

Fragile Financing? How Corporate Reliance on Shadow Banking Affects their Access to Bank Liquidity

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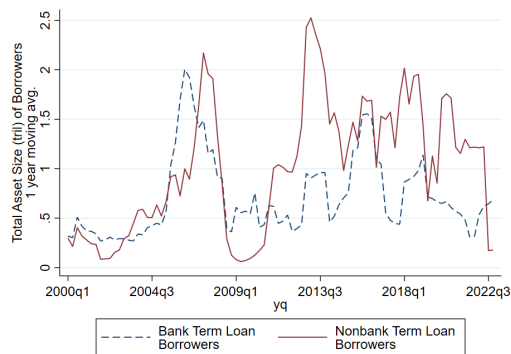
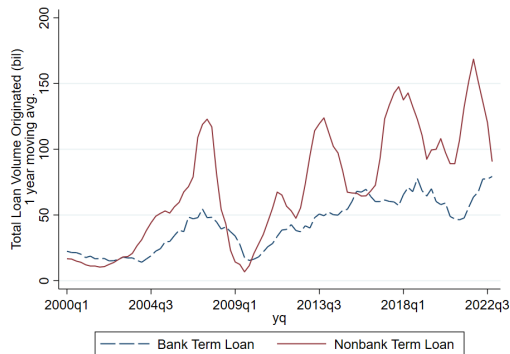
² Georgia Tech

³ Frankfurt School and CEPR

July 7, 2025
NBER SI Corporate Finance

Term Loan Lending through Nonbanks Accelerated

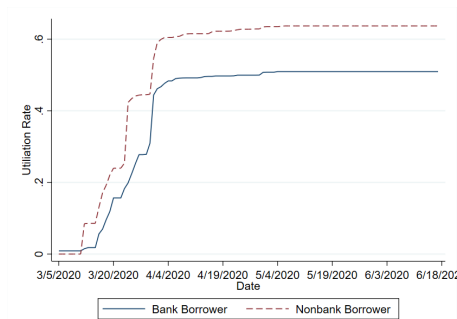
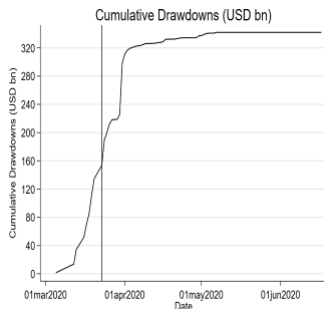
- Substantial growth in nonbank funding to large, economically important firms over the last two decades; but highly cyclical (Berg et al., 2021; Buchak et al., 2024)



Dash-for-Cash during COVID-19

- Firms drew down heavily on credit lines (Acharya and Steffen, 2020) - \$320 billion drawdown within weeks
- Nonbank borrowers drew down more - Capital markets shut down early in the COVID-19 pandemic - Shadow banking funding more fragile

Other crisis periods



Core Research Questions

Main Objective: Examine how reliance on nonbank lenders affects corporate borrowers' access to bank liquidity, especially during periods of financial stress.

Key Questions:

- ❶ **Do banks differentiate** lending behavior based on a borrower's reliance on nonbank funding sources?
- ❷ **Does higher dependence on nonbanks increase rollover risk**, particularly in stressed periods, thereby limiting a firm's access to new or existing bank-provided liquidity?
- ❸ **What are real consequences** of nonbank dependence for corporate liquidity management and investment?

Preview of Results - Do Firms Become more Fragile?

- **Yes!** A firm's nonbank dependence *reduces* its access to credit lines and *increases* credit line spreads (fees)

Identification of a *supply shock*: The 2014-2016 oil-price collapse

- Nonbank lenders contracted severely for *non oil and gas firms* relying on collateralized loan obligations (CLOs) heavily exposed to oil and gas firms
- Bank credit lines increased for firms whose nonbank funding declined, but only if they did not require immediate refinancing
- Firms with maturing nonbank term loan also experienced a sharp reduction in bank credit line lending (a "**double whammy**")
- These firms preserve cash through credit line utilization, assets and capex decline

Data

- **Refinitiv DealScan** - Data at loan issuance incl. loan tranches - Sample Q1 2000 - Q4 2022; US non-financial firms
- **Refinitiv** - Secondary loan market prices (individual loan level prices and industry level prices)
- **LCD and Capital IQ** - Credit Line drawdowns (quarterly and daily during COVID); CLO quarterly issuance volume; bonds outstanding
- **LPC Collateral** - CLO issuance and holdings; merge to Dealscan via LIN
- **Compustat/CRSP** - Firm financials; stock prices
- **BDC Collateral** - Firm financing via private credit

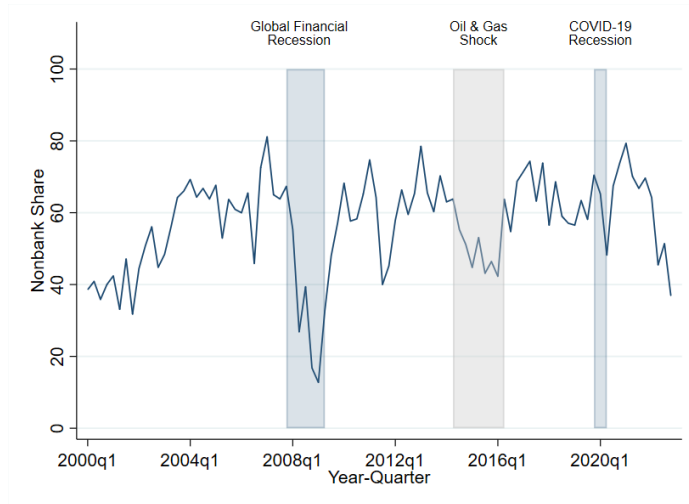
Definition - Nonbank Dependence

- We define **Nonbank Dependence** as the share of total term loans that is financed by nonbanks (based on loan amounts)
- We classify **Term B-K** tranches as **nonbank loans**, **Term A** and **Term Loan** tranches as **bank loans**.
 - Following academic literature (e.g., [Ivashina and Sun, 2011](#); [Nini, 2008](#); [Fleckenstein et al., 2024](#))

$$\text{Nonbank Dependence} = \frac{\text{Nonbank Term Loans}}{\text{Total Term Loans}}$$

- Alternative definition of nonbank dependence: (1) "Term Loans" = Nonbank Term Loans; (2) based on pro-rate definition in "Marketsegment" Nonbank Definitions

Time-Series of Nonbank Shares: Upward Trend and Cyclical



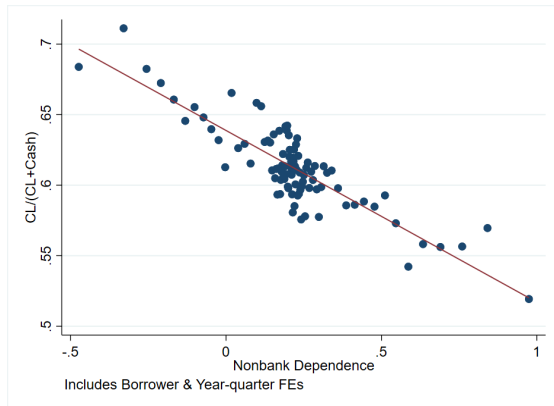
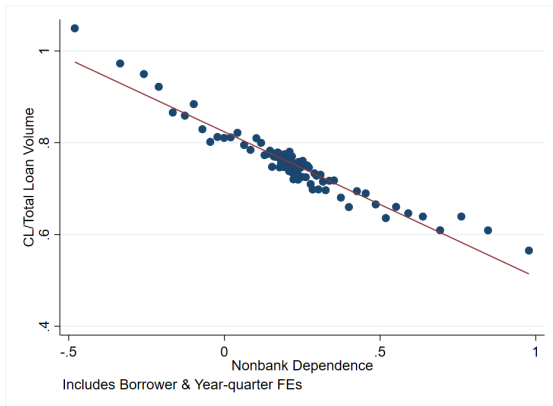
Empirical approach

We estimate the following regression specification via OLS:

$$y_{i,t} = \alpha + \beta \times \text{Nonbank Dependence}_{i,t} + \sum \gamma \mathbf{X}_{i,t} + \lambda_t + \delta_i + \epsilon_{i,t} \quad (1)$$

- $y_{i,t}$: CL share, CL spread
- $\text{Nonbank Dependence}_{i,t}$: (Nonbank term loans / Total term loans) outstanding for each borrower-quarter
- $\mathbf{X}_{i,t}$: Control variables (e.g., loan terms, borrower rating)
- λ_t : Year-Quarter FE
- δ_i : Borrower FE
- S.E. clustered at the borrower level.
- Sample period - 2000-2022

Access to Credit Lines for Nonbank Borrowers



- Firms that have a higher nonbank dependence receive lower levels of credit lines and use more cash in liquidity management

Access to Credit Lines for Nonbank Borrowers

	CL/Total Loans at Issuance				CL/(CL+Cash) at Issuance			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nonbank Dependence	-0.251*** (0.014)	-0.248*** (0.012)	-0.178*** (0.014)	-0.176*** (0.016)	-0.057*** (0.010)	-0.054*** (0.010)	-0.028*** (0.009)	-0.035*** (0.010)
Rating x Year-Quarter FE	N	Y	Y	Y	N	Y	Y	Y
Borrower FE	N	N	Y	Y	N	N	Y	Y
Industry x Year-Quarter FE	N	N	N	Y	N	N	N	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Unconditional mean	0.72	0.72	0.71	0.71	0.65	0.65	0.65	0.65
Obs.	26,021	25,951	24,706	23,517	26,017	25,947	24,704	23,514
R ²	0.052	0.077	0.473	0.537	0.103	0.152	0.663	0.729

- Nonbank dependence $\uparrow \Rightarrow$ CL-Share $\downarrow \Rightarrow$ Use of cash in liquidity management $\uparrow$
- Moving from zero to full nonbank dependence lower CL availability by 17.6ppt (col (4)) and the credit line share in liquidity management by 3.5ppt (col (8))

Outstanding Shares

Cost of Credit Lines for Nonbank Borrowers - Issuance

	Credit Line					TLA	TLB
	(1) AISD	(2) AISU	(3) Upfront fee	(4) Commitment fee	(5) TCB	(6) AISD	(7) AISD
Nonbank Dependence	48.493*** (4.510)	7.572*** (1.288)	1.900 (1.242)	1.240 (1.101)	8.111** (4.109)	150.065*** (24.017)	-39.565 (26.709)
Rating x Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y	Y	Y	Y
Industry x Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y
Unconditional mean	187.88	30.06	70.92	17.80	107.27	274.82	330.87
Obs.	21,563	16,694	10,803	14,879	6,802	3,310	2,772
R^2	0.750	0.711	0.880	0.567	0.816	0.870	0.843

- Nonbank dependence $\uparrow \Rightarrow$ CL / TLA spreads $\uparrow$
- Moving from zero to full nonbank dependence increases drawn (undrawn) spread 48.5bps (7.6bps) — 25% of mean (col (1) and (2))

Outstanding Spreads

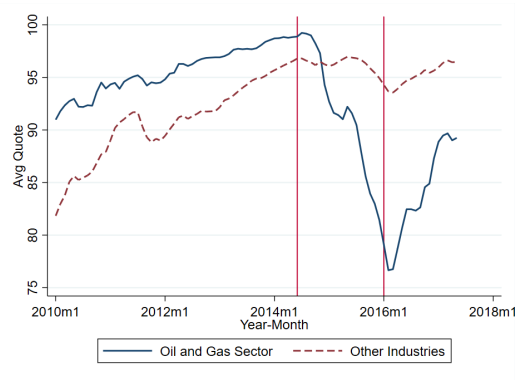
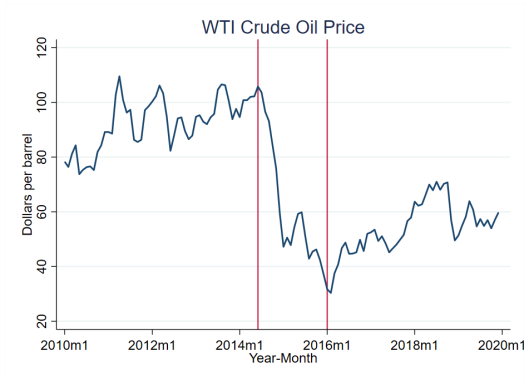
Robustness Tests

- Banks do **relationship lending**, nonbanks transactional -> banks may only provide liquidity to relationship firms **Relationships**
- **Low deposit to assets** banks match with nonbanks + low deposit banks have lower credit line exposure **Deposit ratios**
- There may be **matching** by borrower-lender type and banks may select into lending to certain firms and other firms borrow from nonbanks **Matching**
- By **regulation**, banks may be explicitly prohibited from lending to certain borrowers **EBITDA > 0**
- **Drop rated borrowers** ensures results are not driven by stress in bond markets **Unrated borrowers**

Identification Challenge: Supply vs. Demand

- **Identification strategy:** Need exogenous variation in nonbank share (orthogonal to *firm/bank*)
 - Exploit 2014-2016 oil price shock: Oil prices dropped 70% between June'14 - early '16
 - Price drop fueled by increased U.S. domestic production due too fracking + increased production from OPEC
 - Shock has been used in prior studies (Kundu, 2022; Saunders et al., 2024)
- Oil price shock did not affect all firms, but those in the oil and gas (O&G) sector

Oil Price Shock and Loan Market Response



- No broad stock market response either S&P 500

Identification - 2014-16 Oil Price Shock

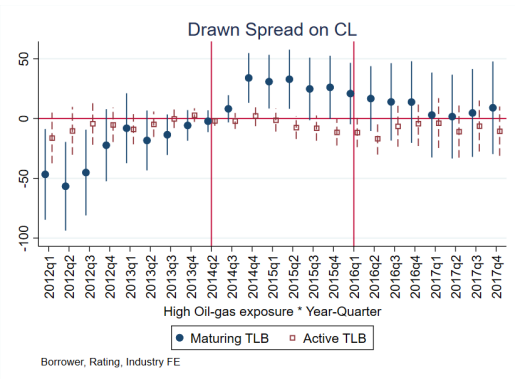
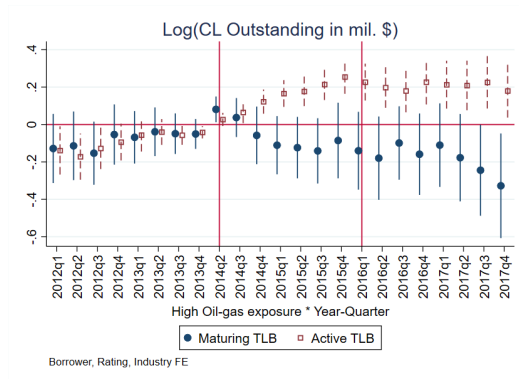
- CLOs heterogenously exposed to the O&G shock
- CLOs more exposed to the O&G shock
 - were more likely to be pushed closer to breaching covenants
 - were forced to sell also non O&G loans... Loan sales
 - ...putting price and funding pressure on non-O&G firms (Kundu, 2022)
- Shock to CLOs can affect credit conditions of firms (*e.g.*, hard to issue/rollover debt (Giannetti and Meisenzahl, 2023)) CLO decline TLB decline
- We compare loan outcomes of non O&G loans — firms with indirect O&G exposure — before vs after the oil price shock. O&G firms are dropped from the analysis.

Empirical Specification

$$y_{i,t} = \alpha + \beta \text{Oil-Gas Exposure}_i \times \text{Post}_t \times \text{Rollover Risk}_i + \lambda_t + \delta_i + \epsilon_{i,t} \quad (2)$$

- $y_{i,t}$ - Outcome variables (e.g., loan volumes and spreads)
- $\text{Oil-Gas Exposure}_i$ - weighted average of share of oil and gas firms in CLOs that held the loans of the borrower in 2014 Q1 - split on median for High Exposure
- Post_t - 2014Q1 onwards; sample period is from January 2012 - December 2017
- Rollover Risk_i - firms with at least one TLB maturing during oil price shock are classified as *Maturing TLB* borrowers
- Omitted group - 2014Q1 - one quarter before shock
- S.E clustered at borrower level

Oil Price Shock - Impact on Credit Lines



- Supply of credit lines **increases** for borrowers with no rollover risk but exogenous reduction in nonbank reliance while it **falls** for borrowers facing rollover risk

Oil Price Shock

	TLB Vol.	Spread TLB	TLA Vol.	Spread TLA	Term Loans Vol.	NB Dep	CL Vol.	Spread CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil shock exposure x Post x Maturing TLB	-0.108*** (0.040)	9.707** (4.557)	-0.078** (0.031)	16.743** (7.220)	-0.163*** (0.045)	0.030* (0.016)	-0.103*** (0.038)	10.007** (4.484)
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	9,516	7,631	9,516	4,461	9,516	9,516	9,516	8,117
R^2	0.144	0.870	0.111	0.902	0.130	0.679	0.082	0.807

- Results are similar for firms without access to bond markets... **Unrated Borrowers**
- ... and for those firms with both bank and nonbank term loans outstanding.
Borrowers with TLA and TLB
- ...and positive EBITDA firms **EBITDA > 0**

Oil Price Shock - Firm Financial Outcomes

	Log(CL Drawdown)	Log(Cash)	Log(Assets)	Capital/Assets
	(1)	(2)	(3)	(4)
Oil shock exposure x Post x Maturing TLB	0.167* (0.095)	-0.029 (0.023)	-0.024** (0.011)	-0.025** (0.011)
Borrower FE	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y
Obs.	3,592	7,737	7,748	7,278
R^2	0.747	0.904	0.971	0.564

- Firms with maturing TLBs utilize credit lines more, grow less, and invest less

Final Thoughts

- Trade-off: reliance on shadow banking—while initially beneficial—creates substantial vulnerability during stress periods.
 - Firms depending on nonbanks find banks less willing to provide liquidity
- 'Double whammy' underscores the inherent fragility in the current financial system.
 - Challenging the idea of safely unbundling bank lending and liquidity provision.
- Policy implications: As nonbank lending continues to expand globally, regulators should
 - pay closer attention to liquidity risks embedded in nonbank financing models,
 - consider measures to strengthen disclosure, monitoring, and potentially even the prudential oversight of these crucial—but fragile—sources of corporate financing.

Appendix

Alternate Loan Classifications

Correlation between nonbank dependence measures

	TL=TLA	TL=TLB	TL based on pro-rata
TL=TLA	1		
TL=TLB	0.552	1	
TL based on pro-rata	0.962	0.568	1

Robustness Tests

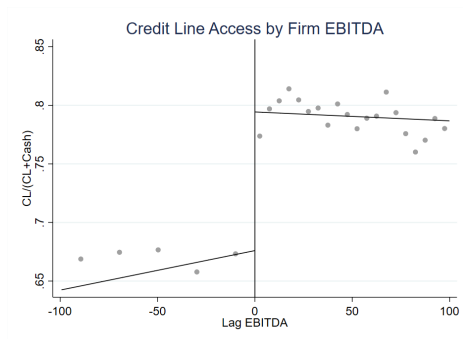
	CL/Total Loans at Issuance				
	(1)	(2)	(3)	(4)	(5)
Nonbank Dependence	−0.135*** (0.010)	−0.136*** (0.010)	−0.134*** (0.010)	−0.107*** (0.009)	−0.093*** (0.022)
Bank-Borrower Relationship		−0.013*** (0.004)	−0.012*** (0.004)	−0.005 (0.004)	−0.010 (0.009)
Rating x Year-Quarter FE	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y	Y
Industry x Year-Quarter FE	Y	Y	Y	Y	Y
Bank x Year-Quarter FE	N	N	Y	Y	Y
Bank x Borrower FE	N	N	N	Y	Y
Sample					Has TLA
Obs.	128,111	128,111	128,028	113,553	38,700
R^2	0.720	0.720	0.729	0.780	0.859

Robustness Tests

	All in drawn spread				
	(1)	(2)	(3)	(4)	(5)
Nonbank Dependence	34.359*** (3.374)	34.369*** (3.373)	34.150*** (3.332)	29.088*** (3.405)	45.566*** (7.207)
Bank-Borrower Relationship		1.202 (1.268)	1.480 (1.274)	1.305 (1.338)	3.105 (2.497)
Rating x Year-Quarter FE	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y	Y
Industry x Year-Quarter FE	Y	Y	Y	Y	Y
Bank x Year-Quarter FE	N	N	Y	Y	Y
Bank x Borrower FE	N	N	N	Y	Y
Sample					Has TLA
Obs.	122,694	122,694	122,605	108,156	37,268
R^2	0.842	0.842	0.848	0.879	0.925

Robustness Tests - Bank Regulation

- Banks may be explicitly prohibited from lending to certain borrowers
- Chernenko et. al. (2022) - costly for banks to lend to negative EBITDA firms (larger loan loss allowance, lower CAMELS ratings)
- We see a discontinuity at 0 EBITDA for credit line provision



Robustness Tests - Bank Regulation

- Check borrowers away from the threshold

Panel A - Credit Line Shares

	CL/Total Volume			CL/(CL+Cash)		
	(1) All firms	(2) Positive EBITDA	(3) EBITDA>10 mil	(4) All firms	(5) Positive EBITDA	(6) EBITDA>10 mil
Nonbank Dependence	-0.176*** (0.016)	-0.071*** (0.015)	-0.066*** (0.017)	-0.035*** (0.010)	-0.023** (0.011)	-0.030** (0.012)
Rating x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y	Y	Y
Industry x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Obs.	23,517	18,912	16,346	23,514	18,907	16,345
R^2	0.537	0.578	0.576	0.729	0.731	0.726

Robustness Tests - Bank Regulation

- Check borrowers away from the threshold

Panel B - Credit Line Spreads

	All-in-drawn-spread			All-in-undrawn-spread		
	(1) All firms	(2) Positive EBITDA	(3) EBITDA>10 mil	(4) All firms	(5) Positive EBITDA	(6) EBITDA>10 mil
Nonbank Dependence	46.920*** (4.458)	10.262** (4.549)	11.773** (4.783)	7.751*** (1.251)	3.023** (1.279)	2.582** (1.299)
Rating x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y	Y	Y
Industry x Year-Quarter FE	Y	Y	Y	Y	Y	Y
Obs.	21,470	17,317	14,975	16,601	13,533	11,814
R ²	0.761	0.768	0.763	0.725	0.740	0.738

Bank-Nonbank Matching - Extensive Margin

	Revolving Credit > 0			
	(1)	(2)	(3)	(4)
TLB Share - Outstanding	-0.282*** (0.012)	-0.171*** (0.011)	-0.133*** (0.010)	-0.117*** (0.011)
Year-Quarter FE	N	Y	N	N
Borrower FE	N	Y	Y	Y
Bank x Year-Quarter FE	N	N	Y	N
Bank * Rating * Year-Quarter FE	N	N	N	Y
Obs.	235,902	235,148	224,330	148,965
R^2	0.107	0.363	0.429	0.443

- TLB $\uparrow \Rightarrow$ Likelihood of receiving CL $\downarrow$

Robustness - Scaling by Assets

	Share CL	CL Spread	TLA Spread	TLB Spread
	(1)	(2)	(3)	(4)
Nonbank Loans Outstanding/ Assets	-0.117*** (0.026)	78.514*** (14.270)	14.154 (50.146)	-24.694*** (7.794)
Year-Quarter FE	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y
Obs.	23,291	21,696	2,396	3,881
R^2	0.627	0.734	0.820	0.693

CL Covenant Restrictions - Within Borrower

	Any Financial	ICR	D/Cash Flow	Fixed Charge	No. Financial Cov	Mat. Restr.
	(1)	(2)	(3)	(4)	(5)	(6)
Share TLB - Outstanding	-0.033 (0.020)	0.017 (0.018)	-0.016 (0.019)	-0.022 (0.015)	-0.036 (0.045)	0.035* (0.019)
Rating * Year-Quarter FE	Y	Y	Y	Y	Y	Y
Borrower FE	Y	Y	Y	Y	Y	Y
Obs.	18,504	18,504	18,504	18,504	18,504	18,504
R^2	0.466	0.501	0.555	0.545	0.504	0.511

- Focus is on inclusion of **covenants** in new **loan issuances**
- Share TLB $\uparrow \Rightarrow \Pr(\text{Financial Covenant}=1) \uparrow, \Pr(\text{ICR}=1) \uparrow, \Pr(\text{D/Cash Flow}=1) \uparrow, \Pr(\text{Fixed Charge}=1) \uparrow, \text{Number of Financial Covenants} \uparrow, \Pr(\text{Mat. Restr.}=1) \uparrow$

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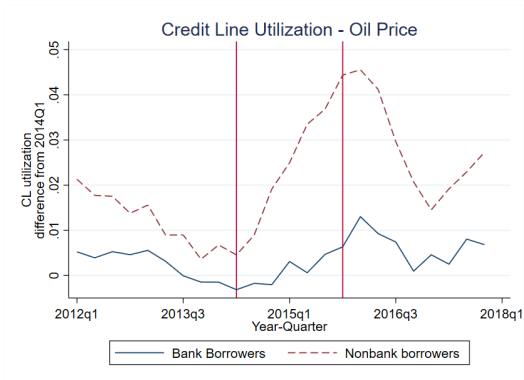
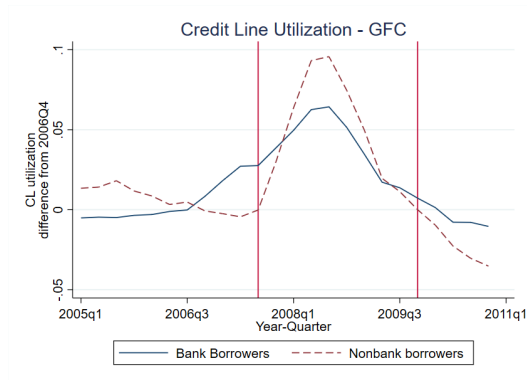
Oil-price shock - unrated borrowers

	TLB Vol.	Spread TLB	TLA Vol.	Spread TLA	Term Loans Vol.	NB Dep	CL Vol.	Spread CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil shock exposure x Post x Maturing TLB	-0.134** (0.060)	11.525 (7.158)	-0.060* (0.033)	12.577 (10.086)	-0.181*** (0.066)	0.008 (0.020)	-0.165*** (0.056)	5.942 (7.115)
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	4,995	3,968	4,995	2,186	4,995	4,995	4,995	4,052
R^2	0.150	0.872	0.130	0.931	0.144	0.691	0.102	0.817

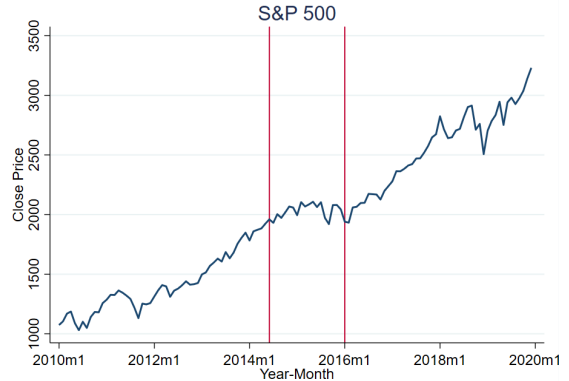
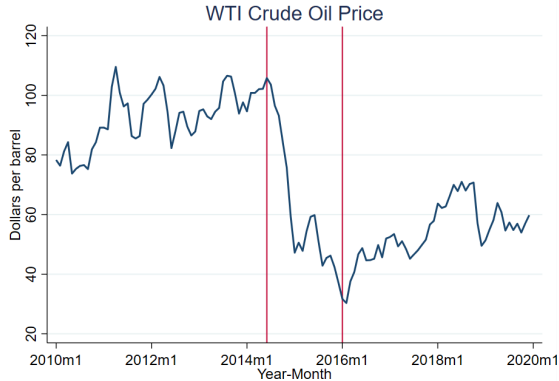
Oil-price shock - borrowers with TLA and TLB

	TLB Vol.	Spread TLB	TLA Vol.	Spread TLA	Term Loans Vol.	NB Dep	CL Vol.	Spread CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil shock exposure x Post x Maturing TLB	-0.077 (0.048)	13.117** (5.553)	-0.114** (0.049)	13.012** (6.392)	-0.182*** (0.062)	0.039** (0.019)	-0.107** (0.054)	9.425* (5.013)
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	5,143	4,209	5,143	3,963	5,143	5,143	5,143	4,776
R^2	0.157	0.856	0.103	0.894	0.134	0.735	0.081	0.846

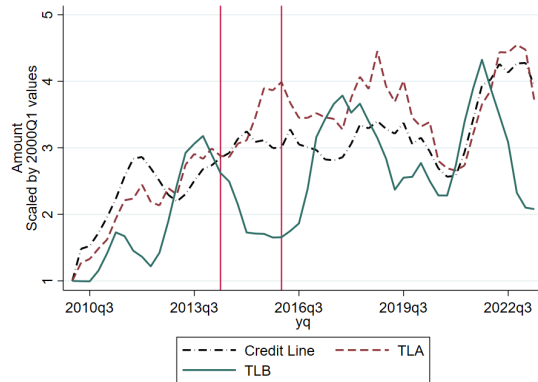
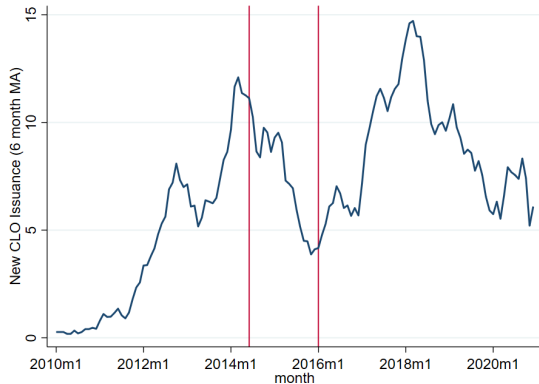
Credit line drawdowns during crises



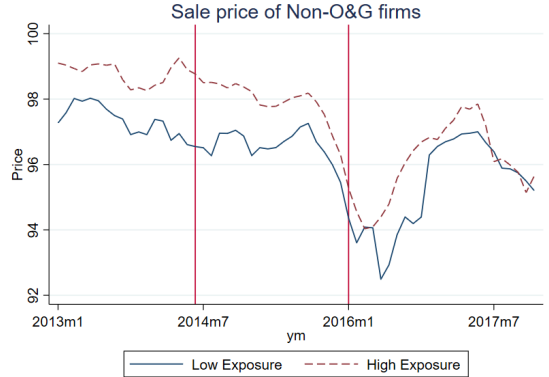
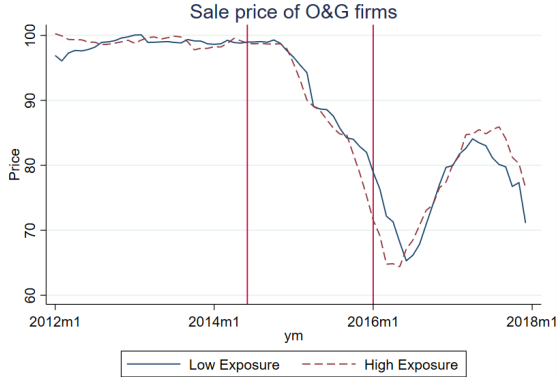
Oil price shock - (No) Stock market response

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Oil price shock - Loan Issuance

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Oil price shock - Loan Sales

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Unrated Borrowers

	TLB Vol.	Spread TLB	TLA Vol.	Spread TLA	Term Loans Vol.	NB Dep	CL Vol.	Spread CL
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Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	4,995	3,968	4,995	2,186	4,995	4,995	4,995	4,052
R^2	0.150	0.872	0.130	0.931	0.144	0.691	0.102	0.817

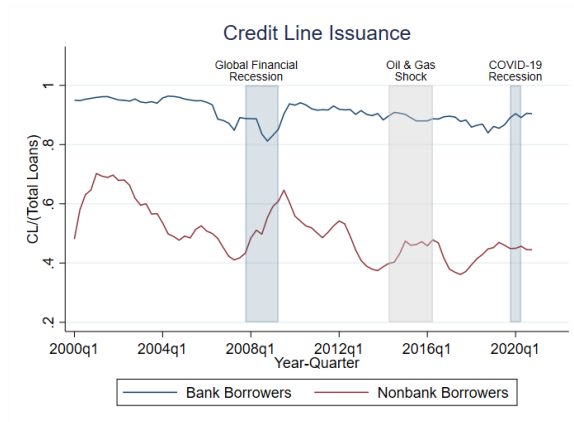
TLA and TLB Borrowers

	TLB Vol.	Spread TLB	TLA Vol.	Spread TLA	Term Loans Vol.	NB Dep	CL Vol.	Spread CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil shock exposure x Post x Maturing TLB	-0.077 (0.048)	13.117** (5.553)	-0.114** (0.049)	13.012** (6.392)	-0.182*** (0.062)	0.039** (0.019)	-0.107** (0.054)	9.425* (5.013)
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	5,143	4,209	5,143	3,963	5,143	5,143	5,143	4,776
R^2	0.157	0.856	0.103	0.894	0.134	0.735	0.081	0.846

Positive EBITDA Firms

	TLB Vol.	Spread TLB	TLA Vol.	Spread TLA	Term Loans Vol.	NB Dep	CL Vol.	Spread CL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Oil shock exposure x Post x Maturing TLB	-0.103** (0.041)	9.645** (4.792)	-0.080** (0.032)	17.588** (7.350)	-0.160*** (0.046)	0.028* (0.016)	-0.102** (0.040)	9.855** (4.600)
Borrower FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind FE	Y	Y	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y	Y	Y
Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	8,874	7,196	8,874	4,229	8,874	8,874	8,874	7,625
R^2	0.147	0.864	0.112	0.897	0.132	0.688	0.081	0.802

Credit Lines - Time series Trends



- Nonbank borrowers have **higher cyclical** of credit line issuances.