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Did State-owned Enterprises Do Better During COVID-19?

Evidence from a survey of 1,182 company executives in China

Howei Wu*

Department of Economics and Decision Sciences
China Europe International Business School (CEIBS)

Bin Xu

Department of Economics and Decision Sciences
China Europe International Business School (CEIBS)

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* Corresponding author: Howei Wu, howeiwu@ceibs.edu. Address: Department of Economics and Decision Sciences, China Europe International Business School (CEIBS), 699 Hongfeng Road, Pudong, Shanghai 201206, China. The authors would like to thank Jiahua Che, Viktar Fedaseyeu, Jinyu He, Fang Yu and Shuang Zhang for valuable comments and suggestions, Danni Chen for research assistance, and financial support from CEIBS Faculty Research Grant (Code: 17BICS). The authors are responsible for all remaining errors.

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Abstract

COVID-19's sudden outbreak and the subsequent lockdown imposed by the government substantially changed China's business environment. In a survey of 1,182 company executives in China, state-owned enterprises (SOEs) reported less business reductions under COVID-19. This paper examines if SOEs' superior performance was resulted from government support rather than innate ability to cope with COVID-19. While firm-level government support is unobservable, the outbreak saw companies responding with various salary and personnel measures, which give us information to construct a proxy for the government-support effect. After controlling for the government-support effect, we find that SOEs performed significantly worse in the pandemic period.

JEL classification: D22; H70; P31

Keywords: COVID-19; State-owned enterprises; Firm characteristics; Survey data; China

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Corresponding author: Howei Wu, howeiwu@ceibs.edu. Address: Department of Economics and Decision Sciences, China Europe International Business School (CEIBS), 699 Hongfeng Road, Pudong, Shanghai 201206, China. The authors would like to thank Jiahua Che, Viktar Fedaseyeu, Jinyu He, Fang Yu and Shuang Zhang for valuable comments and suggestions, Danni Chen for research assistance, and financial support from CEIBS Faculty Research Grant (Code: 17BICS). The authors are responsible for all remaining errors.

1 Introduction

COVID-19's sudden outbreak in China, and the subsequent drastic measures taken by the Chinese government to stop its spread, substantially changed China's business environment. From January 23 (when Wuhan was locked down) to February 12, more than 200 Chinese cities (including 26 provincial capitals and sub-provincial cities) implemented strict quarantine regulations. As production and spending were frozen by the lockdown/quarantine measures, China's gross domestic product (GDP) plummeted 6.8% in the first three months of the year compared with a year earlier, its first such drop since the National Bureau of Statistics of China began publishing quarterly GDP data in 1992.

In this paper, we use data from an online survey of 1,182 company executives in China, which was conducted from April 2 to 9. With business operations in China severely impacted by the sudden outbreak of COVID-19, thetmongptet4(t)-2ingpteh(tmongpte94(eav)56(aluable)-2ing first-hand)-2ingi companies in China responded to the COVID-19 shock. In particular, facing the unprecedented

While SOEs receive more government support than NSOEs, they also have more burdens imposed by the government (Bai et al., 2006; Song et al., 2011; Zhang et al., 2002). For example, SOEs are obliged to hire excess labor (Chong et al., 2011; Cooper et al., 2015; Berkowitz et al., 2017) and are often used as instruments of macroeconomic policy and industry regulations (Bai et al., 2000). In previous studies, some examined firm-government relationship from the cost perspective (policy burdens on SOEs, e.g. Jian et al., 2020), some others from the benefit perspective (ownership-based resources for SOEs, e.g. Ren et al., 2019). In this paper, we do not distinguish the cost side and the benefit side of the firm-government relationship. The proxy we construct should be interpreted as measuring the net government support effect after considering the cost related to government imposed burdens.

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 lays out the empirical approach. Section 4 reports the results. Section 5 concludes.

2 Data description

Data for this research is drawn from an online survey of company executives in China launched at the beginning of April, conducted by a research team of China Europe International Business

In this paper, we examine if SOEs and NSOEs showed signi cant di erences during the COVID-19 period. In our sample of 1,182 companies, 113 (9.6%) are SOEs, 735 (62.2%) are Chinese private enterprises, and 290 (24.5%) are foreign/overseas-owned enterprises in China or joint ventures with more than 50% foreign/overseas ownership.[6] The ownership distribution of our sample is consistent with that of the population: 1.8% of the total number of corporate enterprises in China are SOEs, 89.5% are Chinese private enterprises, and 1.2% are foreign/overseas enterprises (from China's National Bureau of Statistics in 2017). In terms of total current assets in 2017, the share of industrial SOEs is 3.1%, the share of Chinese industrial NSOEs is 72.9%, and the share of foreign/overseas industrial enterprises is 24.0%. SOEs remain a signi cant employer of workers in China. In 2017, 14.3% of urban workers were employed by SOEs, 31.4% by Chinese private enterprises, 22.0% self-employed, and 6.0% by foreign/overseas enterprises.

The survey contains three indicators on company's assessment of COVID-19's impact on their business operations: (1) Estimated reduction of business activities in China in the rst quarter; (2) Expected recovery of business activities by end of June; (3) Estimated adjustment of 2020 target revenue. Table 1 provides a comparison of these three indicators between the SOE sample and the NSOE sample.

[Table 1 about here]

The top part of Table 1 displays the comparison in rst-quarter business reductions (denoted by FBR) measured in ve levels from "Huge reduction (80%)" ($FBR = 5$) to "Small reduction (< 20%)" ($FBR = 1$). Based on a t-test, the hypothesis that "SOE sample mean (FBR) < NSOE sample mean (FBR)" is accepted (p-value = 0:014). Similar results are obtained (shown in middle parts of Table 1) for expected business recovery by end of June (denoted by REC) and estimated adjustment of 2020 revenue target (denoted by REV). The hypothesis that "SOE sample mean (REC) > NSOE sample mean (REC)" is accepted (p-value = 0:006), and the hypothesis that "SOE sample mean (REV) < NSOE sample mean (REV)" is accepted (p-value = 0:004). Thus, in all three dimensions, SOEs fared better than NSOEs. The bottom part of Table 1 shows a comparison between the SOE sample and the NSOE sample in terms of the HR

[6] We checked the data and found no two observations showing the same answers to the survey questions on rm characteristics, so we consider it a sample of 1,182 companies.

decisions that companies had already taken in the first quarter (denoted by HR), measured in seven levels in descending order of harshness to employees from "Laid off workers" ($HR = 1$) to "Raised salary or hiring" ($HR = 7$). In our empirical estimation, we utilize this HR data, which exhibits variations seldom observed in normal times. The survey also provides data on firm's industry (20 industries classified with 10 in manufacturing and 10 in services), firm's rating of government support to the industry, share of firm's revenue generated from China, firm size measured by number of employees, and firm's client type (sell to individuals, to firms, or to both). We use these data as control variables in our regression analysis.

3 Empirical approach

In this section, we first lay out an illustrative model. Consider company i seeking profit π_i. We specify the following reduced-form equation for company i's expected profit:

$$E(\pi_i) = f(S_i; G_i; X_i); \tag{1}$$

where we distinguish between variables of ownership-based firm behavior (S_i), variables of ownership-related government policies (G_i), and other firm characteristics variables (X_i).

Our survey data provides two measures that correspond to expected profit $E(\pi_i)$. The first one is "Expected recovery by end of June" (REC_i), and the second one is "Estimated adjustment of 2020 revenue target" (REV_i). The survey classifies firms into (1) Chinese state-owned or state-holding company ($SOE_i = 1$); (2) Chinese private or private-holding company; (3) Wholly foreign-owned enterprise; (4) Joint venture with both Chinese and foreign share-holding; (5) Others. In our analysis, we combine all non-SOE type enterprises into one NSOE category ($SOE_i = 0$).[7] Ideally, we would like to estimate:

$$R_i = \alpha + \sum_j \beta_j \mathbb{1}_j + \gamma_1 SOE_i + \gamma_g G_i + \sum_k (\beta_k X_{ki}) + \varepsilon_i; \tag{2}$$

where R_i (either REC_i or REV_i) is the dependent variable, $\beta_j \mathbb{1}_j$ are industry fixed effects ($j = 2; 3; ...; 19$), G_i measures government assistance firm i received or expected to receive during

[7] When distinctive dummy variables were assigned to different non-state ownership types, the regression results (available from the authors upon request) showed no statistically significant differences between the estimated coefficients of these dummy variables.

the pandemic period, denotes coe cients, X_{ki} are all potential exogenous factors, and $_i$ is an error term. By estimating equation (2), we would get an unbiased estimate of $_1$ (estimated e ect speci c to SOEs) with rm-level government assistance (G_i) controlled for.

The key to this estimation is to nd measures of rm-level government assistance (G_i). The survey asked participants to rate Chinese government's support to their industry under COVID-19 (rst quarter) on a scale from 0 (lowest support) to 10 (highest support). Based on this data, we construct variable GI. Not surprisingly, the hypothesis that \SOE sample mean (GI) > NSOE sample mean (GI)" is accepted in a t-test (p-value = 0:000). The average rating of SOEs is 6.76 as opposed to 5.62 of NSOEs. Although the survey question was about government support to the *industry*, the rating from participants of the same industry varies signi cantly.[8] Thus, we consider GI_i a variable capturing part of government assistance to the $firm$. For our estimation, we specify the following regression equation:

$$R_i = \ _j \ _j + \ _1 SOE_i + \ _2 SIZ_i + \ _3 CLT_i + \ _4 GI_i + \ _5 GF_i + \sum_k (\ _k X_{ki}) + \ _i; \qquad (3)$$

where SIZ_i is rm size, CLT_i is rm's client type, GF_i is rm-speci c government assistance not captured by GI_i

labor force prior to privatization in a sample of 84 countries, implying the big role played by SOEs in supporting the government's employment goal. Thus, the rm-government relationship is a crucial driver behind personnel decisions. A more supportive HR decision signals closer ties with the state and possibly more assistance, whereas a harsher HR decision signals less net government support.

Since HR action reveals the underlying rm-government relationship, it is subject to the endogeneity issue of being possibly determined at the same time as expected performance. To mitigate the measurement errors and the potential endogeneity of HR as an explanatory variable, we use a two-stage estimation approach. In the rst stage, we run a regression with HR as the dependent variable:

$$HR_i = \quad _j \ _j + \ _s SOE_i + \ _g GI_i + \ _m MCH_i + \sum_k (\ _k X_{ki}) + \ _i; \tag{4}$$

where $_j \ _j$ are industry xed e ects ($j = 1; 2; :::; 19$), denotes coe cients, and $_i$ is an error term. X_k is a set of variables that a ect rm's HR decision, which includes SIZ (rm size), CLT (rm's client type), and FBR (the underlying factors impacting rm performance as re ected in rst-quarter business reduction). Variable MCH is constructed from the survey question \share of company's 2019 revenue generated from business operations in China" (ve levels), which we use as an instrument variable to alleviate the potential endogeneity problem. In our survey data, MCH is positively correlated with HR (Pearson correlation coe cient = 0:062; p-value = 0:038), and is not correlated with REC (Pearson correlation coe cient = 0:025; p-value = 0:412). As the COVID-19 situation was much severer in China than abroad in the rst quarter, companies with a higher share of revenue generated from China were more pressed to take quick and drastic HR measures; this explains the high correlation found in our data between the China-revenue-share variable MCH and the HR measure variable HR. However, entering March, the severity of the COVID-19 situation fell in China but raised signi cantly outside China, and consequently the degree of recovery expected by end of June and the degree of adjustment of revenue target estimated for the year became insensitive to the share of revenue generated from China or from outside China; this explains the lack of correlation in our data between the China-revenue-share variable MCH and the expected recovery/revenue variable

R. These two statistical features allows the China-revenue-share variable

[Table 2 about here]

Table 3 reports results from six regressions with expected business recovery by end of June (*REC*) as the dependent variable. In the survey question, there are ve choices corresponding to ve equally-divided percentage ranges. Based on the answers, we construct *REC* as a ve-level ordinal variable, with *REC* = 1" indicating \Smallest expected recovery (less than 20%)" and *REC* = 5" indicates \Largest expected recovery (80% or more)". Since the survey was conducted on April 2-9, a company's *REC* level re ected the rst-quarter impact it felt and the second-quarter situation it expected to face with regard to the COVID-19 shock.

[Table 3 about here]

Early in the data section, we performed t-tests on sample di erences between SOEs and NSOEs and found that SOEs on average su ered less business reduction in the rst quarter, expected better business recovery by end of June, and estimated less downward adjustment of their 2020 revenue target. In Table 3, regression (3.1) shows an estimated coe cient on *SOE* which is positive and statistically signi cant at the 5% level. As the regression includes industry

level of business recovery. Thus, the higher expected recovery of SOEs shown in regression (3.1) can be explained largely by the fact that the SOEs in our sample have on average a much larger firm size (SIZ has mean values of 4.45 for SOEs and 3.71 for NSOEs).[10]

In equation (3.3) we include GI (government support to the industry reported by firm). The estimated coefficient on GI is positive (as expected) and is significant at the 1% level. Since firm's rating of government support to its industry was based on its own situation, inclusion of GI controls for part of firm-specific government support. We find that the estimated coefficient on SOE remains statistically insignificant with this partial control of firm-specific government support effects.

From regression (4.1) we obtain the predicted value $\widehat{HR}$ and use it as an explanatory variable in the regression on expected business recovery. The results, shown in regression (3.5) of Table 3, indicate a positive estimated coefficient on $\widehat{HR}$ that is statistically significant at the 1% level. When $\widehat{HR}$ is controlled for, the estimated coefficient on SOE becomes

5 Summary and Conclusion

which proxies for some unmeasured rm-speci c e ects). This result is found robust when the estimation is applied to the non- nancial- rm sample and an alternative performance measure.

Our study is limited in several aspects. First, with survey data, the variables are ordinal measured with integer values; thus they are rather crude compared with continuous variables. Second, despite the care taken in constructing the proxy for unobserved rm-speci c government policy factors, we cannot be certain if it captures the underlying rm-government relationship that is crucial for the identi cation of the ownership-based rm behavior e ect; correlation between the SOE dummy variable and the proxy variable may contaminate the identi cation of their distinctive e ects. Last but not least, limited by the small number of questions and the anonymity nature of the survey, ourthath du4ui8(ey)83ly vthsue.4cation

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Table 1
COVID-19's Impact and Company Responses: SOEs vs. NSOEs

Level	Impact on rst-quarter business activities (FBR) (in ascending order of business reduction)	SOE sample	NSOE sample
1	Small reduction (<20%)	37.5%(N=42)	26.6%(N=283)
2	Medium reduction (20-39%)	25.9%(N=29)	25.1%(N=267)
3	Large reduction (40-59%)	15.2%(N=17)	18.7%(N=199)
4	Extra-large reduction (60-79%)	6.3%(N=7)	11.8%(N=125)
5	Huge reduction (		

Table 2
Description of Variables

Variable	Description	Type and value	Mean	Stdev
FBR	Business reduction in first quarter	Ordinal variable (5 levels) Smallest (=1) to Largest (=5).	2.53	1.36
REC	Expected recovery by end of June	Ordinal variable (5 levels): Smallest (=1) to Largest (=5).	3.99	1.24
REV	Adjustment of 2020 revenue target	Ordinal variable (6 levels) Large downward (=1) to Medium/large upward (=6).	2.60	1.50
SOE	Firm ownership (SOE vs. NSOE)	Dummy variable: *SOE* = 1 for SOEs; *SOE* = 0 for NSOEs.	0.10	0.29
SIZ	Firm size (number of employees)	Ordinal variable (7 levels) Smallest (=1) to Largest (=7).	3.78	1.41
CLT	Firm's client type	Dummy variable: *CLT* = 1 if B2B only; *CLT* = 0 otherwise.	0.55	0.50
GI	Government support to industry	Ordinal variable (10 levels) Lowest (=0) to Highest (=10).	5.72	2.63
HR	HR measures taken in first quarter (in descending order of harshness)	Ordinal variable (7 levels) Laid off workers (=1) Sizable increase in hiring (=7).	3.60	1.43
MCH	Share of 2019 revenue from China	Ordinal variable (5 levels) Highest (=1) to Lowest (=5).	2.33	1.48

Table 3 Expected Business Recovery by end of June

	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)
SOE	0.284	0.159	0.058	-0.046	-0.696	-0.996
	(0.121)	(0.123)	(0.129)	(0.129)	(0.146)	(0.174)
SIZ		0.166	0.140	0.141	0.146	0.170
		(0.027)	(0.028)	(0.027)	(0.027)	(0.027)
CLT		0.158	0.142	0.116	-0.157	-0.106
		(0.084)	(0.085)	(0.083)	(0.087)	(0.092)
GI			0.093	0.084	-0.004	-0.016
			(0.016)	(0.016)	(0.018)	(0.020)
HR				0.190		
				(0.028)		
$\widehat{HR}$					1.316	1.279
					(0.119)	(0.124)
Constant	3.962	3.256	2.841	2.075	-2.125	-1.943
	(0.039)	(0.132)	(0.152)	(0.185)	(0.472)	(0.473)
Industry xed e ects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5 Estimated Adjustment of 2020 Revenue Target

			(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)
SOE			0.387	0.316	0.232	0.115	-0.415	-0.763
			(0.142)	(0.144)	(0.152)	(0.151)	(0.172)	(0.218)
SIZ				0.090	0.055	0.060	0.088	0.123
				(0.032)	(0.034)	(0.034)	(0.033)	(0.036)
CLT				0.140	0.097	0.028	-0.167	-0.115
				(0.099)	(0.102)	(0.101)	(0.104)	(0.111)
I_{θ}	0.055	0.060						