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Do Financially Constrained Companies Increase More Leverage during COVID-19?

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Abstract

This paper examines the heterogeneous effects of COVID-19 on financial leverage for companies with different degrees of financing constraints using a dynamic panel regression model. It finds that the COVID-19 has had a great effect on company capital structure choices, and compared to unconstrained companies, financially constrained companies increase more leverage (mainly short-term leverage) during COVID-19 period. Further study confirms that credit supportive policies implemented by the government in the period benefit constrained firms, and enable them more convenient access to obtain more external short-term loans than usual.

Keywords

Capital Structure, Leverage, Financing Constraints, COVID-19

1. Introduction

The COVID-19 pandemic not only has caused great damage to human life and health, but also has created great negative effects on the economy activities (Zhang et al., 2020). Inevitably, corporate financial performance has been deeply affected (Vichitsarawong & Eng, 2023; Aljughaiman et al., 2023; Zhang et al., 2020), and the relationship between the pandemic and firm capital structure decisions has attracted scholars' attention in recent years. Fahlenbrach et al. (2021) find that it's valuable to adjust leverage to sustain financial flexibility during COVID-19; Vo et al. (2022) study the differential effects of COVID-19 on adjustment speed toward target leverage ratio based on the degree of the pandemic damage using an international sample; Rehman et al. (2024) examine the heterogeneious impacts of COVID-19 on the speed of leverage adjustment for firms with different exposure level to the pandemic. However, the study about the causal relationship between

COVID-19 and corporate leverage ratio is lack of concern and exploration. The purpose of our paper is to fill this gap.

Generally speaking, due to low credit or weak link in the credit market, financially constrained firms have worse access to external finance relative to unconstrianed firms. However, it may not be true when an exogenous shock happens. Liu et al. (2022) find that the leverage ratios of financially constrained firms have been increased more than those of unconstrained firms after the enactment of China's Property Rights Law. It's because the law strengthens the former's credit rights and gives them better access to external financing. It's worth noting that, in the COVID-19 period, the Chinese government has implemented various credit intervention policies to help financially constrained companies overcome production and operation difficulties, such as reducing loan interests, arranging discount funds to support the reduction of enterprise financing costs, allowing deferred repayment, and actively increasing new financing products and services[1] and so on. Hence, it should be of interest and meaningful for scholars and policy makers to explore if and to what extent these supportive policies have given constrained companies' convenience to the access to external financing.

Motivated by the above points, our paper proposes a hypothesis that financially constrained companies are better off from the supportive credit policies implemented during COVID-19 period. Given that the COVID-19 affects all the sample companies and it's difficult to identify the list of financially constrained companies, the crux of testing the hypothesis is to ascertain whether more financially constrained companies exhibit a significant increase in leverage, especially external loans during COVID period, compared to less constrained companies. Hence, we employ the interaction item, which is the product of a financing constraint indicator and a time dummy variable, in a dynamic panel regression model to examine the differential change of corporate leverage based on the financing constraint degree's heterogeneity under the effect of COVID-19.

This paper may contribute to the literature in three ways. First, it enriches the empirical literature about the effects of the COVID-19 on financial performance (Vichitsarawong & Eng, 2023; Aljughaiman et al., 2023; Zhang et al., 2020) and capital structure decisions (Fahlenbrach et al., 2021; Vo et al., 2022; Rehman et al., 2024). Second, it shows novel and interesting empirical results that financially constrained companies increase more leverage than unconstrained companies during COVID-19 period. Third, it confirms the existing work that exogenous shocks or preferred policies can benefit financially constrained companies, and help them to obtain more external short financing (Liu et al., 2022).

The remainder of this paper is arranged as follows. Section 2 first discusses three measures of financing constraints and empirical model design, then describes our data and sample. Section 3 reports and analyzes our empirical results. Section 4

[1]New financing products and services are including: actively promoting the use of supply chain finance, commercial factoring, accounts receivable pledge, intellectual property pledge and other financing methods to expand the financing supply for small and medium-sized enterprises.

makes a further test and Section 5 draws a simple conclusion.

2. Method and Data

2.1. The Measurements of Financial Constraints

Firm ownership structure, asset tangibility and the SA index have been widely used as the measurements of financing constraints (Almeida et al., 2004; Berkowitz et al., 2015; Liu et al., 2022; Lyu, 2024). To gain robust empircal conclusions, we choose all three mearsures in the paper.

According to existing literature, state-owned enterprises (SOEs) have more political connection with credit market and have better access to raise bank loans, while private companies face many difficulties and obstacles in external debts (Cull et al., 2015; Ge et al., 2017; Megginson et al., 2014). Asset tangibility refers to the proportion of fixed assets to total assets. It's known that the quantity of fixed assets, which can be used as collateral, is an important basis for lenders to make loan decisions and firms with low tangibility have more barriers to increase debts (Liu et al., 2022). Hence, private companies and low tangibility companies are considered relatively more financially constrained. As the proxy of financing constraints, the SA index is relatively stable and can accurately measure the financing constraints level (Lyu, 2024). Generally, the value of the SA index is smaller than zero, and the smaller the value, the higher the financial constraint degree. The specific calculation formula is as follows:

$$SA = -0.737 \times \text{size} + 0.043 \times \text{size}^2 - 0.040 \times \text{age} \tag{1}$$

2.2. Model Design

To examine the heterogeneious effects of COVID-19 pandemic on the leverage based on the different degrees of financial constraint, we construct a dynamic panel regression model as follows:

$$LR_{it} = \beta_0 + \beta_1 FC_{it} \times \text{During}_t + \beta_2 FC_{it} + \beta_3 \text{During}_t + \gamma X_{it} + \mu_i + \sigma_t + \varepsilon_{it} \tag{2}$$

where subscript i and t represent company i and year t, respectively. LR_{it} denotes one of three leverage ratios: Lev (total leverage), shortlev (short-term leverage) and longlev (long-term leverage)[2]. FC_{it} represents one of three measurments of financial constraint discussed in section 2.1. During_t denotes an annual dummy variable which equals to one if the sample year is bigger than 2019, otherwise zero. X_{it} is a series of control variables including firm size (ln(asset)), firm sales growth (growth), return on assets (ROA), Tobin's q (Q) and firm age (ln(age)), which have links to capital structure choices (Petersen & Rajan, 1994; Myers & Majluf, 1984; Frank & Goyal, 2009). μ_i and σ_t represent firm-fixed effect and time-fixed effect, respectively, while εit denotes the random error term.

Our focus is β_1, the coefficient of the interaction term $FC_{it} \times \text{During}_t$. Since a significant β1 indicates the influence of COVID-19 on companies with different

[2]Lev is the sum of longlev and shortlev, where shortlev is the ratio of short-term liabilities (excluding notes payable) to total assets and longlev is the ratio of long-term liabilities to total assets.

degree of financing constraints is differential. To confirm our hypothesis, we certainly expect that it is positive to private × during and negative to tangibility × During and SA × During, which imply that contrary to usual, more financially constrained companies increase more leverage relative to less constrained companies during COVID-19.

2.3. Data and Sample

All the data used in this paper is from the CSMAR database in Shanghai and Shenzhen Stock Exchange. In China, the COVID-19 broke out at the end of December 2019. In order to stop the spread of the epidemic, the Chinese government immediately implemented many stringent blocking measures[3], which were not completely released until December 7th, 2022. So the sample period we choose is from 2017 to 2022. In addition, we process the data as follows: Firstly, the companies with less than 5 observations are deleted; Secondly, all financial and construction companies are deleted; Finally, all key variables are winsorized at the top and bottom 1% level to avoid the influence of outliers.

3. Empirical Results

3.1. Statistics Description

Table 1 describes the statistical results of main variables before and during

Table 1. Summary statistics.

	Before				During			
	N	mean	median	std.dev	N	mean	median	std.dev
lev	8607	0.346	0.331	0.174	8607	0.376	0.368	0.174
shortlev	8607	0.291	0.275	0.141	8607	0.303	0.287	0.145
longlev	8607	0.055	0.014	0.083	8607	0.074	0.036	0.092
tangibility	8607	0.207	0.176	0.150	8607	0.204	0.175	0.147
private	8607	0.699	1	0.459	8607	0.699	1	0.458
SA	8607	−3.036	−3.144	0.556	8607	−3.038	−3.152	0.591
ln(asset)	8581	22.142	22.023	1.089	8581	22.619	22.400	1.068
growth	8607	0.183	0.125	0.328	8607	0.120	0.084	0.333
ROA	8607	0.043	0.042	0.061	8607	0.029	0.033	0.071
Q	8607	1.835	1.410	1.502	8607	1.766	1.306	1.569
ln(age)	8607	2.956	2.996	0.274	8607	3.103	3.135	0.239
Total debts	8607	0.915	0.135	5.04	8607	1.230	0.202	6.370

Note: ln(asset) (Ln(age)) is the natural logarithm of total book assets (firm age plus one), growth is revenue growth rate. Total debts are the values in the table multiplied by one billion.

[3]These measures affect people's travel and communication and cause a negative impact on normal economic activities.

COVID-19 pandemic period. As shown, lev, shortlev and longlev all experience a significant growth[4], while other indicators such as growth, ROA and Q present a certain degree of decline during COVID-19 period, which show that enterprises' operation is badly affected and companies have to choose to increase financial leverage to tide over the economic crisis caused by the pandemic. In particular, we also noticed that the mean value of lev is 0.346 and the mean value of shortlev is 0.291, while the mean value of longlev is only 0.055. These statistics indicate that the loans of Chinese listed firms are mainly derived from short-term debts.

3.2. The Impacts of COVID-19

In this section, we focus on testing whether there is a significant and differential causal relationship between COVID-19 and leverage of companies with different degree of financial constraint by using model (2). Tables 2-4 show the empirical results using ownership structure, asset tangibility and the SA index as the measures of financing constraints, respectively.

As shown in Table 2, the coefficients of interaction term private*during in column (1) and (2) are both highly significant in 0.016, while it's not in column (3). These results imply that during COVID-19 period, private firms experience a significant increase in lev and shortlev by 1.6% points relative to non-private firms, while nor in longlev. From Table 3, we can see the value of the coefficients of tangibility*during in columns (1), (2) and (3) are all significant in −3.9%, −5.1% and 1.2%. These results demonstrate that the lev and shortlev decrease with the increase of asset tangibility during COVID-19 period, while it's opposite for longlev. Similarly, the coefficients of SA*during in Table 4 are all significant in -0.031, −0.023 and −0.008, which signifies that all three leverages decrease with the SA index increases during COVID-19, but it's worth noting that the absolute value is much smaller for longlev compared to shortlev.

According to the analysis and discussion above, we can conclude that the lev, mainly shortlev, of companies with high level of financing constraints has experienced a greater growth than that of companies with low level of financing constraints during COVID period. This is probably due to governments' credit support policies in the pandemic period which make financially constrained firms increase more short-term external financing than usual.

Certainly, there may exist another possibility: more financially constrained companies increase fewer assets compared to less constrained companies in that tough economic period[5]. In section 4, we try to make a further test to ascertain whether financially constrained firms exhibit a higher increase in debts during COVID-19.

[4]In fact, Chinese enterprises began to reduce financial leverage at the end of 2015 and it achieved great results. The leverage ratios of non-financial enterprises declined year by year from 2017 to 2019.
[5]Known from So the increase of leverage ratio is not due to assets' shrink.

Table 2. COVID-19, ownership structure and leverage.

	lev (1)	stlev (2)	longlev (3)
private * during	0.016***	0.016***	0.000
	(0.003)	(0.003)	(0.002)
during	0.010	0.009	−0.001
	(0.010)	(0.009)	(0.006)
tangibility	0.082***	0.024***	−0.059***
	(0.020)	(0.019)	(0.015)
ln(asset)	0.059***	0.009*	0.050***
	(0.005)	(0.005)	(0.003)
growth	0.032***	0.031***	0.001
	(0.003)	(0.003)	(0.002)
tobin-q	−0.008***	−0.003***	−0.005***
	(0.001)	(0.001)	(0.001)
ROA	−0.452***	−0.322***	−0.130***
	(0.018)	(0.017)	(0.010)
ln(age)	0.036	−0.043	−0.007
	(0.039)	(0.035)	(0.026)
constant	−1.068***	−0.032	−1.035***
	(0.158)	(0.150)	(0.099)
time fixed effects	yes	yes	yes
firm fixed effects	yes	yes	yes
N	17214	17214	17214
R^2	0.32	0.15	0.25

Note: Private is a dummy variable, private = 1 if a firm is 100% privately owned, and private = 0 otherwise. Tangibility in Table 3 and ln(size) in Table 4 are both continuous variables. The values in parentheses are robust standard errors, and *, **, *** represent significance levels of 10%, 5% and 1%, respectively, the same below.

Table 3. COVID-19, tangibility and leverage ratios.

	lev	stlev	longlev
tangibility * during	−0.039***	−0.051***	0.012*
	(0.010)	(0.008)	(0.007)
tangibility	0.106***	0.052***	0.053***
	(0.021)	(0.019)	(0.015)
during	0.003	0.007	−0.004
	(0.010)	(0.009)	(0.006)
ln(asset)	0.060***	0.010***	0.050***
	(0.005)	(0.005)	(0.003)
growth	0.032***	0.031***	0.001***
	(0.003)	(0.002)	(0.002)

Continued

tobin-q	−0.008*** (0.001)	−0.003*** (0.001)	−0.005*** (0.001)
ROA	−0.453*** (0.018)	−0.322*** (0.017)	−0.131*** (0.011)
ln(age)	0.060 (0.038)	0.064* (0.034)	0.003 (0.025)
constant	−1.160*** (0.155)	−0.1119 (0.148)	−1.041*** (0.097)
time fixed effects	yes	yes	yes
firm fixed effects	yes	yes	yes
N	17214	17214	17214
R^2	0.32	0.14	0.25

Table 4. COVID-19, SA and leverage ratios.

	lev	**stlev**	**longlev**
SA * during	−0.031*** (0.002)	−0.023*** (0.002)	−0.008*** (0.002)
SA	0.155*** (0.012)	0.032*** (0.013)	0.122*** (0.008)
during	−0.100*** (0.012)	−0.085*** (0.012)	−0.014 (0.009)
tangibility	0.078*** (0.020)	0.023*** (0.018)	0.055*** (0.015)
growth	0.032*** (0.003)	0.030*** (0.003)	0.002 (0.002)
tobin-q	−0.009*** (0.001)	−0.003*** (0.001)	−0.006*** (0.001)
ROA	−0.442*** (0.018)	−0.318*** (0.016)	−0.124 (0.010)***
ln(age)	0.181*** (0.038)	0.137*** (0.035)	0.044** (0.026)
constant	0.298*** (0.116)	−0.006 (0.103)	0.304*** (0.077)
firm fixed effects	yes	yes	yes
time fixed effects	yes	yes	yes
N	17214	17214	17214
R^2	0.34	0.20	0.24

4. Further Test: Debts Increased More or Assets Increased Fewer?

In this section, we still use model (2) to examine the impact of COVID-19 on firm

debts, with total book debts and short-term debts as the explained variables instead of leverage ratios. Table 5 reports the results and it indicates both total and short-term debts increase with the degree of financial constraint during COVID-19 period. Hence, we can conclude that more financially constrained firms exihibit a significant increase in debts, mainly short debts, compared to less constrained firms. This confirms our hypothesis that financially constrained firms gain more external debts owing to the government's supportive credit policies in COVID period, which is consistent with the findings of Liu et al. (2022).

Table 5. COVID-19, firm debts and financing constraints.

	(1)		(2)		(3)	
	total	short	total	short	total	short
private * during	0.055*** (0.010)	0.061*** (0.011)				
tangibility * during			−0.120*** (0.032)	−0.150*** (0.035)		
SA * during					−0.192*** (0.012)	−0.183*** (0.011)
control Variables	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes
firm fixed effect	yes	yes	yes	yes	yes	yes
N	17188	17214	17188	17188	17214	17214
R^2	0.92	0.89	0.92	0.89	0.86	0.82

5. Conclusion

In this paper, we test the firm-level heterogeneous impacts of the COVID-19 on leverage choices for companies with different financing constraints level. To ensure the robustness of results, we use three measures of financing constraints. We find that the COVID-19 has had a great effect on company capital structure decisions, and financially constrained companies experience a greater increase in leverage (mainly short-term leverage) relative to unconstrained companies. Further study confirms that a series of credit supportive policies implemented by Chinese government during COVID-19 have helped financially constrained firms obtain more external short loans than usual.

In all, this study adds novel and useful empirical evidence to the literature. However, some unsolved problems still exist. For example, a natural extension could extend the sample to unlisted firms. Moreover, it's curious and interesting to study the heterogeneous effect of COVID-19 on leverage of firms with different industries or geographical areas.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Aljughaiman, A. A., Nguyen, T. H., Trinh, V. Q., & Du, A. (2023). The Covid-19 Outbreak, Corporate Financial Distress and Earnings Management. *International Review of Financial Analysis, 88,* Article ID: 102675. https://doi.org/10.1016/j.irfa.2023.102675

Almeida, H., Campello, M., & Weisbach, M. S. (2004). The Cash Flow Sensitivity of Cash. *The Journal of Finance, 59,* 1777-1804. https://doi.org/10.1111/j.1540-6261.2004.00679.x

Berkowitz, D., Lin, C., & Ma, Y. (2015). Do Property Rights Matter? Evidence from a Property Law Enactment. *Journal of Financial Economics, 116,* 583-593. https://doi.org/10.1016/j.jfineco.2015.04.003

Cull, R., Li, W., Sun, B., & Xu, L. C. (2015). Government Connections and Financial Constraints: Evidence from a Large Representative Sample of Chinese Firms. *Journal of Corporate Finance, 32,* 271-294. https://doi.org/10.1016/j.jcorpfin.2014.10.012

Fahlenbrach, R., Rageth, K., & Stulz, R. M. (2021). How Valuable Is Financial Flexibility When Revenue Stops? Evidence from the COVID-19 Crisis. *The Review of Financial Studies, 34,* 5474-5521. https://doi.org/10.1093/rfs/hhaa134

Frank, M. Z., & Goyal, V. K. (2009). Capital Structure Decisions: Which Factors Are Reliably Important? *Financial Management, 38,* 1-37. https://doi.org/10.1111/j.1755-053x.2009.01026.x

Ge, J., Stanley, L. J., Eddleston, K., & Kellermanns, F. W. (2017). Institutional Deterioration and Entrepreneurial Investment: The Role of Political Connections. *Journal of Business Venturing, 32,* 405-419. https://doi.org/10.1016/j.jbusvent.2017.04.002

Liu, Y., Liu, Y., & Wei, Z. (2022). Property Rights Protection, Financial Constraint, and Capital Structure Choices: Evidence from a Chinese Natural Experiment. *Journal of Corporate Finance, 73,* Article ID: 102167. https://doi.org/10.1016/j.jcorpfin.2022.102167

Lyu, J. (2024). The COVID-19 Pandemic, Digitalization Level, and Financing Constraints of Listed Tourism Companies. *Finance Research Letters, 69,* Article ID: 106040. https://doi.org/10.1016/j.frl.2024.106040

Megginson, W. L., Ullah, B., & Wei, Z. (2014). State Ownership, Soft-Budget Constraints, and Cash Holdings: Evidence from China's Privatized Firms. *Journal of Banking & Finance, 48,* 276-291. https://doi.org/10.1016/j.jbankfin.2014.06.011

Myers, S. C., & Majluf, N. S. (1984). Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have. *Journal of Financial Economics, 13,* 187-221. https://doi.org/10.1016/0304-405x(84)90023-0

Petersen, M. A., & Rajan, R. G. (1994). The Benefits of Lending Relationships: Evidence from Small Business Data. *The Journal of Finance, 49,* 3-37. https://doi.org/10.1111/j.1540-6261.1994.tb04418.x

Rehman, O. U., Wu, K., & Liu, J. (2024). COVID-19 Exposure, Financial Flexibility, and Corporate Leverage Adjustment. *International Review of Economics & Finance, 96,* Article ID: 103651. https://doi.org/10.1016/j.iref.2024.103651

Vichitsarawong, T., & Eng, L. L. (2023). Corporate Governance, Financial Indicators and Asset Impairments during the COVID-19 Pandemic Period. *Finance Research Letters, 58,* Article ID: 104627. https://doi.org/10.1016/j.frl.2023.104627

Vo, T. A., Mazur, M., & Thai, A. (2022). The Impact of COVID-19 Economic Crisis on the Speed of Adjustment toward Target Leverage Ratio: An International Analysis. *Finance Research Letters, 45,* Article ID: 102157. https://doi.org/10.1016/j.frl.2021.102157

Zhang, D., Hu, M., & Ji, Q. (2020). Financial Markets under the Global Pandemic of COVID-19. *Finance Research Letters, 36,* Article ID: 101528. https://doi.org/10.1016/j.frl.2020.101528