

Resilience of Bank Lending to Non-Banks

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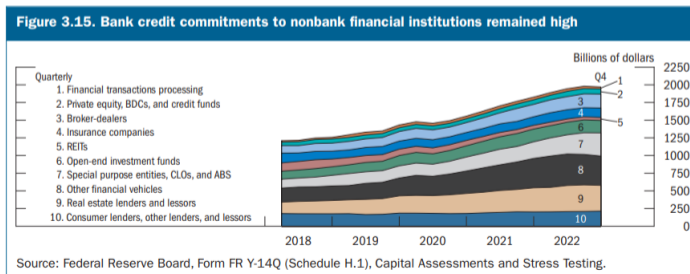
Federal Reserve Board

EEA Conference
Barcelona, August 28, 2023

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Motivation

- Non-Bank Financial Institutions (NBFI), including fintech firms, have experienced significant growth lately.
 - The global assets of these firms, often referred to as the nonbank sector, comprised 49.5% of the total global financial assets by the end of 2019.
- Nonbanks growth (lending) funded partially by bank loans (the topic of our paper)
 - Bank lending to nonbanks doubled from 2013 to 2019, reaching \$1.4T (FSB 2020)



Fragility of Nonbank Lending

- The growth raised potential policy concerns:
 - Nonbanks' funding could be fragile during market stress
 - No access to deposits or lender of last resort may lead to funding instability
 - Refuse to refinance or issue new credit
 - Liquidate assets below fundamental values in the secondary market (Fire sales)
 - Banks could withdraw their funding support during the downturns
- The bank lending channel can act as a liquidity backstop for the nonbanks, but is it resilient during times of stress?

Research Question

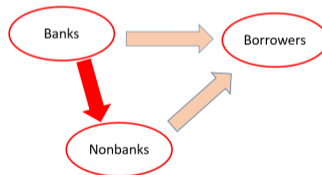
- Research Question:
 - How resilient is banks' lending to nonbanks during times of distress?
 - What are the implications for the real economy?
- Outline of our approach:
 - Focus on two major economic shocks:
 - The Oil & Gas shock of 2015 and the Covid-19 pandemic
 - Exploit cross-sectional variation in banks' exposure to these shocks
 - Employ a Diff-in-Diff specification comparing the change in nonbank lending across banks with heterogeneous exposure to the shocks
 - Examine the impact on the real economy.

Preview of Findings

- Negative economic shocks did not suppress credit supply to nonbank borrowers
 - Distressed banks shifted their lending portfolio towards nonbanks during periods of stress
 - Banks with smaller capital buffers exhibited smaller reductions in lending to nonbanks, possibly due to regulatory benefits
- Implication on the real economy
 - Nonbanks with pre-existing bank relationships were able to continue lending to the economy
 - Nonbanks with access to bank funding demonstrated relatively less cyclical behavior in credit origination
 - The effects are stronger for NBFIs without access to stable funding

Literature Review

- One of the first published references to "shadow banking" was at the 2007 Jackson Hole Symposium, where Paul McCulley noted a growing share of financial innovation
- Studies investigating the growth of the nonbank sector focus on the banks-nonbanks differences
 - The rise of shadow banking: Fahri and Tirole (2017), Kashyap, Stein, and Hanson (2010)
 - Complementarity between banks and nonbanks: Irani et al. (2020), Buchak et al. (2018), Fuster et al. (2019), Tang (2019), Erel & Liebersohn (2020).
 - Fragile funding of nonbanks and cyclicalty: Gorton and Metrick (2012), Fleckenstein et al. (2020)



- Our study complements this work by exploring the resilience of bank lending to nonbanks during periods of bank distress and its implications for credit provisioning by nonbanks

Data

- Shared National Credit (SNC) dataset of syndicated loans (loans larger than \$20 MM & held by at least 3 institutions)
- 95% of DealScan loans meet SNC requirement (Ivashina & Scharfstein, 2010)
- Use quarterly SNC data that tracks loan ownership over time
- Include both term loans (held by banks & nonbanks) and revolvers (held by banks)
 - O&G sample: 5105 loans held by 234 US Banks to 3148 borrowers (20% nonbanks)
 - COVID sample: 9495 loans held by 195 US Banks to 5086 borrowers (26% nonbanks)

▶ Bank exp.

▶ loan sum. Stats.

- Banks balance sheet information from Y9C

Empirical Framework

- We use DiD methodology:
 - Use two exogenous shocks: Oil price decline and COVID economic shutdown.
 - Define "shock exposure" as the pre-shock share of a bank's committed exposures to the industries most severely impacted by the shock.
 - Exploit cross-bank exposure variation: Compare the change in nonbank lending across exposed banks vs. less exposed ones
 - Collapse quarterly time dimension into single "pre" and "post" shock periods
 - Oil & Gas (2013Q3-2014Q2) (2015Q1-2015Q4)
 - COVID (2019Q1-2019Q4) (2020Q3)
- Estimate the change in credit along intensive and extensive margins

$$\Delta \ln(\text{Credit}_{ij}) = \alpha + \beta \text{ShockExposure}_i * \text{Nonbank}_j + \gamma X_{i,j} + \varepsilon_{ij},$$

- For extensive margin analysis, the dependent variable is Entry/Exit

Main Identification Concerns

- Disimilarity between the treated and control group ▶ balance test
- Correlation of credit supply shock with a demand shock
- Potential simultaneity with change in borrowers' creditworthiness
- To address these concerns, we look at different banks' lending to the same borrower (Khwaja and Mian, 2008)

Oil & Gas Shock

- Is bank lending to nonbanks resilient when banks are hit by the Oil shock?

Table 3: Intensive Margin (O&G Shock)

	OLS				Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
							NBFIs
O&G Exposure	-0.00806*** (-2.80)	-0.0173*** (-5.38)	-0.0188*** (-5.46)	-0.0188*** (-5.46)	-0.00672** (-2.56)	-0.00847*** (-2.93)	-0.00323 (-0.53)
Nonbank			0.0290 (1.49)	0.0288 (1.48)			
O&G Exposure * Nonbank			0.0120** (2.11)	0.0121** (2.13)			
Rated				0.0000810 (0.00)			
Rating				-0.00885 (-0.50)			
Loan controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan FE	No	No	No	No	Yes	No	No
Borrower FE	No	No	No	No	No	Yes	Yes
Observations	21708	20349	20349	20349	19833	20105	3892
Adjusted R2	0.002	0.023	0.024	0.024	0.426	0.275	0.310

COVID-19 Shock

Table 4: Intensive Margin (COVID Shock)

	OLS				Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)	(7) NBFIs
COVID Exposure	-0.00912** (-2.47)	-0.00967*** (-2.89)	-0.0132*** (-3.16)	-0.0131*** (-3.16)	-0.00766*** (-2.60)	-0.00654** (-2.12)	-0.00463 (-1.02)
Nonbank			0.0334** (2.50)	0.0289** (2.18)			
Covid Exp. * Nonbank			0.0110* (1.82)	0.0116* (1.94)			
Rated				0.0784*** (3.74)			
Obligor Rating				-0.0737*** (-4.01)			
Loan controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan FE	No	No	No	No	Yes	No	No
Borrower FE	No	No	No	No	No	Yes	Yes
Observations	38423	34777	34777	34777	33837	34399	7995
Adjusted R2	0.002	0.016	0.017	0.021	0.440	0.264	0.289

- Extensive margin analysis is consistent with the finding.

Extensive Margin

Table 5: Extensive Margin (O&G Shock)

	Exit				Entry			
	(1) OLS	(2) OLS	(3) FE	(4) FE-NBFI	(5) OLS	(6) OLS	(7) FE	(8) FE-NBFI
O&G Exposure	-0.00257 (-0.81)	-0.00264 (-0.77)	0.000571 (0.45)	-0.00286 (-0.79)	-0.00414*** (-3.44)	-0.00370*** (-2.88)	-0.00162** (-2.49)	-0.00182 (-1.27)
Nonbank	-0.0537** (-2.11)	-0.128*** (-5.18)			-0.0212*** (-2.79)	-0.0136* (-1.88)		
O&G Exposure * Nonbank	-0.0105 (-1.47)	-0.0149** (-2.06)			-0.00297 (-1.14)	-0.00149 (-0.62)		
Loan controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	43632	38450	37889	6812	43632	38450	37889	6812
Adjusted R2	0.012	0.186	0.831	0.815	0.003	0.018	0.529	0.519

Table 6: Extensive Margin (COVID Shock)

	Exit				Entry			
	(1) OLS	(2) OLS	(3) FE	(4) FE-NBFI	(5) OLS	(6) OLS	(7) FE	(8) FE-NBFI
COVID Exposure	0.00485 (1.13)	0.00723* (1.76)	0.00990*** (4.69)	0.00136 (0.49)	-0.00610** (-2.57)	-0.00518** (-2.25)	-0.00137 (-0.94)	0.00297** (2.01)
Nonbank	-0.0335** (-2.21)	-0.0441*** (-3.35)			0.00903 (1.54)	0.00788 (1.42)		
Covid Exp. * Nonbank	-0.00410 (-0.57)	0.00103 (0.16)			0.0104*** (3.68)	0.00697*** (2.59)		
Loan controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	51146	44259	43826	10101	51146	44259	43826	10101
Adjusted R2	0.001	0.183	0.681	0.741	0.005	0.017	0.382	0.325

Regulatory Capital Channel

- Banks' exposure to a financial shock translates to losses that lower their capital levels.
- In general, capital charges for lending to NBFIs are lower vs. other corporate borrowers.
- We explore whether the increase in the share of nonbank borrowers after a financial shock hits a bank is associated with regulatory capital constraints.

CET1 buffer = CET1 actual – [min CET1 + Conservation Buffer (or SCB in 2020Q4) + GSIB surcharge]

We estimate following regression using OLS:

$$\Delta \ln(Credit_{ij}) = \alpha + \beta ShockExposure_i * Nonbank_j * CET1 Buffer_i + \gamma X_{i,j} + \varepsilon_{ij}$$

Regulatory Capital Channel

Table 7: Capital Channel (O&G Shock)

	(1)	(2)
O&G Exposure	0.249* (1.88)	-0.0197*** (-5.64)
O&G Exposure * Nonbank	0.0110 (0.13)	0.0110* (1.95)
CET1 buffer	-0.0723** (-2.54)	
CET1 buffer * Nonbank	0.0116 (0.42)	
CET1 buffer * O&G Exp.	-0.0258** (-2.15)	
O&G Exp. * Nonbank * CET1 buffer	0.00281 (0.29)	
low_buffer		0.163** (2.55)
Low buffer * Nonbank		0.208** (2.10)
Low buffer * O&G Exp.		0.0594*** (2.61)
O&G Exp. * Nonbank * Low buffer		0.0758** (2.10)
Loan controls	Yes	Yes
Bank controls	Yes	Yes
Borrower FE	No	No
Observations	13391	20349
Adjusted R2	0.033	0.024

Table 8: Capital Channel (COVID Shock)

	(1)	(2)
COVID Exposure	0.434*** (5.79)	-0.0136*** (-3.30)
Covid Exp. * Nonbank	-0.0403 (-0.42)	0.0128** (2.13)
CET1 buffer	-0.213*** (-5.72)	
CET1 buffer * Nonbank	0.0255 (0.57)	
CET1 buffer * COVID Exp.	-0.128*** (-5.70)	
COVID Exp. * Nonbank * CET1 buffer	0.0149 (0.58)	
low_buffer		-0.0509 (-0.32)
Low buffer * Nonbank		0.508** (2.02)
Low buffer * COVID Exp.		-0.0463 (-0.49)
COVID Exp. * Nonbank * Low buffer		0.314** (2.13)
Loan controls	Yes	Yes
Bank controls	Yes	Yes
Borrower FE	No	No
Observations	27761	34777
Adjusted R2	0.026	0.021

Implications of Nonbanks Access to Bank Credit

- Evidence of resilience of bank lending channel to nonbanks even during bad times
- How does this affect credit supply from nonbanks in bad times?
 - Do nonbanks with bank funding sell fewer loans?
 - Do nonbanks with bank funding originate more loans?
- Compare nonbanks with bank funding vs. those without
- Excess Bond Premium (EBP): a proxy for overall credit condition
- Estimation sample:
 - Nonbank lenders
 - Term loans only for loan sales
 - Sales is identified at the top-holder level
 - Period of 2010q1 to 2020q3

$$\text{Loan Sales}_{ijt} = \alpha + \mu_i + \beta \text{Lender Bank Loan}_{j,t} * \text{EBP}_t + \gamma X_{it} + \varepsilon_{ijt}$$

$$\text{New Origination}_{ijt} = \alpha + \mu_i + \beta \text{Lender Bank Loan}_{j,t} * \text{EBP}_t + \gamma X_{i,t} + \varepsilon_{ijt}$$

Where i indicates lender, j indicates borrower, and t indicates quarter

Implications of Nonbanks Access to Bank Credit - Loan Sales

Table 9: Nonbank loan sales

$$LoanSale_{ijt} = \alpha + \mu_i + \beta * LenderBankloan_{j,t-1} * EBP_t + \gamma X_{i,t} + \epsilon_{ijt}$$

	(1)	(2)	(3)	(4)	(5)
ExcessBondPremium (EBP)	0.0197*** (5.41)	0.0149*** (3.64)	0.0128*** (3.19)	0.0128*** (3.19)	0.0138** (2.11)
Bank loans	-0.0480 (-0.16)	0.517 (1.32)	0.515 (1.39)	0.515 (1.39)	-0.0871 (-0.22)
EBP * Lender Bank loans	-3.977*** (-3.85)	-2.886** (-2.27)	-2.888*** (-2.70)	-2.888*** (-2.70)	-2.914*** (-2.68)
Rated	-0.000543 (-0.18)	0.00413 (1.24)	0.00371 (1.06)	0.00371 (1.06)	0.00601 (1.49)
Obligor Rating	0.00453*** (2.65)	0.000638 (0.34)	0.000728 (0.36)	0.000728 (0.36)	0.000313 (0.14)
Unstable					0.00790** (2.05)
Unstable*Lender Bank Loans					-10.42*** (-2.69)
Unstable*Lender Bank Loans*EBP					-25.95** (-2.17)
Unstable*EBP					0.0281*** (2.60)
Loan controls	Yes	Yes	Yes	Yes	Yes
Loan FE	No	No	Yes	Yes	Yes
Borrower FE	No	Yes	No	No	No
Observations	131201	118628	130732	130732	106281
Adjusted R2	0.006	0.027	0.029	0.029	0.028

Implications of Nonbanks Access to Bank Credit - New Originations

Table 10: Nonbank New Originations

$$LoanOriginations_{ijt} = \alpha + \mu_i + \beta * LenderBankloan_{j,t-1} * EBP_t + \gamma X_{i,t} + \epsilon_{ijt}$$

	(1)	(2)	(3)
ExcessBondPremium (EBP)	-0.0819*** (-12.40)	-0.0914*** (-13.12)	-0.0574*** (-4.06)
Lender Bank loans	1.555*** (4.02)	1.248*** (3.59)	2.997*** (3.43)
EBP * Lender Bank loans	4.225*** (3.73)	4.085*** (3.83)	6.783*** (2.63)
EBP * Rating			0.00834 (1.17)
Lender Bank Loan * Rating			-0.361 (-0.73)
EBP * Lender Bank Loan * Rating			-1.090 (-0.72)
Loan controls	Yes	Yes	Yes
Borrower FE	No	Yes	Yes
Loan FE	No	No	No
Observations	133835	133726	83450
Adjusted R2	0.055	0.113	0.162

Conclusion and Discussion

- Bank funding plays a crucial role in the resilience of nonbanks as reliable financial intermediaries.
 - The banks exposed to economic shocks shift lending toward nonbank borrowers.
 - The shift towards nonbanks concentrated in weaker banks (lower capital buffer.)
- Nonbanks with access to bank funding demonstrated greater resilience during periods of stress.
- Findings generate optimism about the resilience of nonbank funding and credit provision during periods of economic downturns.
- Implications for policymakers in terms of regulating and monitoring bank-nonbank relationships.

Thank you!

Summary Stats1.

Panel A: O&G Shock

	Observations	mean	p10	p90	sd
O&G Exposure	249	.068	0	.24	.17
CET1 buffer	12	8.7	6.9	11	1.8
Bank Size (\$Bn)	249	58	.81	39	274
Return-on-Assets	249	.0044	.0018	.0067	.002
Non-Interest Income/NI	249	1.7	.32	3.7	2
Equity/Total Assets	249	.11	.079	.14	.028
Wholesale Funding	249	.1	.025	.2	.091
NPL/Total Assets	249	.0096	.0024	.015	.012

Panel B: COVID Shock

	Observations	mean	p10	p90	sd
COVID Exposure	204	.2	0	.46	.24
CET1 buffer	20	3.1	1.8	5.4	1.3
Bank Size (\$Bn)	204	84	3.5	109	332
Return-on-Assets	204	.012	.007	.016	.0035
Non-Interest Income/NI	204	1.1	.31	1.8	1
Equity/Total Assets	204	.12	.091	.16	.024
Wholesale Funding	204	.13	.046	.21	.086

Summary Stats2.

Panel A: O&G Shock

Intensive Margin	All Loans			Nonbanks		
	Number of Loans	mean	sd	Number of Loans	mean	sd
Loan Size (MM)	21708	604	917	3978	655	1,080
$\Delta \ln(\text{Loan Size})$	21708	.01	.38	3978	.014	.34
Exit Margin	Number of Loans	mean	sd	Number of Loans	mean	sd
	Loan Size (MM)	18054	498	807	2858	482
Entry Margin	Number of Loans	mean	sd	Number of Loans	mean	sd
	Loan Size (MM)	1166	529	1,058	117	675

Panel B: COVID Shock

Intensive Margin	All Loans			Nonbanks		
	Number of Loans	mean	sd	Number of Loans	mean	sd
Loan Size (MM)	38423	667	959	8182	663	835
$\Delta \ln(\text{Loan Size})$	38423	-.04	.39	8182	-.022	.33
Exit Margin	Number of Loans	mean	sd	Number of Loans	mean	sd
	Loan Size (MM)	7616	652	1,295	1340	700
Entry Margin	Number of Loans	mean	sd	Number of Loans	mean	sd
	Loan Size (MM)	1490	862	1,224	230	1,119

Balance test

Panel A: Oil Shock

Covariates	Coefficients	p-value	Observations	Mean Treatment Group	Mean Control Group
Bank Size	1.986454	.0044549	233	16.66352	15.28937
Return-on-Assets	.0002689	.7054937	233	.0045692	.0043203
Non-Interest Income/NI	.026115	.6334769	233	.3284648	.2638759
Equity/Total Assets	.0175723	.0979466	233	.1169354	.1103709
Wholesale Funding	-.0047981	.8581593	233	.1111498	.0868502
NPL/Total Assets	-.0061479	.2284286	233	.0145069	.0149848

Panel B: COVID Shock

Covariates	Coefficients	p-value	Observations	Mean Treatment Group	Mean Control Group
Bank Size	-.6672392	.0079104	187	16.23059	16.75999
Return-on-Assets	-.0006118	.5121053	187	.0119371	.0117645
Non-Interest Income/NI	-.0720154	.0319973	187	.2306725	.2875751
Equity/Total Assets	-.0077503	.218678	187	.1191214	.1211735
Wholesale Funding	-.0092621	.5526199	187	.1121377	.1307236