EUROPEAN CENTRAL BANK

EUROSYSTEM

Spare tyres with a hole: investment funds under stress and credit to firms

Giulio Nicoletti (DGMP) Judit Rariga (DGMP) Costanza Rodriguez d'Acri (DGMF)

CHAMP Worstream 1 Workshop on NBFIs
Frankfurt November 17, 2025

Motivation and background

- Non-banks' credit provision to firms increased since the Great Financial Crisis
- As a 'spare tyre' they are an important source of funding diversification for firms when banks are in trouble (e.g. by substituting loans with bonds)
- However, diversification may expose firms to stronger procyclical risks as a large share of corporate bonds is held by the investment fund sector.
- The COVID-19 pandemic outbreak provides setting to investigate (quantify) how investment funds under stress transmit and amplify liquidity shocks:
  - Direct channel: via firesale mechanisms operating through funds' holdings of corporate bonds
  - Indirect channel: via deposit withdrawal mechanism operating via short-term deposits (repos) to banks

Investment funds in COVID-19

Figure: Redemptions from euro area Bond funds around COVID-19

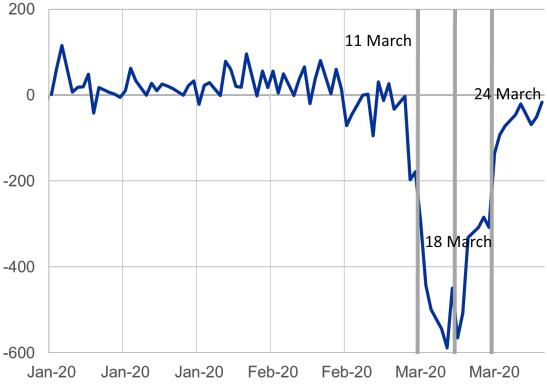


Figure: Source: Lipper

How can investment funds meet clients' redemptions?

a **Selling assets**: corporate yields may tighten if non-banks fire-sell bonds

b **Use their cash**: prior to selling assets, they can use their deposits. This can deprive banks of a source of liquidity and transmitting the shock from non-banks to banks.

This paper finds support for the two channels above to work in conditions of distress. It supports the view that investment funds are procyclical. It finds evidence that policy interventions in the form of purchases mitigate the impact of these channels.

Plan of the talk

Non-banks' relevance in firm and bank financing

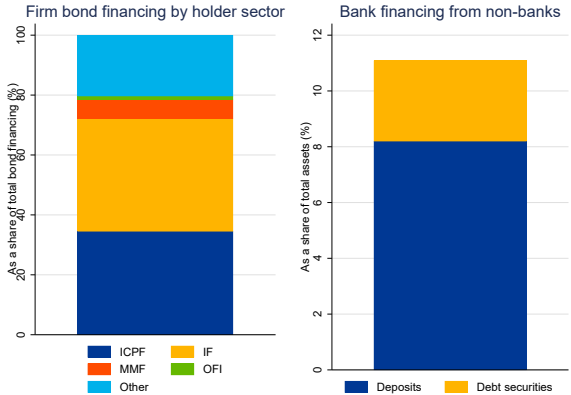


Figure: 2021 Q3. The left panel shows the distribution of corporate bonds by holder sector in the euro area. The right panel shows deposits and debt securities of non-banks in banks' balance sheets as a share of banks' total assets. Own calculations based on ECB Supervisory Statistics, ECB Securities Holding Statistics by Sector.

What happened with the COVID-19 shock (11/03/2020)?

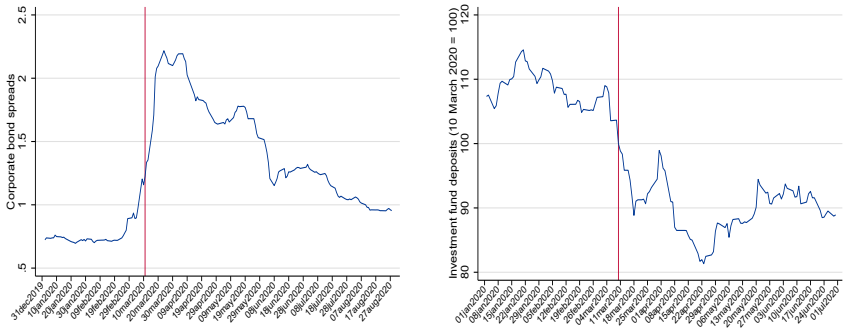


Figure: The left chart shows spreads on corporate bonds. The second chart shows daily data for investment funds' secured and unsecured money market deposits and certificates of deposits held at banks. Own calculations based on ECB Supervisory Reporting, Securities Holding Statistics by Sector and Money Market Statistical Reporting.

Data

- We combine multiple granular data *at daily frequency around the COVID-19 outbreak* to trace the transmission of liquidity shocks generated in the non-bank sector to firms
- **Bond financing** Descriptives bonds
  - **iBOXX** - track the evolution of NFC bond financing costs at daily frequency
  - **SHSS** - **identify** individual bonds/firms' exposure to different holder sectors
  - **CSDB** - control for new bond issuance and bond specific characteristics
- **Bank lending** Descriptives loans
  - **AnaCredit** - define new lending related outcomes, using high-frequency information of AnaCredit
  - **MMSR** - **identify** individual banks' exposure to non-banks
  - **ECB Supervisory Reporting** - control for bank specific characteristics

Related literature

Implications of the growing role of non-banks

- Growing footprint: non-banks as spare tyre (Elliott et al., 2012)
- Liquidity risks and fire-sales (Brunnermeier and Pedersen, 2008) (Fecht and Wedow, 2014)
- Bond pricing: investor base effects (Coppola, 2022); flow effects (Gabaix and Koijen, 2022) and

Banks, non-banks and COVID-19 shock transmission

- Bank lending channel and liquidity shocks (Cingano et al., 2016) (Jiménez et al., 2020))
- COVID-19 turmoil and investor outflows (Falato et al., 2020) (Breckenfelder et al., 2023)
- Mitigating factors of COVID-shock on financial markets (Li et al., 2020)

Design and identification assumptions

When Covid shock hits:

Direct A firm is exposed to investment funds via their concentration of corporate bond holdings (isin level)

Indirect A bank is exposed to investment funds via their share of deposit financing to the bank

$$\Delta Y_{i,t} = \alpha_{i,t} + \beta X + \gamma \omega_{IF,t=preCovid} \times postCovid + \epsilon_{i,t}.$$

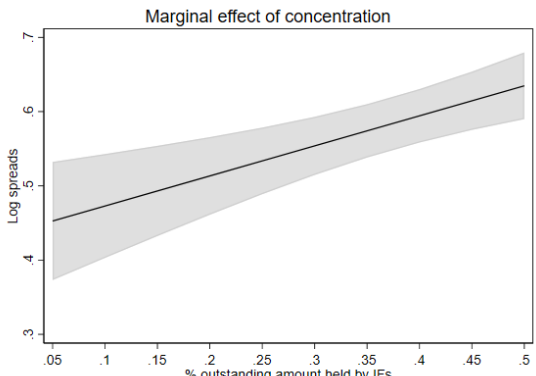
Direct outcomes are bond spreads, $\alpha_{i=f}$ is fixed-effect at the firm f and X are bond and firm level controls, including rating (and timeXrating)

Indirect (new) loans and their terms/conditions. $\alpha_{s,i,c,t}$ is a fixed effect which controls for sector-country (ILS) and X_b are bank level controls.

- DiD-rooted, shares prior to the shock used as exposures to identify channels (see Goldsmith-Pinkham et al, AER 2020
- 3 February-17 March 2020 (24 March), 11 March as treatment date (WHO declared the coronavirus (COVID-19) outbreak a global pandemic), 18 March is the announcement of purchases by ECB (PEPP), 24 March is its implementation.

Do investment funds widen bond spreads? (Direct channel)

Effect on log-spreads of higher IF-holding concentration

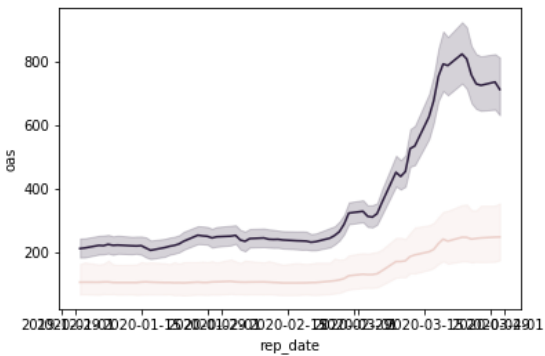


Bonds more concentrated in investment funds increased their spreads more after COVID

- Indirect evidence of IFs **selling assets**
- Such channel explains part of the observed increase in bond spreads
- Controlling for bond ratings, pre shock but also interacting post dummy with rating and by matching bonds of the same ratings does not change results

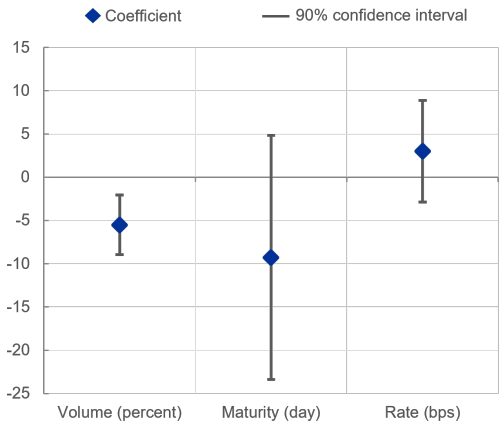
Do investment funds widen bond spreads? (Direct channel) Visual evidence

Effect on log-spreads of higher IF-holding concentration



Bonds more concentrated in investment funds increased their spreads more after COVID

Do non-banks affect the bank lending channel? (Indirect channel)



Sources: AnaCredit, MMSR, Supervisory statistics.

- ✓ **Share of IF's funding matters**
  - **Focus on new loans**: to identify impact of pandemic outbreak
  - **Control for demand**: industry-location-size-time fixed effects
  - **Large vs small firms**: effects on small firms
  - **Intensive vs extensive margin**: intensive margin
  - **Which banks' characteristics matter?** Capital and NPL

Robustness and placebo tests

Also included in the paper:

- Corroborating evidence for indirect channel (banks): did banks have access to alternative sources of funding ?
- Parallel trend discussion for DiD
- All regressions control progressively for an increasing number of features and results do not change: tables with several regressions, also including non continuous treatments
- Placebo tests: what would have happened taking the same dates one year apart? No significant effects
- Balance tables
- ...

Alternative funding for Banks? I

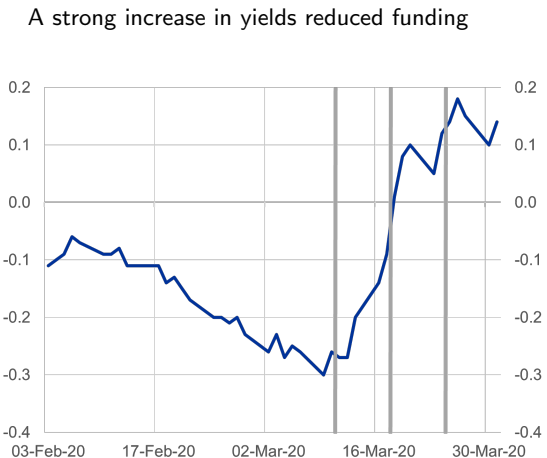


Figure: Source: Haver Analytics

Yields on bonds to be used as collateral were surging

- The yields on Bund 10 year started to surge
- This brought up all other bond yields
- This implied that banks seeking liquidity by using bonds (at the central bank or in private markets) could do so with more difficulty as collateral prices were falling.

Alternative funding for Banks? II

Figure: In March inflows from Households, limited

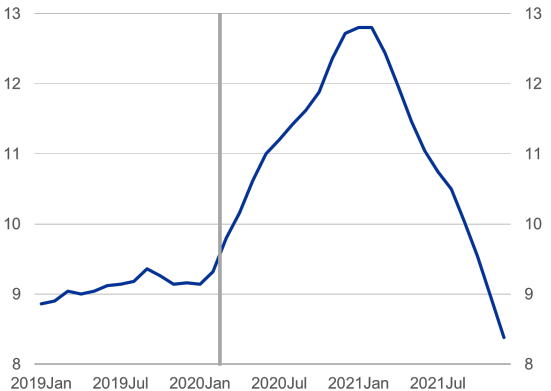


Figure: Source: Haver Analytics

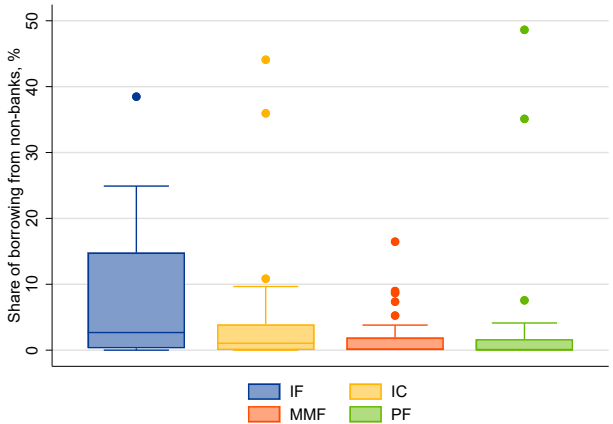
- Households could have liquidated their holdings and opened new deposits in the banking system, thus supporting their liquidity
- (Li et al., 2020) make this case for the US
- In the euro area the bulk deposit increases were later however

Conclusion

- Liquidity shock affecting non-banks at the outbreak of the COVID-19 pandemic resulted in tighter bond financing conditions for firms and reduced bank lending
  - Bond market conditions tightened for firms with bonds mostly held by investment funds
  - Banks most affected by investment fund deposit outflows curtailed their lending to firms
- **Policy implications**: risks in the euro area non-bank sector can spill-over to banks and affect credit provision to firms both directly via bonds and indirectly via bank loans

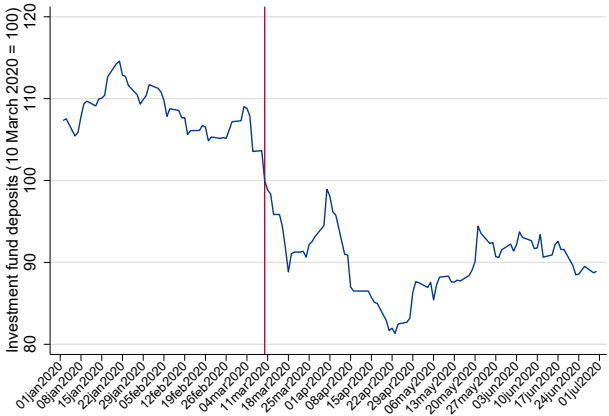
Thank you for your attention!

Euro area banks' exposure to non-banks in repo markets (January 2020)



Notes: Distribution of banks' secured and unsecured deposits from funds, as a share of total money market deposits on 31 January 2020. Own calculations based on Money Market Statistical Reporting.

Main events during COVID-19/COVID-19 shock



Notes: The chart shows daily data for investment funds' secured and unsecured money market deposits and certificates of deposits held at banks. Own calculations based on MMSR.

Descriptives - bonds

Notes: Back

Descriptives - bank lending

	Mean	Median	SD	Number of obs.
Loan level				
Volume (Th. EUR)	93.8	23.2	241.6	*467,795*
Volume, wo off-bs. (Th. EUR)	72.8	15.8	217.6	*467,795*
Maturity (Months)	24.8	10.0	41.1	*460,586*
Rate (Percent)	3.3	1.6	8.1	*379,575*
Firm level				
Volume (Th. EUR)	124.1	30.0	347.5	*345,496*
Volume, wo off-bs. (Th. EUR)	97.4	18.0	317.3	*345,496*
Maturity (Months)	26.0	9.2	42.9	*345,496*
Rate (Percent)	1.8	1.0	3.6	*345,496*
Employment (Th.)	152.0	0.0	3894.8	*279,747*
Turnover (Bn. EUR)	484.9	0.0	26881.7	*294,680*
Assets (Bn. EUR)	624.2	0.0	36916.0	*284,657*
NPL share (Percent)	1.1	0.0	9.3	*289,876*
Bank level				
Assets, (Bn. EUR)	485.9	263.0	461.2	*32*
Capital share (Percent)	1.5	1.0	1.8	*32*
ROE (percent)	4.4	5.8	4.8	*31*
Sh. non-performing (Percent)	6.2	4.7	4.9	*34*
Debt securities (Bn. EUR)	82.5	49.6	74.0	*32*

Notes: The table provides descriptive statistics for *new* loans, and for firms that borrow and banks that give a new loan in our period of interest. Loan level statistics refer to new loans granted on a daily basis in the period 2 February - 17 March 2020. Investment fund (IF) exposure is defined as the share of secured and unsecured borrowing from IFs to total money market borrowing in January 2020, based on transactions reported in MMSR.

Back

Additional literature

Financial stability implications of non-banks

- Growing footprint of non-banks: spare tyre stepping in for banks when constrained by capital (Elliott et al., 2012) or regulation (Chernenko et al., 2022)
- Old risks, new clothes: liquidity risks linked to easy redemption policies, procyclical margining, fire-sale dynamics, the lack of regulation ((Brunnermeier and Pedersen, 2008); (Fecht and Wedow, 2014); (Gennaioli et al., 2013); (Pozsar and Singh, 2011))
- Non-banks as a heterogeneous bunch: investor base affects bond price (and fire-sale) dynamics (US insurers' evidence by (Coppola, 2022), (Ellul et al., 2011), (Bretscher et al., 2021), (Falato et al., 2021) and (Jiang et al., 2022))

Banks, non-banks and COVID-19 shock transmission

- Bank lending channel expanded: beyond traditional liquidity shocks ((Khwaja and Mian, 2008), (Jiménez et al., 2020) and (Cingano et al., 2016))
- Heterogeneous shock amplification: non-banks contract syndicated lending more than banks during financial shocks (Aldasoro et al. (2023))
- Covid turmoil: unprecedented investor outflows from investment funds both in US (Falato et al., 2020) and euro area (Breckenfelder et al., 2023)

Empirical framework (1)

- In a DiD setup we compare the bond spread/bank lending outcomes for firms/banks more exposed to IF financing relative to firms/banks which are less exposed
- IF exposure via bonds is defined based on bonds of firm's i being mostly held by IFs
- IF exposure for banks is defined as the share of investment fund exposure in terms of money market borrowing as of 31 January 2020
- Period of interest is 3 February - 17 March 2020, with the post period starting on 11 March, when WHO declared the COVID-19 a pandemic
- Identifying assumption: parallel trends

Empirical framework (2)

Impact on bond spreads

$$\log(Spreads)_{it} = \alpha_{it} + \beta Concentration_i^x + \gamma Concentration_i^x XPost_t + \Gamma X_i + \varepsilon_{it},$$

- where i denotes firms and t denotes daily time. α_{it} refers to firm-time fixed effects, ΓX_i denotes firm controls and $Log(Spreads)_{it}$ denotes bond prices relative to a risk free bond of similar maturity

Impact on bank lending

$$log(Newloans)_{fbt} = \alpha_{sict} + \beta ExposureIF_b \times Post_t + \Gamma X_b + \theta Y_f + \varepsilon_{fbt},$$

- where f denotes firm, b denotes bank and t denotes daily time, X_b is a vector of bank characteristics measured in 2019 Q4, Y_f represents a vector of firm level characteristics as of end-2019 and α_{sict} is firm size -industry - country - time fixed effect.

Impact on spreads of bonds concentrated in investment funds

	(1) Log(spread)	(2) Log(spread)	(3) Log(spread)
treatedXpost	0.3741***	0.4034***	0.3300***
	(0.0452)	(0.0589)	(0.0690)
N	7086	7086	6801
R^2	0.926	0.926	0.909
Firm FE	Yes	Yes	Yes
Bond controls	No	Yes	Yes
Matching	No	No	Yes

Notes: The table shows the results for the spreads of firms' bonds mostly held by investment funds, referring to the week 11-17 March 2020 as the post period. Spreads are defined relative to the OIS rate of closest maturity. The concentration of bond holdings in IFs is computed as the share of market value of total outstanding held by euro area IFs in 2019Q4. The first column is firm level regression including firm-level fixed effects, the second column adds also bond level controls, maturity coupon and ratings. The third column includes also exact matching on the rating of the bond. *** = significant at 1 percent level; ** = significant at 5 percent level; * = significant at 10 percent level.

Impact on spreads of firm bonds concentrated in ICPFs

	(1) Log(spread)	(2) Log(spread)	(3) Log(spread)
treatedXpost	-0.3019***	-0.2897***	-0.2756***
	(0.0701)	(0.0702)	(0.0702)
N	7023	7023	6930
R^2	0.930	0.930	0.927
Firm FE	Yes	Yes	Yes
Bond controls	No	Yes	Yes
Matching	No	No	Yes

Notes: The table shows the results for the spreads of firms' bonds mostly held by insurance companies and pension funds (ICPFs), referring to the week 11-17 March 2020 as the post period. Spreads are defined relative to the OIS rate of closest maturity. The concentration of bond holdings in ICPFs is computed as the share of market value of total outstanding held by ICPFs in 2019Q4. The first column is firm level regression including firm-level fixed effects, the second column adds also bond level controls, maturity coupon and ratings. The third column includes also exact matching on the rating of the bond. *** = significant at 1 percent level; ** = significant at 5 percent level; * = significant at 10 percent level.

Do non-banks widen bond spreads?

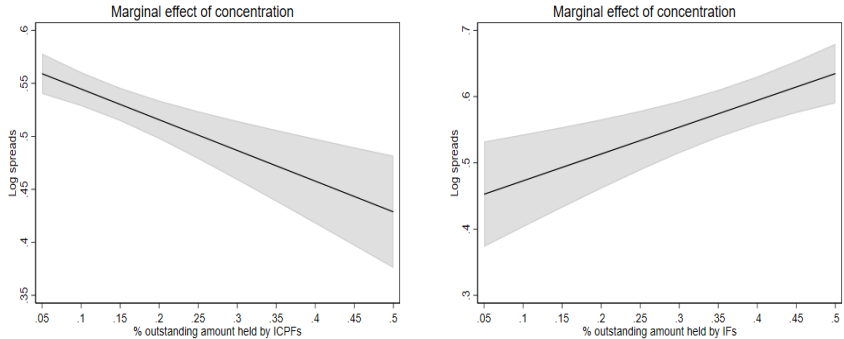


Figure: The left chart shows change in log spreads on corporate bonds for ICPFs-concentrated securities as function of the concentration after COVID-19. The right chart shows the same but for IF-concentrated securities. Sources: Markit IBoxx, SHSS, Eikon, CSDB.

Impact on *new* bank loans

	(1) Volume	(2) Volume	(3) Volume	(4) Volume	(5) Volume
treatedXpost	-0.0031***	-0.0034***	-0.0029**	-0.0061***	-0.0055***
	(0.0010)	(0.0013)	(0.0012)	(0.0020)	(0.0021)
N	308381	249727	138212	146997	127113
R^2	0.000	0.037	0.764	0.434	0.453
Firm FE	No	No	Yes	No	No
Bank controls	No	Yes	Yes	Yes	Yes
Firm controls	No	No	No	No	Yes
Size-industry-country-time FE	No	No	No	Yes	Yes

Notes:Period covered in the analysis is 3 February - 17 March 2020, with post period starting on 11 March. Outcome variable is log volume of new lending. New lending is defined as the sum of new on and off balance sheet amounts granted on a daily basis. Bank controls refer to ROE, non-performing loan shares, total assets, capital ratio and debt securities for Q4 2019. Firm controls refer to firm turnover and assets at the end of 2019.*** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Lending impact by bank characteristics

	(1) Volume	(2) Volume	(3) Volume
treatedXpost	-0.0099***	-0.0051**	-0.0002
	(0.0023)	(0.0024)	(0.0038)
CapitalXtreatedXpost	0.0083***		
	(0.0023)		
ROEXtreatedXpost		-0.0016	
		(0.0023)	
NPLXtreatedXpost			-0.0076**
			(0.0037)
N	127063	127063	146988
R^2	0.454	0.453	0.433
Firm FE	No	No	No
Bank controls	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes
Size-industry-country-time FE	Yes	Yes	Yes

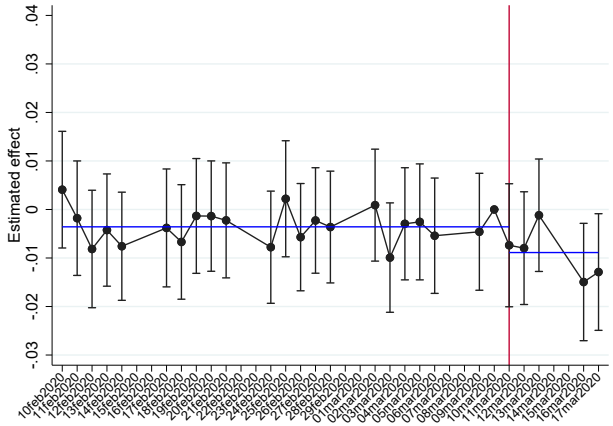
Notes: Capital, ROE and NPL are dummy variables taking value 1 for above median values. All bank-level variables defined in Q4 2019. The period covered in the analysis is 3 February - 17 March 2020. Outcome variable is log volume of new lending. *** = significant at 1 percent level; ** = significant at 5 percent level; * = significant at 10 percent level.

Lending impact by firm characteristics

	(1) Volume	(2) Volume	(3) Volume	(4) Volume	(5) Volume
treatedXpost	0.0193***	-0.0058***	-0.0067*	-0.0128***	-0.0175***
	(0.0053)	(0.0021)	(0.0037)	(0.0028)	(0.0037)
SMEXtreatedXpost	-0.0264***				
	(0.0053)				
NPLXtreatedXpost		-0.0024			
		(0.0048)			
ConnectedXtreatedXpost			0.0009		
			(0.0034)		
HighturnoverXtreatedXpost				0.0099***	
				(0.0027)	
ServicesXtreatedXpost					0.0140***
					(0.0043)
N	126907	127063	127063	127063	118006
R^2	0.454	0.454	0.462	0.453	0.451
Firm FE	No	No	No	No	No
Bank controls	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Size-industry-country-time FE	Yes	Yes	Yes	Yes	Yes

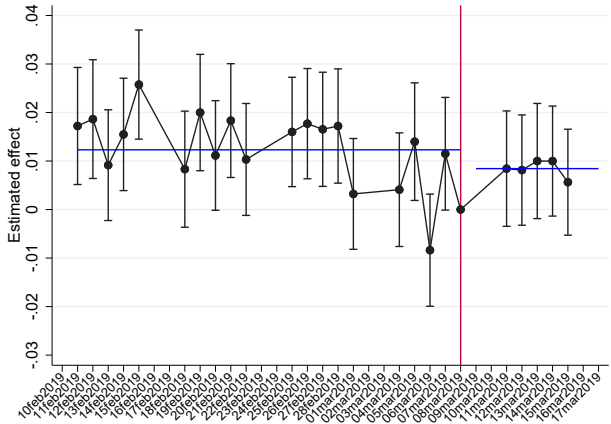
Notes: In column (1), *SME* is a dummy variable indicating small- and medium sized enterprises according to the the Eurostat definition based on headcount, turnover and balance sheet total. In column (2), *NPL* is a dummy variable which takes value 1 if the firm had some non-performing exposure in Q4 2018, Q2 2019 or Q4 2019. In column (3), *Connected* is a dummy variable which takes value 1 if the firm had an outstanding exposure with the bank in Q4 2019. In column (4), high turnover is a dummy variable which takes value 1 if the firm had above median sales in 2019. In column (5), *Services* indicated the additional impact for firms in the services sector, relative to firms in manufacturing and construction. Outcome variable is log volume of new lending. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level..

Bank lending impact around the COVID-19 outbreak, volumes



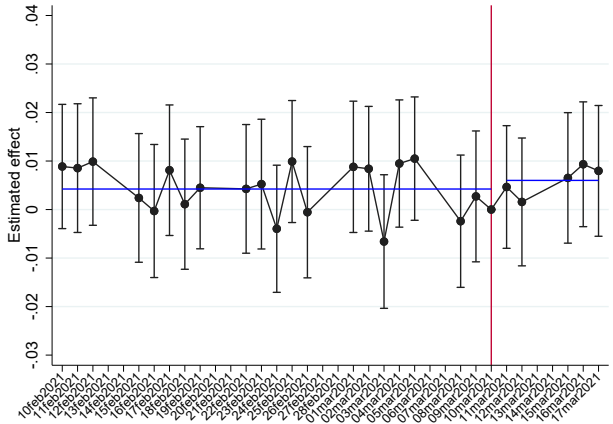
Notes: The outcome variables is log volume of new loans. New lending is defined as the sum of new on and off balance sheet amounts granted on a daily basis. Horizontal lines represent pre- and post-treatment average effects across days. Error bars represent 95 percent confidence intervals.

Bank lending impact around the COVID-19 outbreak, volumes in 2019



Notes: Outcome variable is log volume of new loans for the period 2 February - 17 March 2019. Horizontal lines represent pre- and post-treatment average effects across days. Error bars represent 95 percent confidence intervals.

Bank lending impact around the COVID-19 outbreak, volumes in 2021



Notes: Outcome variable is log volume of new loans for the period 2 February - 17 March 2021. Horizontal lines represent pre- and post-treatment average effects across days. Error bars represent 95 percent confidence intervals.

References

Aldasoro, I., S. Doerr, and N.-b. L. D. C. Zhou, Haonan (16 February 2023). Non-bank lending during financial crises. BIS Working Papers No 1074.

Breckenfelder, J., N. Grimm, and M. Hoerova (2023). Do non-banks need access to the lender of last resort? evidence from fund runs. ECB Working Paper Series No 2805 April 2023.

Bretscher, L., L. Schmid, I. Sen, and V. Sharma (2021, January). Institutional Corporate Bond Demand. Swiss Finance Institute Research Paper Series 21-07, Swiss Finance Institute.

Brunnermeier, M. K. and L. H. Pedersen (2008, 11). Market Liquidity and Funding Liquidity. The Review of Financial Studies 22(6), 2201–2238.

Chernenko, S., I. Erel, and R. Prilmeier (2022, 03). Why Do Firms Borrow Directly from Nonbanks? The Review of Financial Studies 35(11), 4902–4947.

Cingano, F., F. Manaresi, and E. Sette (2016). Does Credit Crunch Investment Down? New Evidence on the Real Effects of the Bank-Lending Channel. The Review of Financial Studies 29(10), 2737–2773.

Coppola, A. (2022). In Safe Hands: The Financial and Real Impact of Investor Composition Over the Credit Cycle. Manuscript, available at https://acoppola.s3.amazonaws.com/safehands-draft.pdf.

Elliott, D., R. Meisenzahl, J.-L. Peydró, and B. Turner (2012). Nonbank Lenders as Global Shock Absorbers: Evidence from US Monetary Policy Spillovers. Bank of England Staff Working Paper No. 1,012.

Ellul, A., C. Jotikasthira, and C. Lundblad (2011). Regulatory pressure and fire sales in the corporate bond market. Journal of Financial Economics 101(3), 596–620.

Falato, A., I. Goldstein, and A. Hortaçsu (2020). Financial fragility in the covid-19 crisis: The case of investment funds in corporate bond markets. working Paper 27559, National Bureau of Economic Research.

Falato, A., A. Hortaasu, D. Li, and C. Shin (2021). Fire-sale spillovers in debt markets. The Journal of Finance 76(6), 3055–3102.

Fecht, F. and M. Wedow (2014). The dark and the bright side of liquidity risks: Evidence from open-end real estate funds in germany. Journal of Financial Intermediation 23(3), 376–399.

Gabaix, X. and R. Koijen (2022). In search of the origins of financial fluctuations: The inelastic markets hypothesis [working paper].

Gennaioli, N., A. Shleifer, and R. W. Vishny (2013). A model of shadow banking. The Journal of Finance 68(4), 1331–1363.

Jiang, H., Y. Li, Z. Sun, and A. Wang (2022). Does mutual fund illiquidity introduce fragility into asset prices? evidence from the corporate bond market. Journal of Financial Economics 143(1), 277–302.

Jiménez, G., A. Mian, J.-L. Peydró, and J. Saurina (2020). The real effects of the bank lending channel. Journal of Monetary Economics 115(C), 162–179.

Khwaja, A. I. and A. Mian (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. American Economic Review 98(4), 1413–42.

Li, L., P. E. Strahan, and S. Zhang (2020, 07). Banks as Lenders of First Resort: Evidence from the COVID-19 Crisis. The Review of Corporate Finance Studies 9(3), 472–500.

Pozsar, M. Z. and M. M. Singh (2011, December). The Nonbank-Bank Nexus and the Shadow Banking System. IMF Working Papers 2011/289, International Monetary Fund.