Network Based State Ownership and Corporate Resilience: Evidence from China

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Abstract

A common view is that state ownership in firms is associated with low efficiency due to agency problems. Yet better support from the state shareholders may also enhance corporate resilience, especially when facing large negative shocks. We empirically test this effect based on data from Chinese listed firms, an institutional environment featuring wide state ownership, and exploit the significant negative macro shock for identification. We adopt a new measure of state ownership, which is constructed for each firm by penetrating its ultimate shareholders through its entire ownership network. The findings robustly support that state ownership contributes to firm resilience, and a major channel is the better financial flexibility provided by stronger state ownership.

Keywords: Corporate resilience; state ownership; ownership network
JEL Classifications: G31; G32; G38

1 Introduction

Resilience enables a company to maintain stable operations, investments, and employment in the face of negative shocks or adverse events. More recently, there emerges a strong appreciation of firm resilience in the COVID-19 pandemic (Cheema-Fox et al., 2021), and correspondingly there is a resurgence of interests in examining factors affecting resilience. A number of studies have underscored the critical role of finance. Fahlenbrach et al. (2020) stresses that companies with greater financial flexibility are better equipped to mitigate revenue shortfalls resulting from negative shocks. Balduzzi et al. (2024) and Forbes et al. (2023) confirm that credit constraints and funding structures do affect corporate resilience. Additional firm characteristics have also been identified to affect firm resilience during the pandemic.[1] Nonetheless, few

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[1]A partial list of the related literature includes: Chen et al. (2023) for exporters, Kuhn et al. (2023) for internal coordination, Li et al. (2021) for corporate culture, Liu and Zhao (2023) for political connections, Shan and Tang (2023) for employee morale, and Xia et al. (2022) for digital finance.

studies have investigated the influence of corporate ownership structure, and in particular the state ownership, on firm resilience. This paper aims at filling this gap in the literature.

Despite a common view backed by the literature in 1990s about low efficiency of state-owned enterprises (SOEs) (Megginson and Netter, 2001; Shleifer, 1998), the recent studies cast doubts on this claim (Lazzarini and Musacchio, 2018) and stress on the positive sides of state ownership for a more balanced view (Bruton et al., 2015; Lin et al., 2020). Indeed, the multitask theory of SOEs (Lin et al., 1998; Bai et al., 2000) emphasizes that SOEs effectively balance between profit efficiency and social responsibility by providing non-governmental public insurance when the economy faces adverse scenarios.[2] One implication of this theory is that SOEs are likely to be more resilient to negative shocks in terms of maintaining more stable operations, investment, and employment. Furthermore, according to the hybrid organization perspective of Bruton et al. (2015), the resilience effect should not be confined to the SOEs only.[3]

Consider the more realistic situation of a hybrid ownership with both state and private shareholders, then the decision making of the firm is most likely to account for both the economic efficiency and social responsibility, and the final outcome is determined through certain bargaining process.[4] While the precise outcome must depend on details of firm characteristics, it is reasonable to conjecture that firm decision will weigh more on social responsibility, thus enhance resilience, given a higher state ownership. This is the main hypothesis that we test in this paper. In addition, we also investigate one possible underlying mechanism for this hypothesis: we argue that higher state ownership in a firm brings about better financial flexibility, through both an internal capital market channel and an external financing channel. The latter channel is particularly relevant for China, given the markedly advantageous access to external finance through state shareholders (cf. Zhu, 2021), while the former channel may also be operative around the world given the common practice of business groups formed by ownership linkages (cf. Khanna and Yafeh, 2005).

It is worth noting that existing literature often categorizes companies into SOEs and non-SOEs when analyzing the role of state ownership, rather than utilizing continuous variables to discuss the proportion of state ownership in more detail. This approach limits the scope of the research to some extent. Therefore, this study adopts a methodology inspired by Brioschi et al. (1989) to calculate the proportion of penetrating state ownership in A-share listed companies and then use this indicator to examine the role of penetrating state ownership in companies' responses to negative shocks.

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[2]This is not to deny the existence of perverse incentives in SOEs, as analyzed in Shleifer and Vishny (1994), but to complement the existing literature by offering a more impartial perspective on state ownership in firms, especially given the fact that around the world more firms now have a hybrid ownership structure blending state and non-state ownership as documented by Bruton et al. (2015).

[3]The status of SOE for a company is almost exclusively related to the fact that the control power of the company falls in the hand of the state. However, given that hybrid ownership of both state and private shareholders is now the prevailing ownership structure in the aftermath of the privatization wave post the Cold War (Megginson, 2017), it is necessary to have a broader conceptual framework to encompass companies with state ownership but without state control.

[4]Shleifer and Vishny (1994) offers a particular model of Nash bargaining for the decision making of a public firm. Although the model focuses on the case of bargaining between the politician and the manager, the conceptual framework can be applied to different types of shareholders as well.

This paper examines the relationship between penetrating state ownership and firm resilience using data from Chinese A-share listed companies from 2018 to 2021. We find that when facing adverse shocks, companies with higher proportions of penetrating state ownership demonstrate better performance in operations, investments and employment. Importantly, this result exhibits robustness across various tests. Mechanism analysis suggests that penetrating state ownership primarily enhances firm resilience by improving firms' financial flexibility.

Further analysis reveals that there exists an optimal proportion of state ownership that maximizes firms' financial resilience. This is mainly due to the distinct advantages and disadvantages of state-owned and non-state ownership. State-owned equity tends to have easier access to financing and can better fulfill social responsibilities, but often exhibits lower decision-making and managerial efficiency. Non-state ownership, on the other hand, demonstrates higher efficiency, stronger adaptability to market conditions, but comparatively weaker access to resources in factor markets and poorer performance in social responsibility. Therefore, further advancing mixed ownership reforms to leverage the advantages of both state-owned and non-state ownership is conducive to enhancing firms' resilience and promoting economic development.

Our paper makes two contributions to the existing literature. Firstly, this paper examines the role of state ownership when companies face negative shocks, thereby complementing the existing literature on firm characteristics influencing firm resilience. Secondly, unlike previous studies that dichotomize state ownership into SOEs and non-SOEs, this paper employs a continuous measure of state ownership. This approach helps to reduce measurement errors and facilitates the assessment of the marginal effects of state ownership.

The rest of paper is organized as follows. Section 2 presents the empirical model and data, and in particular, the network based measure of state ownership. Section 3 reports the baseline results and robustness checks. Section 4 inspects one particular mechanism, namely financial flexibility, underlying the resilience effect of the state ownership. Section 5 concludes.

2   Model and Data

2.1   Empirical specification

This paper exploits the outbreak of the COVID-19 pandemic as the shock to establish a (generalized) difference-in-differences (DID) model. The aim is to examine whether companies with a higher proportion of penetrating state ownership demonstrate greater operational resilience in the face of these negative shocks.

$$y_{ijt} = \beta \text{State}_i \times \text{Post}_t + Z'_{ijt}\phi + \mu_i + \mu_t + \epsilon_{it}, \tag{1}$$

where i, j, t index for firm, industry and year, respectively; y denotes one of an array of outcome variables, covering firm level operations, investment and employment; State_i denotes the network based measure of the state ownership of firm i before the COVID-19 pandemic, while Post_t is the shock variable which equals to 1 for years starting from 2020; Z is a vector of control variables at the firm levels; and μ_i and μ_t are firm fixed effect and year fixed effect, which also absorb State_i and Post_t respectively. The coefficient of interest is β, which captures

the differential responses of high state ownership versus low state ownership firms before and after the COVID-19 pandemic shock.

We use a panel data sample comprising all A-share listed companies in China. For the baseline results, we restrict the sample period to be 2018–2021. Prior to 2018, China experienced a series of internal and external shocks,[5] which likely to contaminate the results. Furthermore, China officially abandoned the pandemic policy at the end of 2022, and there were a lot of policy uncertainties in the whole year, which may also interfere the inference of the baseline specification.[6]

2.2 Data Sources and Measurement

As resilience encompasses the ability of a company to maintain stable operations, investments, and employment in the face of negative shocks, we examine a host of outcome variables. These include the net profit, total operating income, cash investment, and number of staff, all normalized by total assets (Liu and Zhao, 2023). To inspect the financial flexibility mechanism, we employ the current ratio, quick ratio, cash ratio, and (total) asset growth rate as additional outcome variables.

The core variable of interest is the network based measure of the state ownership for each firm. We adopt the methodology used by Brioschi et al. (1989) to construct our focal explanatory variable, State$_i$, for each firm i in the year of 2018.[7] In particular, we start by constructing the entire ownership network for each listed firm in our sample, by searching the direct shareholders and all the indirect shareholders of the firm. In other words, we exhaust the shareholders of shareholders of firm i until we identify all the ultimate shareholders, i.e., shareholders without further shareholders. We divide the ultimate shareholders into four categories following La Porta et al. (1999): state owners,[8] private owners,[9] widely held owners,[10] and foreign owners.[11] Once we identify the ultimate state owners of firm i, we then use the algorithm of Brioschi et al. (1989) to calculate the ultimate ownership s_{ik} of any ultimate state owner k to firm i. Finally, we sum up the ultimate ownership of all ultimate state owners of firm i to arrive at our network based measure of state ownership, State$_i = \sum_{k \in U_i} s_{ik}$, where U_i denotes the set of ultimate state owners of firm i.

We adopt a set of standard firm-level control variables, including the size as measured by log total assets (Balduzzi et al., 2024; Igan et al., 2023), fixed asset ratio (Zhang et al., 2022),

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[5]The main shocks are as follows: (i) the supply-side structural reform starting from 2015; (ii) the shadow banking regulatory reform in 2017; and (iii) the trade war with the US starting from 2018.

[6]Nonetheless, the baseline results are robust to longer sample periods, as briefly discussed in Section 3.2.

[7]The choice of 2018 is due to data availability. We obtain the full sample of enterprise registration data for the years of 2017 and 2018.

[8]Ultimate state owners in China are government entities and public entities, where the latter include public universities, hospitals, etc.

[9]These are individuals with significant shares, typically larger than 5%.

[10]For instance, small individual holders of listed firms.

[11]We lack the ownership registration data for foreign firms operating in China or holding shares of firms in China. Therefore, we group all foreign owners together and do not further distinguish their own types. Foreign owners account for a tiny portion of shareholders numbers for firm ownership networks in China.

intangible asset ratio (Shan and Tang, 2023), and debt ratio (Lins et al., 2017).

All data, except for State, are sourced from the CSMAR database, a standard database for Chinese listed companies. To mitigate the impact of outliers, we winsorize all continuous indicators at the 0.5% and 99.5% percentiles. Table 1 reports summary statistics of all variables.

Table 1: Summary statistics

Variables	Obs.	Mean	Std.	Min	Median	Max
State	13,535	0.122	0.194	0.000	0.020	0.850
Net profit	13,535	0.029	0.104	-2.817	0.023	4.766
Total operating income	13,530	0.376	0.585	-0.019	0.273	35.127
Cash investment	10,499	0.237	0.436	0.000	0.054	3.585
Staff	13,533	57.452	49.956	1.054	45.633	350.726
Current ratio	13,237	11.915	24.503	0.014	4.036	226.630
Quick ratio	13,237	9.835	21.588	0.009	3.013	203.313
Cash ratio	13,237	3.668	9.522	0.002	0.787	98.332
Asset growth rate	13,535	0.528	2.102	-4.319	0.094	33.373
Political connection	13,535	0.256	0.437	0.000	0.000	1.000
Size	13,535	4.084	1.491	0.802	3.843	10.081
Fixed asset ratio	13,535	0.707	1.048	0.000	0.334	8.234
Int. asset ratio	13,535	0.163	0.278	0.000	0.069	2.776
Debt ratio	13,535	1.392	1.963	0.003	0.825	28.181

2.3 Baseline results

Table 2 and Table 3 present the estimation results of the baseline specification of (1). In the odd-numbered columns, no control variables are included, while in the even-numbered columns, firm-level control variables are incorporated.

Table 2 examines the impact of state ownership on firms' operations. All the coefficients of the interaction term are positive and significant at the 1% level. This suggests that when firms face adverse shocks, firms with higher proportions of penetrating state ownership exhibit superior profitability and revenue levels. This indicates that state ownership helps enhance the operational stability of companies when facing shocks, thereby mitigating the adverse impacts.

Table 3 examines the impact of penetrating state ownership on firms' investments and employment. All the coefficients of the interaction term are also positive and significant, which indicate that when facing adverse shocks, companies with higher proportions of state ownership tend to engage in more cash investments and employ more staff. This is related to its function in maintaining social stability. On one hand, companies with higher proportions of state ownership are more susceptible to government intervention, which encourages increased investment and more jobs during adverse periods to mitigate the negative impact of shocks on the macroeconomy. On the other hand, the government is also more likely to provide assistance, in particular the financial ones, to these firms.

Table 2: The impact of state ownership on operations

	(1) Net profit	(2) Net profit	(3) Tot. ope. income	(4) Tot. ope. income
State×Post	0.0176**	0.0170**	0.1103***	0.1081***
	(0.0071)	(0.0071)	(0.0413)	(0.0405)
Size		0.0423***		0.1663***
		(0.0070)		(0.0611)
Fixed asset ratio		0.0047		0.0399**
		(0.0034)		(0.0166)
Int. asset ratio		0.0016		0.0108
		(0.0075)		(0.0345)
Debt ratio		0.0041		0.0700***
		(0.0025)		(0.0132)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.4647	0.4714	0.4945	0.5038
Obs.	13,455	13,455	13,449	13,449

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

Table 3: The impact of state ownership on investment and employment

	(1) Cash investment	(2) Cash investment	(3) Staff	(4) Staff
State×Post	0.1011***	0.0975***	4.0859***	3.8237***
	(0.0266)	(0.0261)	(1.2868)	(1.1749)
Size		0.0826***		-19.4647***
		(0.0226)		(1.4921)
Fixed asset ratio		0.0229		3.1422***
		(0.0197)		(0.7921)
Int. asset ratio		0.0672		1.3499
		(0.0515)		(2.6250)
Debt ratio		0.0191		-0.0987
		(0.0127)		(0.3717)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.7743	0.7764	0.9390	0.9469
Obs.	10,101	10,101	13,453	13,453

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

To save space, we report the parallel trend tests for the baseline regressions in Table 4 instead of drawing separate figures for all 4 main dependent variables. Following the standard practice, we choose 2019 to be the base year. We report the 95% confidence interval (CI) under each estimate of the interaction terms. To summarize, all CIs for State×2018 contain 0, whereas all but 2 CIs for State×2019 and State×2020 are above 0, and for each outcome variable at least one post shock CI is above 0. As a result, we conclude that pre-trend requirements are satisfied for all the dependent variables.

Table 4: Parallel trend tests

	(1) Net profit	(2) Tot. ope. income	(3) Cash investment	(4) Staff
State×2018	0.0010	-0.0048	-0.0474	-1.8618
	$[-0.0121, 0.0141]$	$[-0.1053, 0.0958]$	$[-0.1026, 0.0077]$	$[-3.9860, 0.2623]$
State×2020	0.0090	0.1460	0.0531	1.8032
	$[-0.0051, 0.0230]$	$[0.0241, 0.2679]$	$[0.0059, 0.1002]$	$[0.1653, 3.4410]$
State×2021	0.0261	0.0654	0.0951	3.9808
	$[0.0022, 0.0500]$	$[-0.0112, 0.1420]$	$[0.0365, 0.1538]$	$[1.3771, 6.5844]$
Control Var.	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.4716	0.5039	0.7765	0.9469
Obs.	13,455	13,449	10,101	13,453

Notes: Brackets under point estimates indicate the 95% confidence intervals. 2019 is the base period for the parallel trend tests.

2.4   Robustness checks

We further conduct a series of tests to ensure the robustness of our empirical findings. Firstly, we control for industry and time fixed effects while excluding individual fixed effects and introduce the variable State as a control variable. This strategy allows us to assess the first order impact of State in the cross section. Following the inclusion of industry fixed effects, the coefficients of the interaction term remain consistent in direction with the baseline and attain statistical significance. Moreover, we augment the model by including a binary variable indicating whether a firm is state-owned, and find that our empirical results remain unchanged.

Secondly, considering that the China-US trade war in 2019 led to deteriorating trade conditions for China and disruptions in international supply chains, potentially causing adverse impacts on business operations, we adjust the starting year of the negative shock from 2020 to 2019. Our empirical results remain unchanged.[12]

Thirdly, we employ other commonly used financial performance indicators such as operating profit margin, return on equity, total asset turnover, and cash ratio as dependent variables

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[12]For this case, we choose a longer sample period of 2017–2020, so that we have enough sample in the pre-shock periods.

Table 5: Consideration of the impact of political connection

	(1) Net profit	(2) Tot. ope. income	(3) Cash investment	(4) Staff
State×Post	0.0170**	0.1095***	0.0975***	3.7737***
	(0.0071)	(0.0407)	(0.0263)	(1.1817)
PC×Post	0.0022	0.0251*	0.0240*	0.8431
	(0.0031)	(0.0145)	(0.0128)	(0.6602)
PC	-0.0004	0.0094	0.0044	-0.8114
	(0.0035)	(0.0179)	(0.0123)	(1.0299)
Size	0.0423***	0.1662***	0.0828***	-19.4368***
	(0.0070)	(0.0611)	(0.0226)	(1.4954)
Fixed asset ratio	0.0047	0.0398**	0.0225	3.1421***
	(0.0035)	(0.0166)	(0.0197)	(0.7903)
Int. asset ratio	0.0016	0.0110	0.0674	1.3435
	(0.0075)	(0.0345)	(0.0517)	(2.6226)
Debt ratio	0.0041	0.0702***	0.0193	-0.0985
	(0.0025)	(0.0132)	(0.0128)	(0.3707)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.4715	0.5039	0.7765	0.9469
Obs.	13,455	13,449	10,101	13,453

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

to measure corporate operational resilience, and the coefficients of the interaction terms remain significant.

Finally, we report an important robustness test in Table 5 to control for the potential confounding effects from firm political connections, as stressed by Liu and Zhao (2023). Specifically, we use the same measure of political connections as in Liu and Zhao (2023), and conduct a horse race by adding an interaction term of political connection (PC) with COVID-19 shock (Post). The results show that our baseline results on state ownership survive in all cases, with no change in the signs of the coefficient estimates, and very small changes in the magnitudes. As a result, we conclude that our findings are not driven by the political connection channel.

3 Inspecting the Mechanisms

The preceding results have demonstrated that a higher level of penetrating state ownership enhances firms' operational resilience when facing negative shocks. In this section, we delve into the mechanisms underlying this impact.

Fahlenbrach et al. (2020) stresses that firms with greater financial flexibility are better equipped to withstand revenue shortfalls resulting from the COVID-19 shock. In their study,

financial flexibility is defined as the ease with which a firm can fund a cash flow shortfall. Inspired by this literature, our study examines whether the presence of penetrating state ownership improves firms' operational performance when facing negative shocks by enhancing their financial resilience.

We employ four indicators, namely current ratio, quick ratio, cash ratio, and total asset growth rate, to capture firm's financial resilience. The results are presented in Table 6. All four indicators show statistically significant positive coefficients, indicating that when facing negative shocks, companies with higher proportions of penetrating state ownership demonstrate stronger abilities to generate cash flows and sustain growth, thereby exhibiting higher financial resilience.

Table 6: Mechanism inspection of financial flexibility

| | (1) | (2) | (3) | (4) |
	Current ratio	Quick ratio	Cash ratio	Total asset growth rate
State×Post	5.2302***	4.7658***	1.2197***	0.2987***
	(0.7378)	(0.6508)	(0.3379)	(0.1147)
Size	-8.2232***	-6.7206***	-2.2762***	2.2320***
	(1.3878)	(1.2633)	(0.3698)	(0.2927)
Fixed asset ratio	4.0757***	3.5443***	1.0613***	0.2426
	(1.0219)	(0.8052)	(0.3858)	(0.2158)
Int. asset ratio	6.3670**	4.8176**	1.7234*	2.4821***
	(2.6544)	(2.2926)	(0.9176)	(0.7037)
Debt ratio	-2.4325***	-2.2423***	-0.9599***	0.9824***
	(0.5167)	(0.4676)	(0.2078)	(0.1200)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.8894	0.8819	0.8396	0.5094
Obs.	13,155	13,155	13,155	13,455

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

However, is it preferable for the proportion of penetrating state ownership to be higher? The answer is negative. We introduce an interaction term between State^2 and Post into our model, and the results are presented in Table 7. Both the squared interaction terms and the linear interaction terms for all four indicators are statistically significant, with the coefficients of the squared interaction terms being negative. This suggests that there exists an optimal proportion of state ownership that maximizes firms' financial resilience. The optimal range for the proportion of penetrating state ownership, ensuring the highest level of financial resilience, lies between 30% and 40%. This indicates that a certain proportion of state ownership in a mixed ownership reform is more conducive to enhancing firms' financial and operational resilience.

Table 7: Mechanism analysis: Existence of the optimal level of state ownership

	(1) Current ratio	(2) Quick ratio	(3) Cash ratio	(4) Total asset growth rate
State×Post	14.7716***	12.9809***	3.7472***	1.2828***
	(2.4563)	(2.2104)	(1.1154)	(0.4248)
State^2×Post	-16.6339***	-14.3216***	-4.4062**	-1.7191***
	(3.6456)	(3.2487)	(1.7419)	(0.6295)
Size	-8.1972***	-6.6982***	-2.2693***	2.2343***
	(1.3873)	(1.2631)	(0.3697)	(0.2927)
Fixed asset ratio	4.0740***	3.5427***	1.0608***	0.2420
	(1.0205)	(0.8044)	(0.3854)	(0.2159)
Int. asset ratio	6.2910**	4.7521**	1.7032*	2.4738***
	(2.6515)	(2.2901)	(0.9176)	(0.7043)
Debt ratio	-2.4256***	-2.2363***	-0.9580***	0.9832***
	(0.5161)	(0.4671)	(0.2076)	(0.1200)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.8895	0.8820	0.8397	0.5096
Obs.	13,155	13,155	13,155	13,455

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

4 Conclusion

In this paper, we identify the impact of the proportion of penetrating state ownership on firm resilience. Our findings indicate that companies with higher proportions of penetrating state ownership typically exhibit better profitability, investment levels, and employment capabilities. Our results remain robust when excluding control variables, replacing firm fixed effects with industry fixed effects, adjusting the time of the shock, and using alternative measures of corporate resilience. Furthermore, we find that state ownership primarily enhances firms' risk resilience by improving their financial resilience, and there exists an optimal proportion of state ownership. An important implication of this study is the imperative to consistently promote mixed ownership reforms, fostering an environment where both state-owned and non-state ownership can effectively contribute to corporate operations. This approach will enhance corporate operational resilience and better foster economic development.

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