institutional quality at the provincial level. More specific studies including information on municipal governance and legal system could well supplement for our findings. We leave these potential issues for future research.

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