A Replication of

"Corporate debt booms, financial constraints, and the investment nexus"

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Abstract

This study examines the impact of corporate debt booms on firm-level investment, focusing on the role of financial vulnerability. Using quarterly data from 94 U.S. nonfinancial firms across three industries between 2006 and 2023, the analysis employs a local projection method to estimate the effects across six distinct time horizons. Results indicate that debt booms significantly reduce medium-term investment, particularly for vulnerable firms characterized by high leverage and low liquidity. The study also uncovers congestion effects, where financially distressed firms negatively impact unconstrained firms within the same industry. An instrumental variable approach is utilized to address potential endogeneity, confirming the robustness of these findings. By building on Albuquerque (2023), this research provides actionable insights for policymakers and extends the literature on corporate finance by exploring the broader implications of debt booms on investment behavior and industry dynamics.

Introduction

The sustainability of corporate debt has emerged as a pressing concern in recent years, particularly after the significant rise in corporate leverage leading up to the COVID-19 pandemic. By the end of 2019, nonfinancial corporate debt reached a record-high 48% of GDP in the United States, driven by rapid debt accumulation following the deleveraging period of the 2007–2009 Great Financial Crisis (GFC). This pattern of leverage accumulation, often referred to as a "debt boom,"

is not unique to recent times. Historically, corporate debt increases sharply before economic recessions and then declines abruptly as firms and economies deleverage during downturns. Such rapid debt buildups have raised concerns among policymakers and researchers due to their potential to create significant financial imbalances and disrupt firm-level and macroeconomic performance (Dell'Ariccia et al., 2016; Greenwood et al., 2022).

The relationship between corporate debt and firm performance has been extensively studied, with conflicting findings. Some research highlights the positive role of debt in fostering investment and economic growth by allowing firms to finance expansion and innovation (King & Levine, 1993; Levine, 2005; Rancière et al., 2008; Beck et al., 2012). On the other hand, excessive debt can lead to negative outcomes, particularly through the mechanisms of financial constraints and debt overhang. High leverage often increases the cost of debt, reduces stock returns, and elevates the risk of default, which can severely constrain investment activity, especially during economic downturns (Hennessy, 2004; Hennessy et al., 2007; Almeida et al., 2011; Campello et al., 2010).

This study investigates the impact of corporate debt booms on firm-level investment behavior, focusing on the role of financial vulnerability. Vulnerable firms—characterized by high leverage and low liquidity—are particularly affected by debt booms, as they struggle to secure external financing and maintain investment levels (Giroud & Mueller, 2021). Using firm-level data spanning 2006–2023, this research employs a local projection method to analyze the dynamic effects of debt booms across six time horizons, ranging from one quarter to five years. By incorporating an instrumental variable approach to address endogeneity, this study contributes to understanding how debt booms affect investment decisions and identifies the congestion effects caused by vulnerable firms within industries (Acharya et al., 2019; Albuquerque & Mao, 2023).

Literature Review

The interplay between corporate debt and investment has been a longstanding focus in finance and macroeconomics. While some studies emphasize the beneficial effects of borrowing on firm growth, others highlight the risks of overleveraging, particularly during economic downturns. King and Levine (1993) and Levine (2005) argue that corporate borrowing supports economic development by enabling firms to exploit investment opportunities. However, high debt levels can constrain firms' financial flexibility and lead to underinvestment, especially in periods of heightened economic uncertainty (Lang et al., 1996; Giroud et al., 2011).

The concept of debt booms, defined as rapid accumulations of debt relative to firm assets over a three-year period, has been linked to adverse economic outcomes. Dell'Ariccia et al. (2016) and Jordà et al. (2013, 2015, 2022) show that such misalignments in leverage can sow the seeds for financial crises and prolonged economic slowdowns. Financially constrained firms are particularly vulnerable to these effects. Research by Almeida et al. (2011) and Campello et al. (2010) demonstrates that firms with high leverage and low liquidity are less capable of financing investment, even when profitable opportunities exist. This aligns with the debt overhang theory proposed by Myers (1977), which posits that heavily indebted firms are unable to secure additional borrowing due to the risk that returns will accrue primarily to existing creditors.

Recent studies also highlight the role of financial constraints in increasing the negative effects of debt booms. Vulnerable firms, identified as those with high leverage and low liquidity, face significant challenges in managing debt obligations and maintaining operational efficiency. Farre-Mensa and Ljungqvist (2016) and Hoberg and Maksimovic (2015) argue that traditional metrics for financial constraints may underestimate the challenges faced by vulnerable firms. Instead, a combined measure of leverage and liquidity provides a more accurate assessment of firms'

financial health. These firms often experience reduced investment, lower stock returns, and higher probabilities of default during debt booms (Mian et al., 2017; Giroud & Mueller, 2021).

Beyond firm-specific impacts, debt booms can have spillover effects within industries. Vulnerable firms often engage in hostile competitive strategies, such as price undercutting or overproduction, to maintain solvency, which can distort market dynamics and harm financially stable firms. Acharya et al. (2019) and Banerjee and Hofmann (2022) refer to this phenomenon as the congestion effect, where the financial distress of vulnerable firms adversely impacts other firms in the same industry. These findings underscore the broader economic implications of debt booms and the importance of addressing financial vulnerabilities within the corporate sector.

This study contributes to the existing literature by using a local projection method and an instrumental variable approach to provide a comprehensive analysis of the causal effects of debt booms on firm-level investment. By focusing on the role of financial vulnerability and exploring congestion effects, this research sheds new light on the complex relationship between corporate debt and economic performance (Greenwood et al., 2022; Schularick & Taylor, 2012).

Data and Methodology

Data

This research includes firm level and industry level data from the first quarter of 2006 to the fourth quarter of 2023. This data covers 18 financial years with 72 consecutive quarters data of 94 USA based firms from 3 different industries which are: telecom industry, IT service industry and electronics industry. In this research, I deliberately excluded financial firms like banks, NBFIs, insurance, mortgage firms, investment bankers etc. I collected all these data from Capita IQ and Compustat using the platform WRDS (Wharton Research Data Services).

Key Variables

This research tried to analyze the impacts of debt boom on various firms' operating and financial indicators. However, the concept of debt boom needs to be clarified. For this research, debt boom for a particular quarter for a firm is the 12 quarter change in debt asset ratio in the last quarter. The main reason of not taking the debt asset ratio of that quarter only or the first difference only is that firms sometimes collect debt for short term liquidity purpose and pay that loan as early as possible; as a result, the debt asset ratio of that quarter only or the first difference of that quarter from the previous quarter may not indicate the actual debt boom. On the other hand, the 12 quarter change in debt asset ratio may indicate the cumulative change of debt percentage in the capital structure which is a sign of dependence on debt capital for a firm that can be said as debt boom. So, debt boom for a firm, i is:

$$debt\ boom_i = \Delta_{12} debt\ ratio_i = debt\ ratio_{i,t-13} - debt\ ratio_{i,t-1}$$

Again, another important explanatory variable of this research is vulnerable firm. To determine a firm to be vulnerable, I looked for two different variables concurrently; the first one is percentage of debt ratio of total debt ratio of that quarter and the second one is percentage of liquidity of total liquidity of that particular quarter. A firm is termed as vulnerable if that firms stays below 33% of the total liquidity of that particular quarter and above 66% of the total debt ratio of that quarter. The reason behind using two variables simultaneously is sometimes some firms may have higher debt in their capital structure maybe they try to exercise the benefits of debt capital and they mitigate the risks of bankruptcy having more liquid assets. As a result, when a firm having more debt with lower level of liquid asset may fail to pay the mandatory payments of the debt, which may make them vulnerable.

Methodology

Local Projection Method

This research is done in local projection or LP method which basically says to do the analysis or run regression separately for different time horizon. Here, I separated the whole data in 6 different horizon according to the quarter, where my first debt horizon is 1 quarter, second debt horizon is 4 quarter, third one is 8 quarter, fourth one is 12 quarter, fifth one is 16 quarter and the final one is 20 quarter. And then I did different analysis and all those analysis were done separately for these 6 time horizon.

Analysis 1: Effect of Vulnerability

In this research, firstly I tried to find the impact of being vulnerable on some key balance sheet items and financial indicators of the firms. For that the econometric model I used was:

$$Y_{i,n,t} = \beta V_{i,n,t} + \gamma_{n,t} + \varepsilon_{i,n,t}$$

Where, $Y_{i,n,t}$ are some balance sheet items and financial indicators which are capital expenditure (CAPEX), liquidity, debt, debt boom, sales, Tobin's Q, return on assets (ROA), stock prices, size or log assets etc. $V_{i,n,t}$ is the dummy variable, where 1 means firm i of industry n is vulnerable at quarter t and 0 otherwise. $\gamma_{n,t}$ is industry and time fixed effect. So, β is the average differences in the balance sheet and financial indicators among the vulnerable and other firms.

Analysis 2: Instrument variable approach

Secondly, this research tries to find the impact of debt boom on the real investment. In this analysis, the proxy of the real investment is log of capital expenditure for each firm in each quarter. The econometric model for this analysis is:

$$\log(capex_{i,t}) = \beta * \Delta_{12} debt\ ratio_{i,t-1} + \sum_{j=1}^{4} \gamma_j X_{i,j} + \zeta_i + \lambda_t + \varepsilon_{i,t}$$

Here, the real investment of firm i at quarter t is $\log(capex_{i,t})$, then, $\Delta_{12} debt\ ratio_{i,t-1}$ is the debt boom of a particular firm i at t-1 time, $X_{i,j}$ are some control variables which are size of the firm or log asset, Tobin's Q and liquidity of the firm i at that particular quarter; ζ_i is the firms' fixed effect and λ_t is the time fixed effect. However, this model may miss some important adjustment of vulnerable firms; so I extended this model by including vulnerable firms as a dummy variable independently and jointly as explanatory variables. So, the updated econometric model is:

$$\log(capex_{i,t}) = \beta * \Delta_{12} debt\ ratio_{i,t-1} + \eta * V_{i,t} + V_{i,t}\left(\sum_{j=1}^{4} \delta_j X_{i,j} + \theta * \Delta_{12} debt\ ratio_{i,t-1}\right) + \sum_{j=1}^{4} \Upsilon_j X_{i,j} + \zeta_i + \lambda_t + \varepsilon_{i,t}$$

Here, dummy variable $V_{i,t}$ or vulnerable (1 for vulnerable firm, 0 otherwise) is taken separately and jointly with debt booms and other control variables. Now, the matter of concern for this analysis is the independent variable debt booms can have endogeneity problem, because it may correlate with some unobserved factors of this analysis; for example, management quality and skills which is an unobserved factor that directly affects the real investment of a firm. To adjust this endogeneity issue, I used industry debt ratio as the instrument variable. The reason of using industry debt ratio as the instrument variable because, it does not directly affect the real investment, it has a strong correlation with firm's debt boom and it has no correlation with the unobserved factor (management quality and skills). So, my reduced form regression or first stage regression is:

$$\Delta_{12} debt\ ratio_{i,t-1}$$

$$= \delta * Z_{i,n,t-1} + \eta * V_{i,t} + V_{i,t}\left(\sum_{j=1}^{4} \delta_j X_{i,j} + \theta * Z_{i,n,t-1}\right) + \sum_{j=1}^{4} \Upsilon_j X_{i,j} + \zeta_i + \lambda_t$$

$$+ \varepsilon_{i,t}$$

Where, $Z_{i,n,t-1}$ is the instrument variable, industry debt ratio which is ($\xi_n * Debt\ ratio_{n,t-1}$) of industry n for firm i at t-1 time, and ξ_n is time invariant sensitivity of industry debt ratio to firms debt boom.

Analysis 3: Congestion Effect

When a firm become vulnerable (lower amount of liquidity and higher proportion of debt), the capital investment of that firm reduces, so that the firm cannot have adequate assets when necessary which leads the firm having lower amount of sales revenue and lower net operating profit. In such situation, those firm involves in some hostile competition, take some bad investment decision and some bad strategies which ultimately affect the other firms of the industry of that firm. In a word, those vulnerable firms becomes zombie firms for the other firms in that industry. This effect is called congestion effect. Here, in my analysis, I tried to look for that congestion effect done by the vulnerable firms. For that my econometric model is:

$$Y_{i,n,t} = \beta * U_{i,n,t} + \delta * U_{i,n,t} * Vul\ share_{n,t} + \Upsilon * U_{i,n,t} * Vul\ share_{n,t} * \Delta_{12} debt\ ratio_{i,t-1}$$

$$+ \sum_{j=1}^{k} \theta_j X_{i,j,t} + \gamma_{n,t} + \varepsilon_{i,n,t}$$

Here, $Y_{i,n,t}$ is some firm's financial statement items which are capital expenditure, stock prices, total asset turnover and return on assets; and for each of these items separate regression analysis was run for separate time horizon. Then, $U_{i,n,t}$ is a binary variable which is unconstrained firms where 1 is unconstrained (liquidity is over 66% and debt is below 33% in an industry for a

particular quarter). $Vul\ share_{n,t}$ is the share of total vulnerable of for an industry in a particular year; and $X_{i,j,t}$ are some control variables which are log asset, liquidity and Tobin's Q. And, $\gamma_{n,t}$ is time fixed effect.

Here, $\delta\ and\ \Upsilon$ are the two coefficients which will give the insight of congestion effect due to debt and vulnerable firms in an industry for a particular quarter.

Main Output

Output1

At the very first section, I tried to find the effects of vulnerable firms on various balance sheet items and financial indicators. The analysis was done for each of the debt horizons.

For horizon is 1 quarter:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	capex	liquidity	total debt	debt_boom	revenue	tobins_Q	ROA	prices	log_asset
vulnerable	-164.32	-0.122***	-57.91	-1531.232***	-194.99	-0.18	0.00	0.35	0.248***
	(104.85)	(0.01)	(949.92)	(575.10)	(163.75)	(0.14)	(0.01)	(3.00)	(0.05)

For horizon is 4 quarter:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	capex	liquidity	total debt	debt_boom	revenue	tobins_Q	ROA	prices	log_asset
vulnerable	-226.32	-0.11***	-1029.63	1581.543*	-371.68	-0.13	-0.01	1.82	0.163*
	(180.54)	(0.02)	(1735.36)	(956.48)	(295.77)	(0.23)	(0.01)	(6.06)	(0.09)

For horizon is 8 quarter:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	capex	liquidity	total debt	debt_boom	revenue	tobins_Q	ROA	prices	log_asset
vulnerable	-124.45	-0.101***	-2888.41	82.25	-676.69	-0.05	0.00	-0.58	0.271**
	(259.10)	(0.02)	(2683.77)	(1187.60)	(432.66)	(0.33)	(0.02)	(8.97)	(0.12)

For horizon is 12 quarter:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	-9
	capex	liquidity	total debt	debt_boom	revenue	tobins_Q	ROA	prices	log_asset
vulnerable	-6.13	-0.14***	858.52	-293.41	-16.16	-0.02	-0.026*	-11.44	0.16
	(323.58)	(0.03)	(3356.57)	(1802.11)	(530.87)	(0.45)	(0.01)	(11.28)	(0.14)

For horizon is 16 quarter:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	capex	liquidity	total debt	debt_boom	revenue	tobins_Q	ROA	prices	log_asset
vulnerable	172.09	-0.103***	1337.67	-3976.705**	-19.23	-0.38	0.00	-12.30	0.28
	(372.68)	(0.03)	(4315.31)	(1878.81)	(731.75)	(0.68)	(0.03)	(13.02)	(0.19)

For horizon is 20 quarter:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	capex	liquidity	total debt	debt_boom	revenue	tobins_Q	ROA	prices	log_asset
vulnerable	-528.52	-0.131***	2681.71	-2625.38	30.62	0.46	-0.06	19.59	0.28
	(337.46)	(0.05)	(2650.70)	(1719.44)	(838.62)	(0.62)	(0.04)	(15.39)	(0.27)

So, in most cases, capital expenditure, liquidity, revenue Tobin's Q, and stock prices are lower for vulnerable firms than those of other firms, where liquidity is strongly statistically significant in all cases and some abnormal outputs are found for debt boom however they are statistically insignificant; and vulnerable firms are higher in size as the coefficient of log asset is positive, this anomaly was also found in the original report of Bruno Albuquerque.

Output 2

In second analysis I tried to find out the impact of debt boom on real investment of a firm, and to do that I introduced vulnerable firm as a key explanatory variable. I did this analysis again for six different time horizons. Here, the second stage regressions are stated below for each of the horizons.

When the horizon is 1:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
debt_boom	0.0000344	0.0002673	0.13	0.898	-0.00049	0.000558
vulnerable#c.debt_boom	-8.26E-05	0.0002909	-0.28	0.776	-0.00065	0.000488
vulnerable	2.751634	7.219812	0.38	0.703	-11.3989	16.90221
Control Variables	yes					
firms and time fixed effect	yes					

When the horizon is 4:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
debt_boom	-1.19E-05	0.0001879	-0.06	0.949	-0.00038	0.000356
vulnerable#c.debt_boom	1.24E-04	0.0003981	0.31	0.755	-0.00066	0.000904
vulnerable	-4.354714	13.08199	-0.33	0.739	-29.995	21.28552
Control Variables	yes					
firms and time fixed effect	yes					

When the horizon is 8:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
debt_boom	-0.001451	0.0521464	-0.03	0.978	-0.10366	0.100754
vulnerable#c.debt_boom	4.10E-03	0.1473067	0.03	0.978	-0.28462	0.292811
vulnerable	-73.28339	2692.932	-0.03	0.978	-5351.33	5204.766
Control Variables	yes					
firms and time fixed effect	yes					

When the horizon is 12:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
debt_boom	-6.81E-05	0.0002993	-0.23	0.82	-0.00065	0.000519
vulnerable#c.debt_boom	8.30E-05	0.0002922	0.28	0.776	-0.00049	0.000656
vulnerable	-1.089651	4.759964	-0.23	0.819	-10.419	8.239706
Control Variables	yes					
firms and time fixed effect	yes					

When the horizon is 16:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	6.05E-05	1.81E-04	0.33	0.738	-0.00029	0.000416
vulnerable#c.debt_boom	-1.23E-04	1.62E-04	-0.76	0.448	-0.00044	0.000195
vulnerable	5.6578	4.074355	1.39	0.165	-2.32779	13.64339
Control Variables	yes					
firms and time fixed effect	yes					

When the horizon is 20:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	2.24E-04	1.86E-04	1.2	0.228	-0.00014	0.000589
vulnerable#c.debt_boom	-2.83E-04	3.49E-04	-0.81	0.418	-0.00097	0.000401
vulnerable	-1.114944	5.939154	-0.19	0.851	-12.7555	10.52558
Control Variables	yes					
firms and time fixed effect	yes					

From the outputs, it can be seen that specially in the longer cases, debt boom interacts with vulnerable firm has negative coefficients, which means vulnerable firms having debt boom suffer from lower of real investment in their capital assets. However for short debt horizon this finding is quite inconsistent, besides these findings are statistically insignificant in 95% confidence interval, the issue of lower amount of sample size may have exacerbated this situation. But in a nutshell, the impact of debt boom on real investment is negative and it is consistent for vulnerable firms also.

Output 3

Here, the outputs of congestion effects are stated. And this analysis was also done for each of the six debt horizons separately.

When the horizon is 1:

	(1)	(2)	(3)	(4)
	capex	prccq	turnover	ROA
unconstrained	17.15	5.068***	-0.019***	-0.004
	(53.90)	(1.44)	(0.00)	(0.01)
unconstrained#vul_share =0	-728.630**	1.943	-0.090***	-0.019
	(286.42)	(7.67)	(0.02)	(0.03)
unconstrained#vul_share =1	-687.880**	18.463**	-0.034	0.047
	(342.95)	(9.19)	(0.02)	(0.03)
unconstrained#vul_share#debt_boom =0	-0.027***	0	-0.000**	0
	(0.00)	(0.00)	(0.00)	(0.00)
unconstrained#vul_share#debt_boom =1	-0.37	-0.126***	0.00	0.00
	(0.73)	(0.02)	(0.00)	(0.00)
controls	yes			
time fixed effect	yes			

Here, vulnerable firms share in an industry creates negative impacts on the capital expenditure and total asset turnover of the unconstrained firms and the effect becomes negative on the stock prices when considering debt boom.

When the horizon is 4:

	(1)	(2)	(3)	(4)
	capex	prccq	turnover	ROA
unconstrained	-37.937	7.444**	-0.027***	0.007
	(104.96)	(3.25)	(0.01)	(0.01)
unconstrained#vul_share =0	-1883.845***	-8.243	-0.115**	0.003
	(537.83)	(16.64)	(0.05)	(0.03)
unconstrained#vul_share =1	-1679.189**	10.954	-0.048	0.087**
	(667.88)	(20.66)	(0.06)	(0.04)
unconstrained#vul_share#debt_boom =0	-0.050***	0	0	0.000**
	(0.01)	(0.00)	(0.00)	(0.00)
unconstrained#vul_share#debt_boom =1	-0.897	-0.214***	0.00	0.000***
	(1.17)	(0.04)	(0.00)	(0.00)
controls	yes			
time fixed effect	yes			

Again, same as the previous debt horizon, vulnerable share has negative impact on the capital investment and turnover for the unconstrained firms, and the situation is even negative for stock prices of those firm in the situation of debt boom.

When the horizon is 8:

	(1)	(2)	(3)	(4)
	capex	prccq	turnover	ROA
unconstrained	-93.785	11.205**	-0.012	0.014
	(166.53)	(5.26)	(0.01)	(0.01)
unconstrained#vul_share =0	-841.746	-32.295	-0.059	0.015
	(819.49)	(25.90)	(0.07)	(0.05)
unconstrained#vul_share =1	-512.348	-40.726	0.074	0.057
	(1137.95)	(35.97)	(0.09)	(0.07)
unconstrained#vul_share#debt_boom =0	-0.053***	0	0	0
	(0.02)	(0.00)	(0.00)	(0.00)
unconstrained#vul_share#debt_boom =1	-2.387	-0.286***	0.00	0.00
	(2.21)	(0.07)	(0.00)	(0.00)
controls	yes			
time fixed effect	yes			

Here, the congestion effect is apparent on the capital expenditure and stock prices of the unconstrained firms.

When the horizon is 12:

	(1)	(2)	(3)	(4)
	capex	prccq	turnover	ROA
unconstrained	-23.135	14.584**	-0.037**	0.004
	(211.60)	(6.54)	(0.02)	(0.01)
unconstrained#vul_share =0	403.186	-21.974	-0.031	-0.034
	(1215.14)	(37.54)	(0.09)	(0.05)
unconstrained#vul_share =1	962.916	-38.859	0.149	-0.064
	(1621.43)	(50.09)	(0.11)	(0.07)
unconstrained#vul_share#debt_boom =0	-0.064***	0	0	0
	(0.02)	(0.00)	(0.00)	(0.00)
unconstrained#vul_share#debt_boom =1	0.15	-0.423***	0.00	0.00
	(2.41)	(0.07)	(0.00)	(0.00)
controls	yes			
time fixed effect	yes			

This time congestion effect is found in the stock prices and return on assets of the unconstrained firms.

When the horizon is 16:

	(1)	(2)	(3)	(4)
	capex	prccq	turnover	ROA
unconstrained	49.139	12.935*	-0.029	0.022
	(233.33)	(6.64)	(0.02)	(0.01)
unconstrained#vul_share =0	-37.388	5.964	-0.239**	0.01
	(1253.80)	(35.68)	(0.11)	(0.08)
unconstrained#vul_share =1	742.636	6.957	-0.014	0.057
	(1527.28)	(43.46)	(0.14)	(0.09)
unconstrained#vul_share#debt_boom =0	-0.058**	0.001	0	0
	(0.02)	(0.00)	(0.00)	(0.00)
unconstrained#vul_share#debt_boom =1	0.971	-0.411***	0.00	0.00
	(2.23)	(0.06)	(0.00)	(0.00)
controls	yes			
time fixed effect	yes			

Here, the share of vulnerable firm puts negative impacts on the total asset turnover of the unconstrained firms and including debt boom has downward effect on stock prices of those firms.

When the horizon is 20:

	(1)	(2)	(3)	(4)
	capex	prccq	turnover	ROA
unconstrained	-79.549	18.053**	-0.013	0
	(169.51)	(8.53)	(0.03)	(0.02)
unconstrained#vul_share =0	-1009.94	55.287	0.036	-0.098
	(1019.09)	(51.26)	(0.17)	(0.10)
unconstrained#vul_share =1	-990.669	47.351	0.239	-0.073
	(1353.01)	(68.06)	(0.23)	(0.13)
unconstrained#vul_share#debt_boom =0	-0.196***	-0.003**	0	0
	(0.03)	(0.00)	(0.00)	(0.00)
unconstrained#vul_share#debt_boom =1	1.047	0.05	0.00	0.001***
	(2.31)	(0.12)	(0.00)	(0.00)
controls	yes			
time fixed effect	yes			

And, lastly, vulnerable share puts downward effects on the capital expenditure and return on assets of the unconstrained firms however these are statistically not significant.

Additional Robustness Check

In the second analysis, when an instrument variable, (industry debt ratio) was introduced for debt boom, there one assumption was taken that the sensitivity of industry debt ratio to firm's debt is time invariant. However, this sensitivity may not be time invariant for all the time. This sensitivity may change in accordance with some market situations. Such kind of market situation is GFC (Global Financial Crisis) which was happened in 2007 to 2009. Here, in my analysis, I included the effect of GFC on the sensitivity of industry debt ratio to firm's debt boom. For this the econometric model for the firm's debt boom is:

$$Z_{i,t-1} = \begin{cases} \xi_n * Debt\ ratio_{n,t-1} & when\ GFC = 0 \\ \xi_n * \theta_n * Debt\ ratio_{n,t-1} & when\ GFC = 1 \end{cases}$$

Where, GFC is a dummy variable which is 1 for post-GFC period (above 2008) and 0 for pre-GFC period (up to 2008). The outputs of that analysis are stated below:

When the horizon is 1:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	-8.45E-05	2.28E-04	-0.37	0.71	-0.00053	0.000362
vulnerable#c.debt_boom	6.45E-05	2.36E-04	0.27	0.785	-0.0004	0.000528
vulnerable	-1.364783	5.606175	-0.24	0.808	-12.3527	9.623118
Control Variables	yes					
firms and time fixed effect	yes					

Here, debt boom and vulnerable firms have negative effect on real investment however their interaction does the opposite, and these are statistically insignificant.

When the horizon is 4:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	8.87E-05	1.33E-04	0.67	0.504	-0.00017	0.000349
vulnerable#c.debt_boom	-1.08E-04	1.66E-04	-0.65	0.514	-0.00043	0.000217
vulnerable	3.471076	5.955433	0.58	0.56	-8.20136	15.14351
Control Variables	yes					
firms and time fixed effect	yes					

Here, the interaction of vulnerable firms with debt has negative impacts on the real investment of the firms.

When the horizon is 8:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	-5.09E-05	9.49E-05	-0.54	0.591	-0.00024	0.000135
vulnerable#c.debt_boom	2.41E-05	1.13E-04	0.21	0.832	-0.0002	0.000246
vulnerable	0.179528	3.418985	0.05	0.958	-6.52156	6.880616
Control Variables	yes					
firms and time fixed effect	yes					

This results say that debt boom has negative effect on real investment however, the interaction with vulnerable firms says the opposite.

When the horizon is 12:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	2.43E-04	3.58E-04	0.68	0.496	-0.00046	0.000945
vulnerable#c.debt_boom	-2.64E-04	3.51E-04	-0.75	0.452	-0.00095	0.000423
vulnerable	4.344436	4.924542	0.88	0.378	-5.30749	13.99636
Control Variables	yes					
firms and time fixed effect	yes					

Again, the interaction of debt boom with the vulnerable firms shows negative relationship for the real investment of the firms.

When the horizon is 16:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	2.34E-04	1.56E-04	1.5	0.133	-7.1E-05	0.000539
vulnerable#c.debt_boom	-2.51E-04	1.57E-04	-1.59	0.111	-0.00056	5.75E-05
vulnerable	4.771992	2.512771	1.9	0.058	-0.15295	9.696932
Control Variables	yes					
firms and time fixed effect	yes					

This one is similar with the previous horizon's output where the interaction of debt boom with vulnerable firms has negative impact on real investments of the firms.

When the horizon is 20:

investment	Coefficient	Robust std. err.	z	P>|z|	[95% conf. interval]	
debt_boom	2.30E-04	1.84E-04	1.25	0.21	-0.00013	0.000591
vulnerable#c.debt_boom	-2.32E-04	3.43E-04	-0.68	0.499	-0.00091	0.000441
vulnerable	-2.289744	5.848676	-0.39	0.695	-13.7529	9.17345
Control Variables	yes					
firms and time fixed effect	yes					

And finally, here for vulnerable firms with debt boom and without debt boom face more shrinkage of real investment.

So, the introduction of time sensitive coefficient for the industry debt ratio to firm's debt boom has made the output more consistent and more robust.

Policy Implication

The findings of this study highlight the critical need for policymakers to monitor corporate debt dynamics closely, particularly during periods of rapid debt accumulation or debt booms. Financially vulnerable firms, characterized by high leverage and low liquidity, are disproportionately affected by debt booms, experiencing reduced investment and heightened financial distress. Policies aimed at mitigating these vulnerabilities, such as stricter leverage caps or liquidity requirements, could help improve firms' resilience during economic downturns. Furthermore, targeted interventions to support financially healthy firms in industries with a high concentration of vulnerable firms may reduce the congestion effects caused by distressed competitors. Policymakers should also consider sensible measures to curb excessive borrowing during periods of economic growth, as these preventive steps could minimize the risks of future financial crises and protect medium-term economic stability.

Conclusion

This study revisits the impact of corporate debt booms on firm-level investment, with a particular focus on the role of financial vulnerability. Using data from U.S. nonfinancial firms spanning 2006 to 2023, the results reveal that debt booms lead to a decline in medium-term investment, particularly for vulnerable firms with high leverage and low liquidity. These effects are amplified by congestion effects, where financially distressed firms negatively influence other firms within their industry. By employing a local projection method and an instrumental variable approach, this study provides robust evidence of the causal effects of debt booms on investment behavior. The findings contribute to the broader understanding of corporate finance and offer actionable insights for both firms and policymakers to mitigate the adverse effects of debt booms.

Reconciliation with the Original Paper

This study closely follows the methodology and objectives of Albuquerque and Mao (2023) while tailoring the analysis to a distinct dataset and timeframe. Consistent with the original findings, this replication confirms that debt booms have a significant and adverse impact on firm-level investment, particularly among financially vulnerable firms. However, the scope of this study extends beyond the original by incorporating additional time horizons and a broader industry focus, allowing for a more comprehensive understanding of how debt dynamics evolve over time. While the original paper identified the critical role of financial constraints, this study emphasizes the interplay between leverage, liquidity, and vulnerability metrics in driving these outcomes. The replication also validates the presence of congestion effects within industries, further reinforcing the robustness and applicability of the original study's conclusions across different datasets and contexts.

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