EUROPEAN CENTRAL BANK

EUROSYSTEM

Do non-banks need access to the lender of last resort? Evidence from fund runs

September 2025

The views expressed are solely those of the authors.

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Non-banks increasingly important

In the euro area (EA):

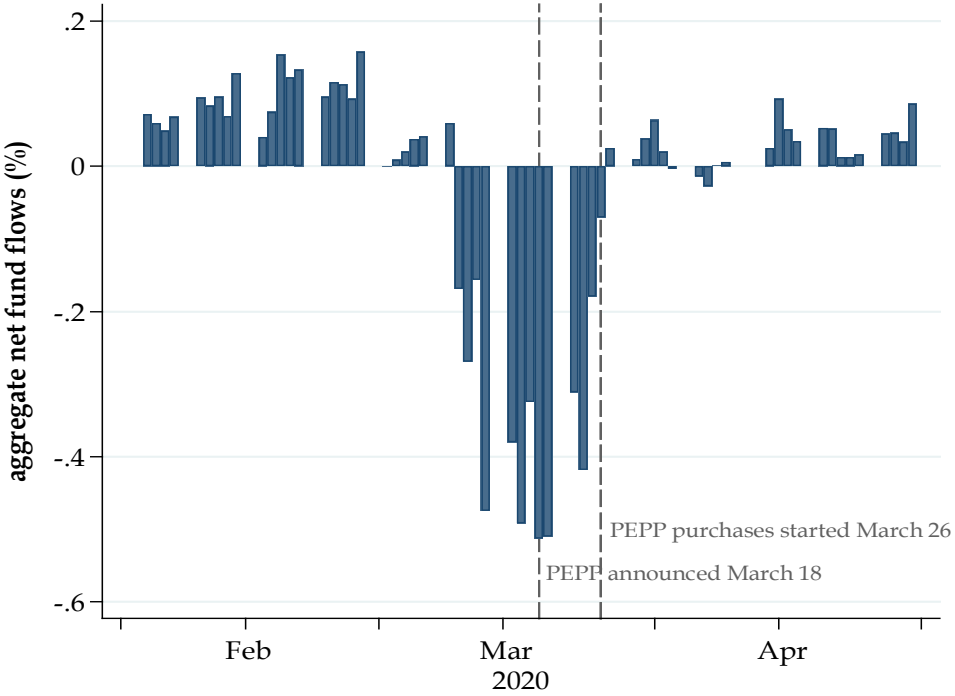
- account for close to 60% of financial sector assets (ECB, 2024)
- a significant source of financing for corporates

Concerns that risks in non-banks can adversely affect financial stability and monetary policy transmission

- March 2020: an unprecedented liquidity crisis in the investment fund sector

→ Do non-banks need access to the lender of last resort (LOLR)?

March 2020 liquidity crisis: “Runs” on EA mutual funds



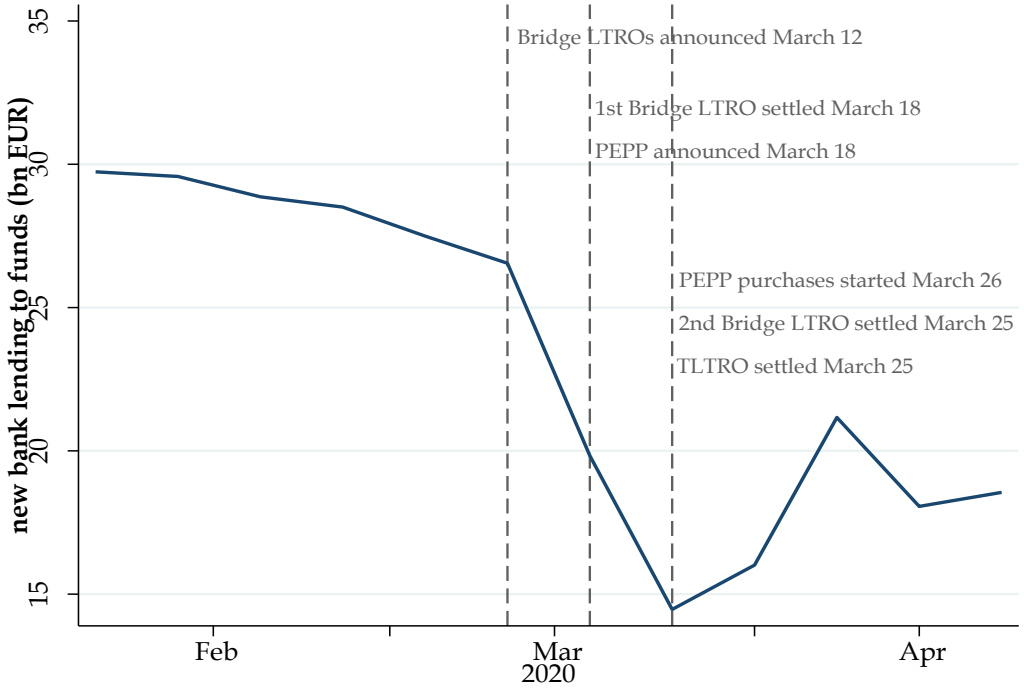
Outflows unprecedented in scale, largely from **bond funds** (€150 bn)

Exceptionally large outflows also in US bond mutual funds (Falato, Goldstein, Hortaçsu, 2021)

Runs → funds fire sell assets → strains on financial markets (Ma, Xiao, Zeng, 2022; Vissing-Jorgensen, 2021)

Note: Daily average bond fund flows (investment grade): $flows_{i,t} = (TNA_{i,t} - (1 + r_{i,t}) * TNA_{i,t-1}) / TNA_{i,t-1}$.
Source: Refinitiv’s Lipper, authors’ calculations.

Funds also faced a dry-up in repo markets



Bank cash lending to investment funds ↓ 50% bw February and March 2020, from €30 bn to €15 bn a day

Note: Bank cash lending to funds in EA secured markets, new transactions (daily averages over a week, € bn).
Source: MMSR, authors' calculations.

This paper

March 2020 crisis as a laboratory to assess two ECB interventions:

1. "Direct": asset purchases → may attenuate fire-sales, directly support market prices of assets held by funds and stabilize outflows
2. "Indirect": liquidity provision to *banks* → banks may channel liquidity to funds (here: through the repo market), reducing fire sale pressures

Why this laboratory?

- trigger: pandemic-induced, aggregate "dash-for-cash"
- interventions: no new facilities set up by the ECB
- granular (daily) data: funds, banks (incl. LOLR access), bank-fund relationships in the repo market

[data]

Outline

1. “Direct” interventions: Asset purchases → Impact on funds

2. “Indirect” interventions: Liquidity to *banks* → Impact on funds

3. Policy implications

1

Central bank asset purchases

Impact of purchases on fund performance and flows

The Pandemic Emergency Purchase Programme (PEPP):

- announced March 18, 2020 (evening), implemented as of March 26, 2020

Focus on bond mutual funds that:

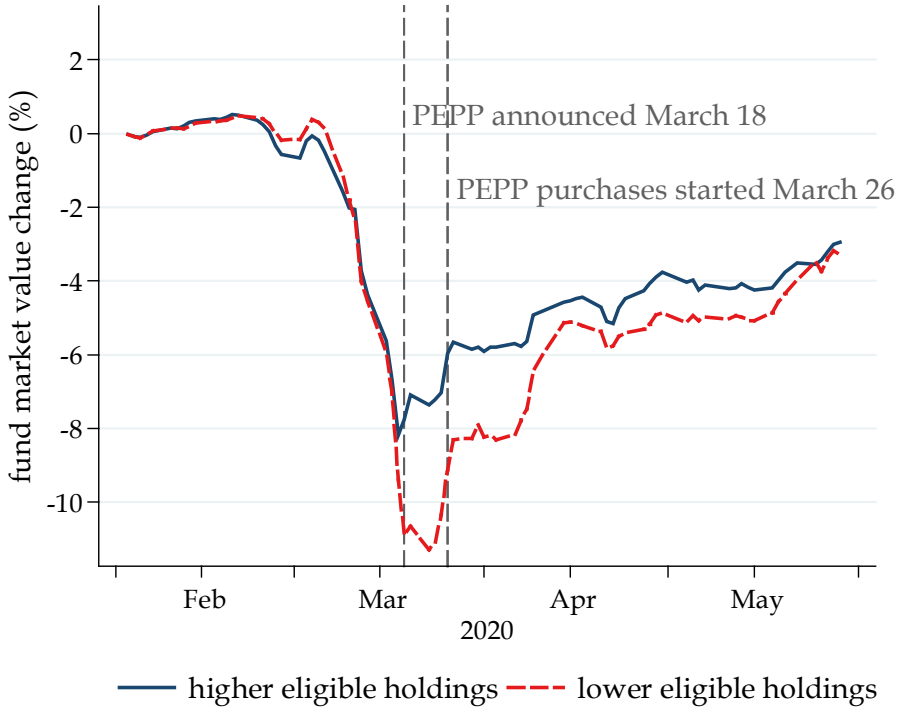
- invest in investment grade securities
- hold a non-zero share of euro area securities in their portfolio

Compare funds with higher shares of PEPP-eligible assets ex ante (Jan. 2020) with funds with lower shares:

- difference related, e.g., to holdings of bonds issued by US-issuers or by EA banks

[stats] [diff-in-diff setup]

PEPP impact on fund performance



Diff-in-diff analysis: after PEPP announcement, a gap between the higher/lower eligible groups

- announcement week: 3.6 p.p.
- 1st implementation week: 2.6 p.p.
- 2nd implementation week: 2.1 p.p.
- thereafter, gap not significant

[table]

Note: Evolution of daily average fund performance.
Source: Refinitiv's Lipper, authors' calculations.

PEPP impact on fund net flows

	differential higher/lower eligible holdings
*crisis onset * eligible bond dummy (> median)*	0.163
	(0.116)
*PEPP announcement * eligible bond dummy (> median)*	**0.323*** **
	(0.111)
*PEPP impl. week 1 * eligible bond dummy (> median)*	0.032
	(0.036)
*PEPP impl. week 2 * eligible bond dummy (> median)*	0.038
	(0.045)
…	…
PEPP announcement	**-0.520*** **
	(0.106)
Observations	77,915
R-squared	0.059
Fund Share FE	YES
Clustered Std. Err.	Fund

PEPP impact on fund net flows

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…	…
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R-squared	0.059
Fund Share FE	YES
Clustered Std. Err.	Fund

In relative terms, net flows in funds with higher eligible holdings ↑ by 62%, after PEPP announcement

By end-March 2020, runs stopped and flows largely stabilized in both groups

Additional analyses

1. We find strong announcement effects → why?

- investigate the role of PEPP flexibility: ECB could temporarily "tilt" its asset purchases towards some issuers
- funds more/less exposed to most indebted EA countries, *within* the more eligible group → performance differential of 2.6 p.p. in the announcement week

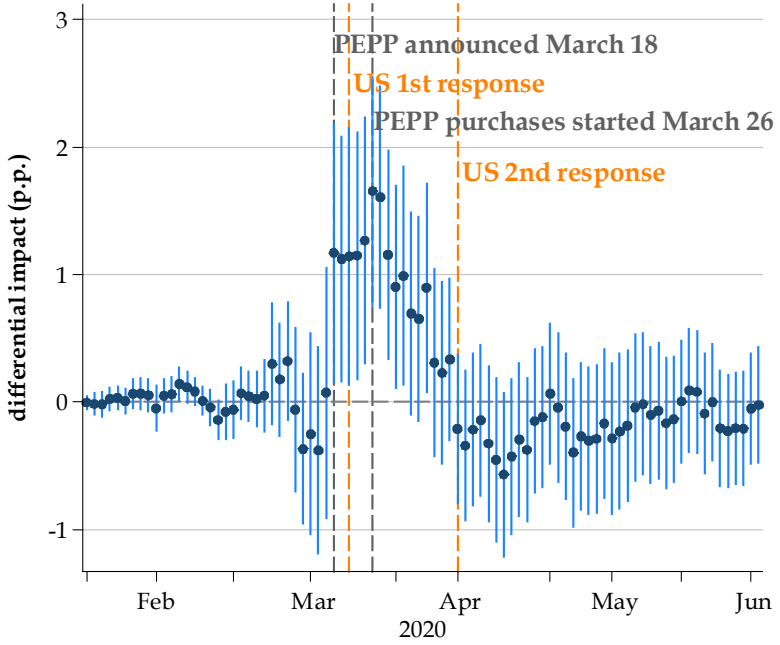
2. Control for US Fed interventions: two large interventions, March 23 and April 9, 2020

- double sort on PEPP and Fed eligibility
- daily dummies to zoom in more closely on the interventions

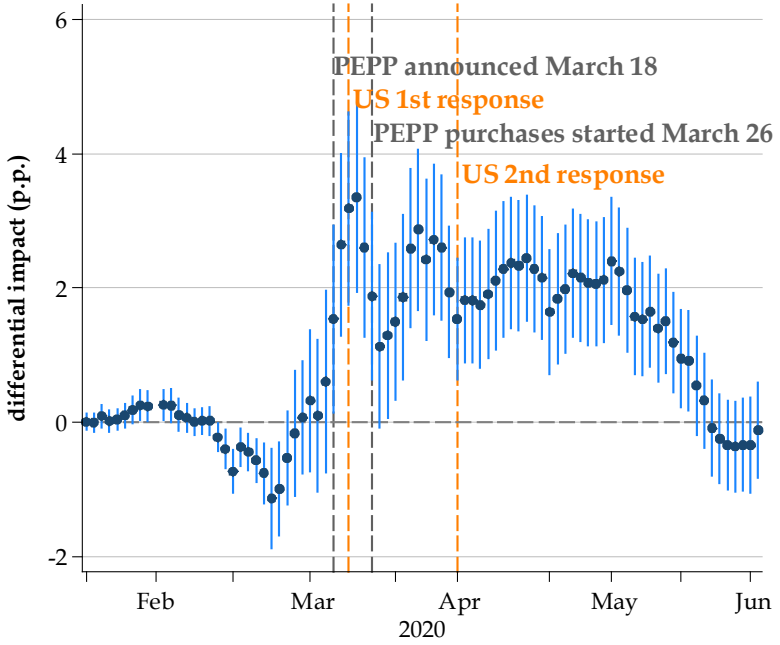
[more]

PEPP and Fed impact on fund performance

higher PEPP-eligible



higher PEPP & higher Fed-eligible



Note: Fund performance, double sort on PEPP/Fed eligibility, regression coefficients on double (LHS) and triple (RHS) interactions.

2

Central bank liquidity provision

CB liquidity provision and bank repo lending

New Long-Term Refinancing Operations - “Bridge” LTROs:

- announced March 12, 2020; conducted weekly; all matured June 24, 2020

Focus on relationships an investment fund had with banks prior to the crisis:

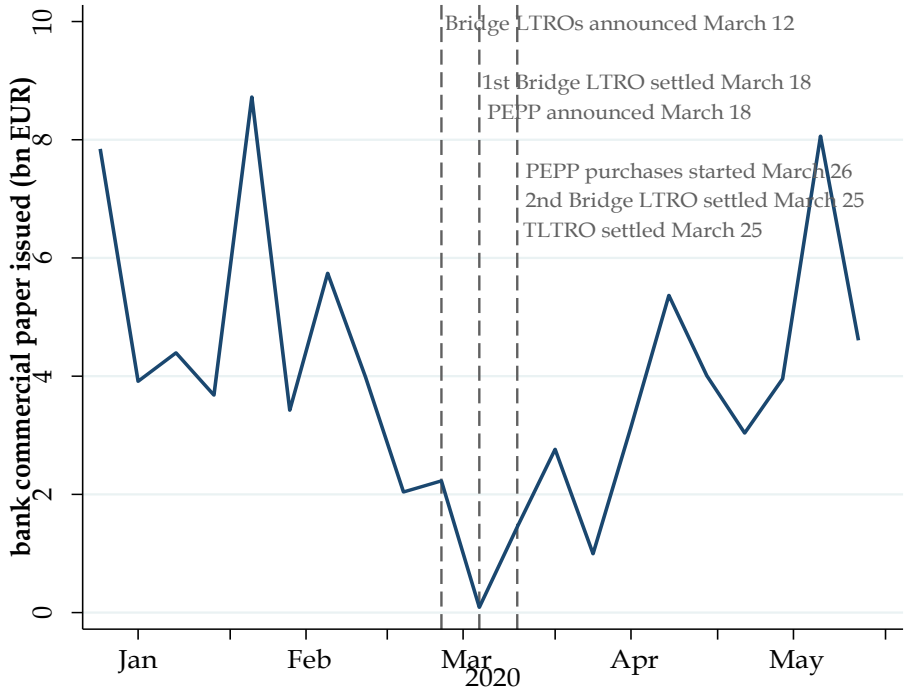
- bank-fund relationships sticky and do not change over time
- funds with ≥2 relationships, control for fund-specific effects (Khwaja, Mian, 2008)

Compare repo lending across banks with higher / lower exposure to the pandemic-induced liquidity crisis ex ante:

- two cross-sectional splits: 1) on commercial paper roll-over; 2) on excess reserves

[stats] [diff-in-diff setup]

Commercial paper (CP) issuance came to a standstill



Note: Evolution of new issuances in the bank commercial paper market.
Source: CSDB, authors' calculations.

Split on CP roll-over:

- banks with CP maturing in March 2020 vs those without
- a measure of bank funding liquidity needs

Split on excess reserves:

- excess reserves held (ratio to assets) ex ante (Jan. 2020)
- a measure of readily available liquidity

CB liquidity provision and bank repo lending

Test how bank repo lending to investment funds changed:

1. following the **announcement** of the Bridge LTROs (compared to previous week)
2. following the **settlement** of the 1st Bridge LTRO / PEPP announcement (compared to previous week)

– banks more exposed to March 2020 liquidity crisis should be relatively more affected by the CB liquidity provision

1. **Announcement** of Bridge LTROs:

– no effect on bank repo lending to funds, across more/less exposed banks

[more]

2. Settlement of 1st Bridge LTRO / PEPP announcement

More exposed banks lend more: the growth of repo transactions and repo amounts outstanding ↑

	commercial paper split		excess reserves split	
	Δ transaction volumes	Δ amount outstanding	Δ transaction volumes	Δ amount outstanding
exposure dummy	**1.406****	**1.354*****	**1.639***	**1.642*****
	(0.682)	(0.466)	(0.847)	(0.440)
…	…	…	…	…
bank-level controls	YES	YES	YES	YES
Fund FE	YES	YES	YES	YES
Observations	670	670	670	670
R-squared	0.326	0.250	0.33	0.259
Clustered Std. Err.	Bank	Bank	Bank	Bank

[more]

Banks lend more → impact on funds?

Compare outcomes across funds with / without prior relationship with a bank that obtained liquidity in the 1st Bridge LTRO:

- with / without "indirect" LOLR access

After the 1st Bridge LTRO, funds with ex ante LTRO-bank relationship:

- higher repo borrowing, from the banks that obtained LTRO liquidity
- higher performance and flows, even controlling for PEPP-eligibility

Repos are not a panacea for funds:

- not widely used; not easily scalable due to regulatory leverage limits (10% of NAV)
- by contrast: "direct" interventions (asset purchases) do not add leverage

3

Policy implications

Do non-banks need access to the LOLR?

Funds as eligible CB counterparties? New dedicated credit facility?

- challenges of granting funds access to LOLR: operational; regulatory limits on fund leverage; potential additional risks

This paper: Applying the *existing* toolkit during March 2020 helped

- asset purchases (aka market maker of last resort interventions) effective: fund performance improved upon announcement, outflows stabilized quickly
- central bank liquidity provision to *banks* supported bank repo lending to *funds*

→ An input into a cost-benefit analysis of granting access to non-banks

THANK YOU!

Moral hazard when using *existing* tools?

Direct interventions (aka market maker of last resort):

- Mutual funds (and other non-banks) hold a lot of marketable securities
- Having a defined set of eligible securities - liquid in normal times, in line with Bagehot's principle - may incentivize holding liquid securities ex ante

Indirect liquidity provision through *banks*:

- Banks are regulated and supervised!
- Banks and funds are interconnected: exposures of banks to non-banks can be monitored

Data: A lot of granularity

1. Refinitiv's Lipper for Investment Fund Management: detailed **fund**-(share)-level data including flows, performance and security-level portfolio holdings
2. ECB Market Operations Database: **bank**-level data on the take-up in the ECB liquidity-providing operations as well as the banks' excess reserve holdings
3. Centralized Securities Database: **bank**-level information on their commercial paper issuance (banks' exposure to the March 2020 liquidity dry-up)
4. Individual Balance Sheet Items database: **bank**-level balance sheet information
5. Money Market Statistical Reporting: transactions-level data on money market trading **between banks and investment funds**

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PEPP analysis: fund summary statistics

	lower eligible holdings			higher eligible holdings		
	mean	sd	N	mean	sd	N
Fund share characteristics						
fund value (TNA) (mil)	171	680	1335	160	399	1334
annually compounded return (%)	7.140	5.088	1335	5.052	4.313	1334
Fund portfolio						
investment grade (% of total)	79	11	393	88	12	391
non-investment grade (% of total)	13	10	393	5	6	391
unrated (% of total)	8	8	393	7	15	391
eligible holdings (% of total)	5	6	393	46	24	391
euro area issuers (% of total)	26	21	393	68	22	391
US issuers (% of total)	42	30	393	15	13	391
other issuers (% of total)	32	20	393	17	13	391

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PEPP: Difference-in-difference regression setup

$$x_{i,t} = \beta_0 + \sum_{k=1}^{5} \beta_k \, CrisisPeriod_{k,t} \times relMoreElig_i + \sum_{k=1}^{5} \varphi_k \, CrisisPeriod_{k,t} + \mu_i + X_t + \varepsilon_{i,t}$$

$x_{i,t}$: daily fund share flow or cumulative fund share performance

$CrisisPeriod_{k,t}$: 1 for sub−period k and zero otherwise (5 sub-periods k)

k: run-up (Mar 9–17), PEPP announced (Mar 18–25), PEPP implemented week 1 (Mar 26–Apr 1), week 2 (Apr 2–8), and thereafter

$relMoreElig$: 1 for above-the-median PEPP-eligible holdings at the end of Jan 2020

μ_i: fund share fixed effects

Standard errors are clustered at the fund level

[back]

PEPP impact on fund performance

$$performance_{i,t} = \beta_0 + \sum_{k=1}^{5} \beta_k \, CrisisPeriod_{k,t} \times relMoreElig_i + \sum_{k=1}^{5} \varphi_k \, CrisisPeriod_{k,t} + \mu_i + X_t + \varepsilon_{i,t}$$

	differential higher/lower eligible holdings	differential higher/lower eligible holdings
*crisis onset * eligible bond dummy (> median)*	0.362	0.337
	(0.746)	(0.741)
*PEPP announcement * eligible bond dummy (> median)*	**3.679*** **	**3.641*** **
	(1.460)	(1.449)
*PEPP impl. week 1 * eligible bond dummy (> median)*	**2.630** **	**2.620** **
	(1.169)	(1.169)
*PEPP impl. week 2 * eligible bond dummy (> median)*	**2.094***	**2.070***
	(1.107)	(1.100)
*PEPP impl. week 2 plus * eligible bond dummy (> median)*	0.435	0.422
	(0.773)	(0.772)
...	**...**	**...**
Δ USD/EUR exchange rate		10.885***
		(1.929)
Observations	77,915	77,915
R-squared	0.4066	0.7327
Fund Share FE	NO	YES
Clustered Std. Err.	Fund	Fund

[back]

Central bank asset purchases: PEPP flexibility

We find strong announcement effects → why?

- investigate the role of PEPP flexibility: allowed the ECB to temporarily "tilt" its asset purchases towards some issuers

Compare funds *within* the more PEPP-eligible group:

- funds more/less exposed to securities issued by the most indebted euro area countries (debt-to-GDP ratios of above 90% in December 2019)

A significant differential in performance *within* the more eligible group:

- 2.6 p.p. in the announcement week, 2.1 p.p. in the 1st implementation week
- no differential in outflows

[table] [back]

PEPP flexibility: Fund performance and flows

$$x_{i,t} = \beta_0 + \sum_{k=1}^{5} \beta_k \, CrisisPeriod_{k,t} \times relMoreExposed\_to\_Debt_i + \sum_{k=1}^{5} \varphi_k \, CrisisPeriod_{k,t} + \mu_i + X_t + \varepsilon_{i,t}$$

	cumulative performance		fund flows	
*crisis onset * exposure to indebted countries dummy (> median)*	1.197	1.205	0.008	0.008
	(0.844)	(0.848)	(0.054)	(0.054)
*PEPP announcement * exposure to indebted countries dummy (> median)*	**2.629*** **	**2.633*** **	-0.009	-0.009
	(1.034)	(1.039)	(0.061)	(0.061)
*PEPP impl. week 1 * exposure to indebted countries dummy (> median)*	**2.052*** **	**2.054*** **	0.009	0.009
	(0.889)	(0.893)	(0.049)	(0.049)
*PEPP impl. week 2 * exposure to indebted countries dummy (> median)*	1.216	1.226	-0.005	-0.005
	(0.759)	(0.762)	(0.043)	(0.043)
*PEPP impl. week 2 plus * exposure to indebted countries dummy (> median)*	-0.054	-0.048	0.014	0.014
	(0.568)	(0.571)	(0.031)	(0.031)
...				
Observations	38,982	38,982	38,982	38,982
R-squared	0.3884	0.7317	0.0112	0.0478
Fund Share FE	NO	YES	NO	YES
Clustered Std. Err.	Fund	Fund	Fund	Fund

[back]

Repo analysis: bank-fund summary statistics

	CP rollover need			no CP rollover need		
	mean	sd	N	mean	sd	N
Bank characteristics						
bank total assets (bn)	559	371	8	587	387	8
maturing CP March / bank total assets (%)	0.235	0.215	8	0.000	0.000	8
capital / bank total assets (%)	7.949	3.465	8	6.204	2.094	8
Bank-fund relationships						
repo outstanding amount, total (EUR mil)	167	505	315	105	348	355
repo new transaction volume, total (EUR mil)	334	1420	315	109	574	355

	lower excess reserves			higher excess reserves		
	mean	sd	N	mean	sd	N
Bank characteristics						
bank total assets (bn)	681	373	9	433	332	8
excess reserves / bank total assets (%)	3.144	0.462	9	6.449	2.893	8
capital / bank total assets (%)	7.738	2.818	9	6.227	3.011	8
Bank-fund relationships						
repo outstanding amount, total (EUR mil)	145	476	403	127	413	267
repo new transaction volume, total (EUR mil)	269	1260	403	135	653	267

[back]

Bridge LTROs: Khwaja, Mian (2008) regression setup

$$\Delta bank\ lending_{f,b} = \beta\ relHigherExposure_b + \mu_f + X_b + \varepsilon_{f,b}$$

$\Delta\ bank\ lending_{f,b}$: the log change in bank-fund repo transaction volumes over a week or week-on-week change in the stock of repos outstanding

LTRO announcement effect: Δ bw the week of March 11 and the previous week

1st LTRO settlement effect: Δ bw the week of March 18 and the previous week

$relHigherExposure_b$: 1 for banks with CP roll−over needs in Mar 2020 (scaled by total assets) or 1 for below−the−median excess reserves (scaled by total assets) in Jan 2020

μ_f: fund fixed effects; X_b: bank-level controls

Standard errors are clustered at the bank level

[back]

Bridge LTRO take-up: Regression setup

$$\Delta bank\ lending_{f,b} = \\ = \beta\ relHigherExposure_b \times LTROdummy_b + \gamma\ relHigherExposure_b + \delta\ LTROdummy_b + \mu_f + X_b + \varepsilon_{f,b}$$

$\Delta\ bank\ lending_{f,b}$: the log change in bank-fund repo transaction volumes over a week or week-on-week change in the stock of repos outstanding

$LTROdummy_b$: 1 if bank *b* borrowed liquidity in the 1st Bridge LTRO

$relHigherExposure_b$:1 for banks with CP roll−over needs in Mar 2020 (scaled by total assets) or 1 for below−the−median excess reserves (scaled by total assets) in Jan 2020

μ_f: fund fixed effects; X_b: bank-level controls

Standard errors are clustered at the bank level

[back]

1. Announcement of Bridge LTROs

No evidence of announcement effects on bank repo lending to investment funds, across more/less exposed banks

	commercial paper split		excess reserves split	
	Δ transaction volumes	Δ amount outstanding	Δ transaction volumes	Δ amount outstanding
exposure dummy	-1.160	-0.550	-0.877	-0.398
	(0.871)	(0.487)	(0.597)	(0.358)
…	…	…	…	…
bank-level controls	YES	YES	YES	YES
Fund FE	YES	YES	YES	YES
Observations	670	670	670	670
R-squared	0.474	0.368	0.474	0.367
Clustered Std. Err.	Bank	Bank	Bank	Bank

[back]

2a. 1st Bridge LTRO take-up

More exposed banks that took up 1st Bridge LTRO lend more

	commercial paper split		excess reserves split	
	Δ transaction volumes	Δ amount outstanding	Δ transaction volumes	Δ amount outstanding
exposure dummy x LTRO take-up dummy	**5.517****	2.135	**4.189****	0.947
	(2.439)	(1.780)	(1.589)	(1.249)
…	…	…	…	…
bank-level controls	YES	YES	YES	YES
Fund FE	YES	YES	YES	YES
Observations	670	670	670	670
R-squared	0.341	0.254	0.345	0.260
Clustered Std. Err.	Bank	Bank	Bank	Bank

[back]