

Is there a zero lower bound?

The effects of negative policy rates on banks and firms

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The opinions in this presentation are those of the authors and do not necessarily reflect the views of the European Central Bank, the Central Bank of Ireland, or the Eurosystem.

The transmission of monetary policy below the zero lower bound

- Heated debate about the effectiveness of monetary policy below the zero lower bound
- Two opposite views
 - **Negative interest rates policies would be ineffective or even recessive**
 - Banks would not be able to lower interest rates on deposits, because market participants would rather hoard cash. (see e.g. Keynes, 1936; Krugman, 1998; Eggertsson and Woodford, 2003; Christiano et al, 2011; Correia et al., 2013; Summers, 2014)
 - Negative and low policy rates can be contractionary because they hurt bank profitability and may depress lending (Brunnemeier and Koby, 2018)
 - **In standard New Keynesian models (with sticky price and wage adjustment), negative interest rates policies should (or can) be “central bank business as usual”**
 - (Rogoff 2018; Agarwal and Kimball, 2015; Buiters, 2009)



This paper

- Is the transmission mechanism hampered below the ZLB?
 - Do banks pass negative rates onto (corporate) depositors?
Which banks do so? Do their deposits contract?
 - ✓ Safe bonds in the euro area have negative yields
 - ✓ Safe banks may also be able to do so
 - How negative rates banks (if any) affect firm behavior?



An Overview of the Findings

Effects of the ECB's NIRP:

1. Sound banks pass negative rates on to corporate depositors, without experiencing a contraction in funding.
 - The effects become stronger as policy rates move deeper into negative territory.

About a trillion of corporate deposits are in negative territory by the end of the sample period
2. The NIRP provides stimulus mainly through firms' asset rebalancing: **Corporate channel of monetary policy**
 - Firms with high liquid assets associated with banks offering negative rates increase their investment and decrease cash-holdings.



Related (Empirical Micro) Literature

Growing literature considering the transmission mechanism at negative rates

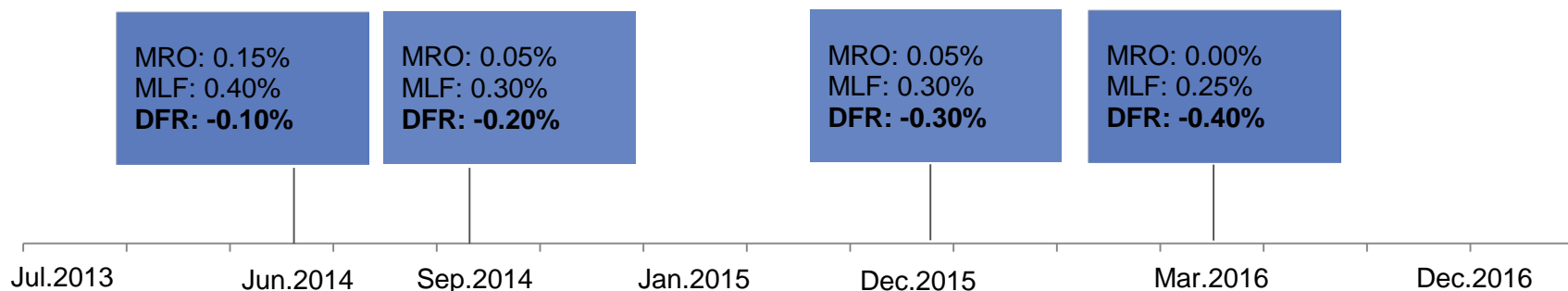
- Eggertsson, Juelsrud, Summers, and Wold (2019)
 - No pass-through to loan rates in Sweden
 - Riksbanken's reports however show dynamic effects

- Heider, Saidi and Schepens (2019)
 - High deposits lenders issue syndicated loans to riskier borrowers after the start of the NIRP
 - They also seems to issue less loans

- Bottero, Minoiu, Peydro, Polo, Presbitero and Sette (2019)
 - Positive effect of the NIRP in Italy because banks reduce liquid assets and expand credit supply

- We are the first to document that at least some banks can pass interest rates on depositors and that their behavior has real effects on investment

The ECB's NIRP



DFR is the relevant rate during the period of negative rates, because

- ✓ banks facing uncertain times tend to hold large amounts of excess liquidity
- ✓ ECB's APP since 2015 increased the volume of excess liquidity in the system

We explore the effects of the NIRP using confidential data from the euro area banks, and a comprehensive sample of firms matched to their main banks.



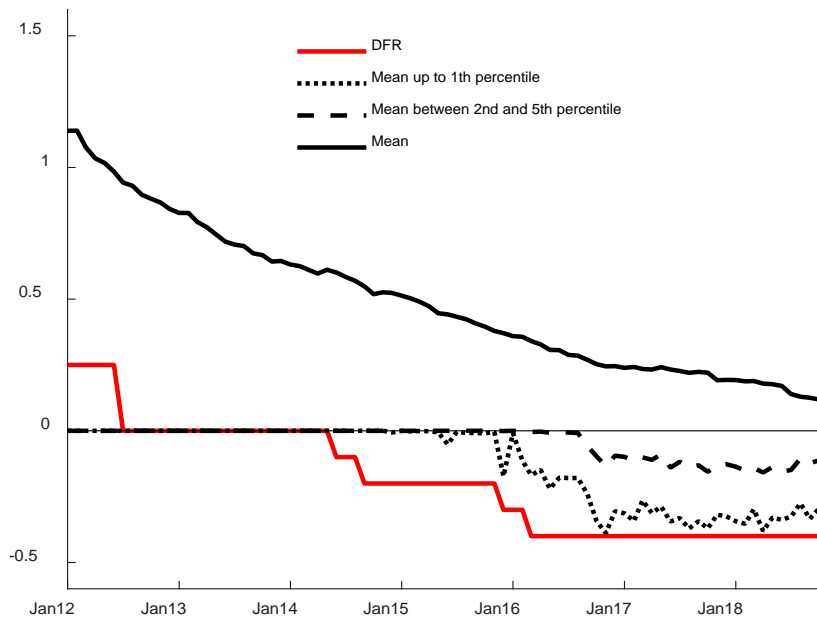
Bank Level data

- Bank level information (confidential data)
 - Individual Balance Sheet Indicators (IBSI):
 - Main asset and liability items of over 260 banks resident in the euro area from August 2007 to September 2018. Unconsolidated level.
 - CDS spreads from Datastream

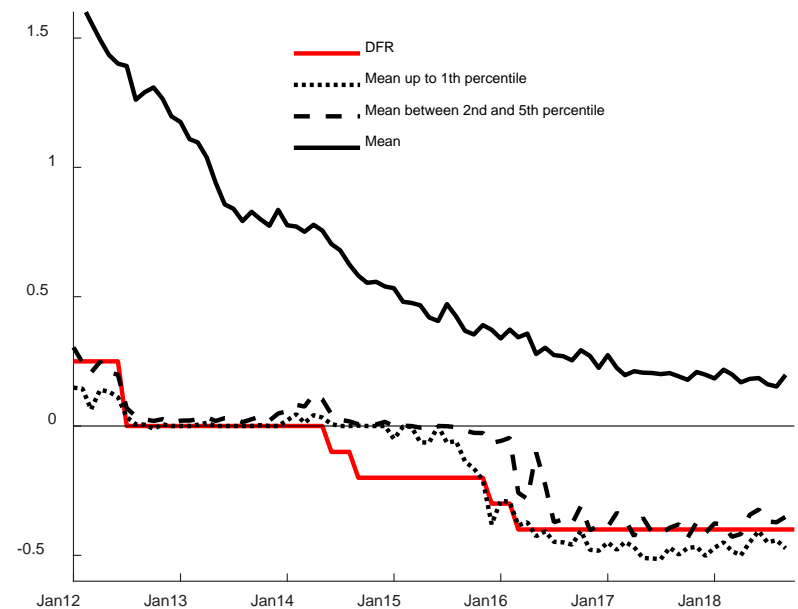
- Deposits and lending rates (confidential data)
 - Individual Monetary and Financial Institutions Interest Rates (IMIR):
 - Deposits and lending rates charged for different maturities and loan sizes

Interest Rate on Corporate Deposits: The ZLB does not exist for some banks

Stock of Deposits
(percentage points)

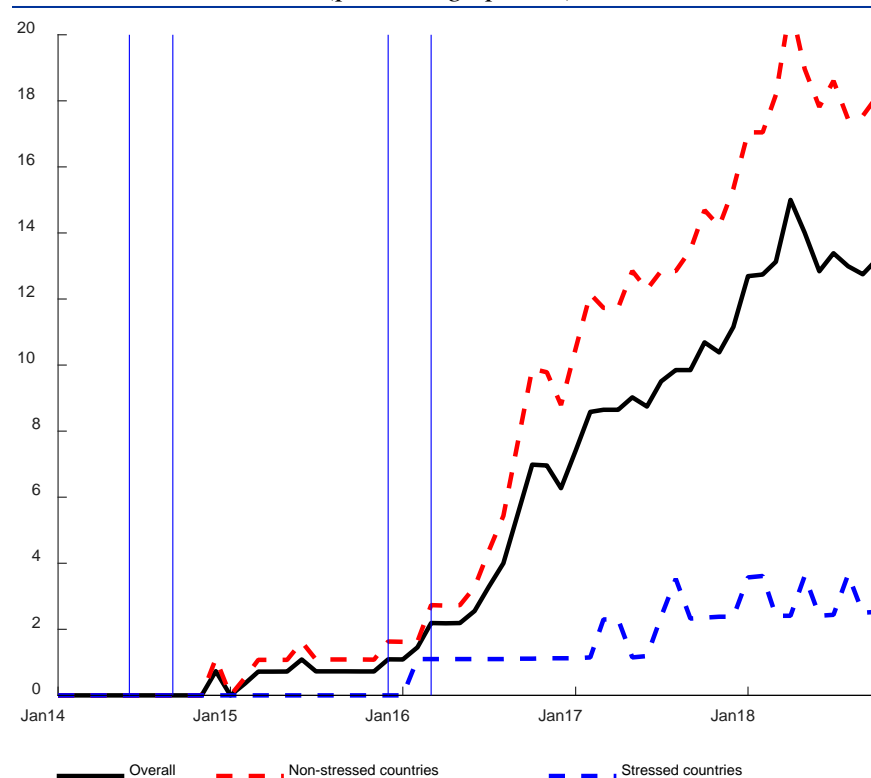


New deposits with maturity less than 1 year
(percentage points)



Deposits with negative rates across countries

Percentage of banks with negative deposits
(percentage points)



35% of corporate deposits yield negative rates (with a peak of 60% in Germany)

Notes: The figure shows the percentage of banks that report offering negative rates on average across all deposit segments distinguishing between stressed countries and non-stressed countries. The blue vertical lines indicate the four episodes of DFR cuts below zero. Latest observation: September 2018. 10

Which banks offer negative rates on deposits?

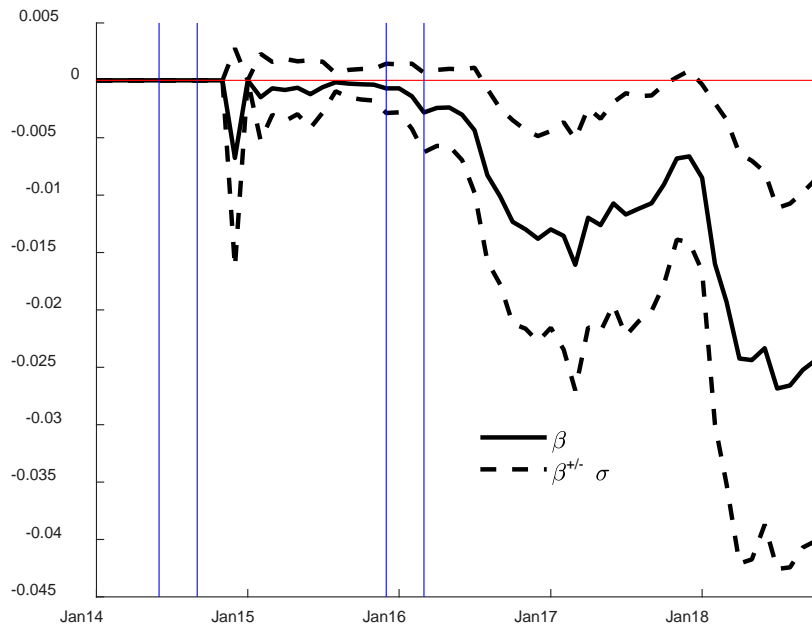
Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Prob. that deposit rate < 0 in month t								
Stressed country	-1.057** (0.473)			-0.752* (0.447)	-0.802 (0.508)			
NPL ratio		-0.051*** (0.019)		-0.039** (0.016)	-0.037* (0.022)	-0.040* (0.023)	-0.007 (0.021)	-0.046* (0.024)
CDS spread			-0.001** (0.000)					
NPL ratio*Exc. liquidity							-0.008* (0.004)	
Additional controls:								
Assets, ROA, Foreign	-	-	-	Yes	Yes	Yes	Yes	Yes
Dep. ratio, Exc. liquidity	-	-	-	-	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	-	-	-	-	-	Yes	Yes	-
Bank FE	-	-	-	-	-	-	-	Yes
Observations	22,633	22,633	13,296	22,633	22,633	22,633	22,633	22,633
R-squared	0.036	0.036	0.043	0.037	0.038	0.079	0.082	0.217

✓ Only sound banks go negative

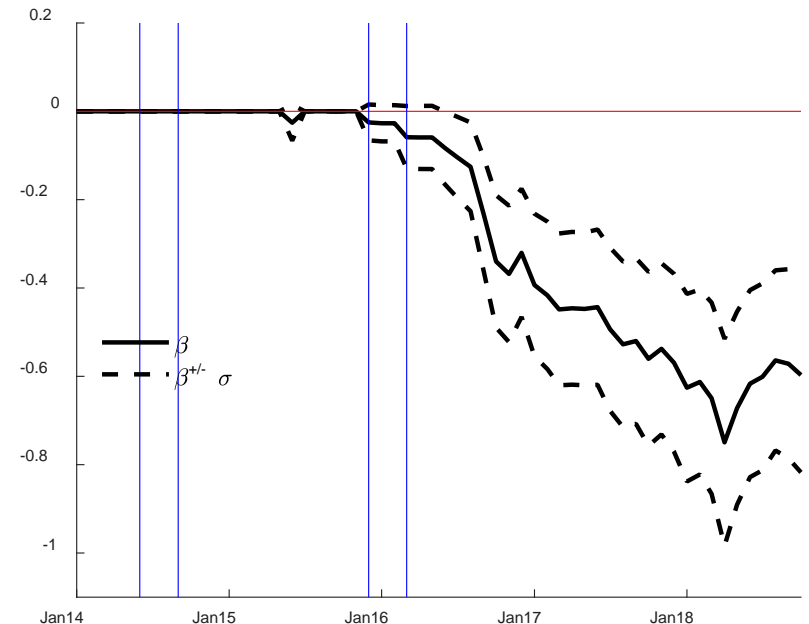
✓ **Variation even within countries**

Which banks offer negative rates on deposits?

Effect of CDS on probability of negative rates
(percentage points for each basis point of CDS)



Effect of NPL on probability of negative rates
(percentage points for each percentage point of NPL)

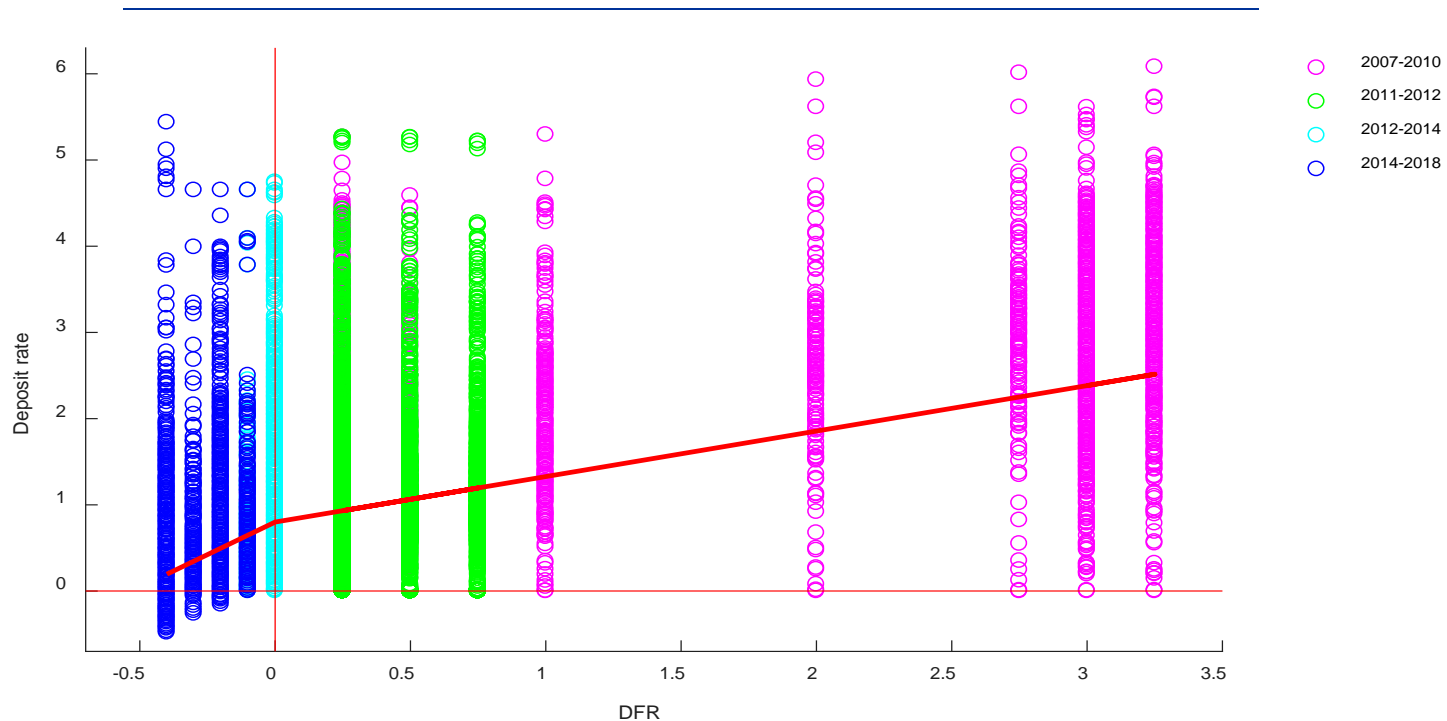


Notes: We plot the estimated coefficient on the CDS (left) and the NPL (right) of cross-sectional regressions in which the dependent variable is a categorical variable that takes value equal to 100 if a bank charges negative rates on deposits. We also plot the confidence intervals. The blue vertical lines indicate the four episodes of DFR cuts below zero. Latest observation: September 2018.

Effect particularly large after last rate cut in March 2016

Interest Rate Pass-Through at Positive and Negative Rates

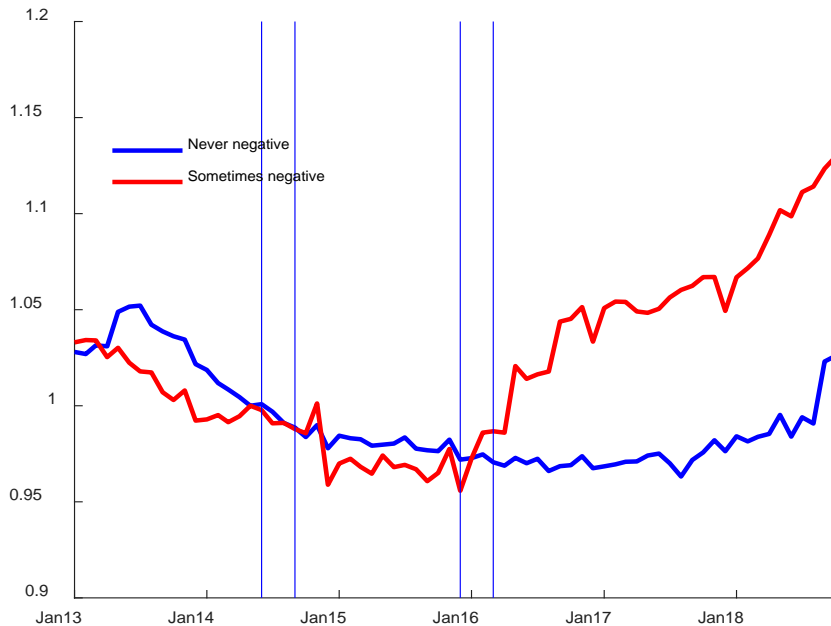
Corporate deposit rates and Deposit Facility Rate
(percentage points)



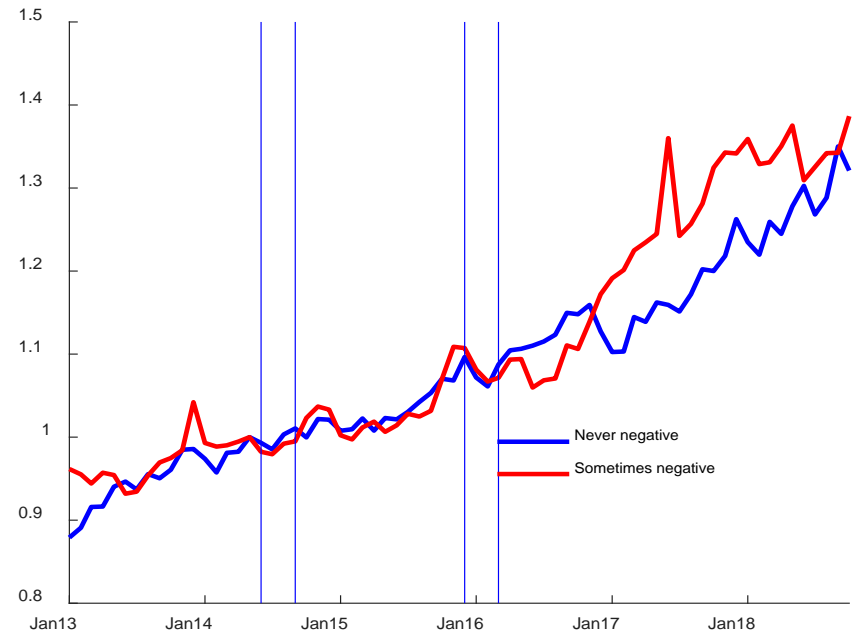
Notes: The solid line is the predicted values of a spline regression of individual banks deposit rate on the DFR and the interaction between the DFR and a dummy variable capturing whether the DFR is negative. The spline regression includes bank fixed effects. We also report the observations for banks' deposit rates associated with different levels of the DFR. Latest observation: September 2018.

Effects of Negative Rates on Loan and Deposit Volumes

Lending volumes
(level; 100=May 2014)




Deposit volumes
(level; 100=May 2014)



Notes: Total lending (left) and total deposits (right) of banks that never charge negative deposit rates as opposed to banks that do offer negative deposit rates. Total volumes for the two categories are normalized to the level in May 2014. The blue vertical lines indicate the four episodes of DFR cuts below zero. Latest observation: September 2018.

- ✓ No contraction in funding for banks with negative rates
- ✓ High NPL banks lend less after the ZLB is hit



The Real Effects of Monetary Policy below the ZLB

- Matched firm-bank data highly representative of the euro area
 - Much more representative than datasets relying on syndicated bank loans

- Firm level information from Bureau Van Dijk's Orbis
 - Financial information on listed and unlisted companies.
 - Information on the most important banks of each firm



Firm Level Sample

- Final sample:
 - Unbalanced panel of 466K firms from 2007 to 2017
 - 12 euro area countries
 - Austria, Estonia, France, Germany, Greece, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, and Spain
 - 89 banks
 - 715 4-digit industry classifications and 27,598 cities

- We can control for shocks faced by different firms, within a cluster, similarly to Acharya et al. (2018)

How Relationships with Negative Rates Banks Affect Firms?

- Implicit assumption: Firms do not switch banks
 - Firms do not want to jeopardize lending relationships
 - Deposits are used for sending and receiving payments
 - ✓ Firms have hundreds of customers and suppliers → Huge transactions costs
 - Firms would have to switch to riskier banks

The Lending Channel and Corporate Investment

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Debt/Assets	Debt/Assets	Debt/Assets	Investment	Investment	Investment
Negative bank*Post	0.728*** (0.176)	0.681*** (0.151)	0.543*** (0.128)	1.045 (0.774)	1.395 (0.889)	0.089 (0.799)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time FE	Yes	-	-	Yes	-	-
Country-Industry-Time FE	-	Yes	Yes	-	Yes	Yes
City-Time FE	-	-	Yes	-	-	Yes
Observations	3,126,407	3,126,406	3,035,455	3,126,515	3,126,515	3,035,564
R-squared	0.797	0.804	0.810	0.177	0.189	0.217

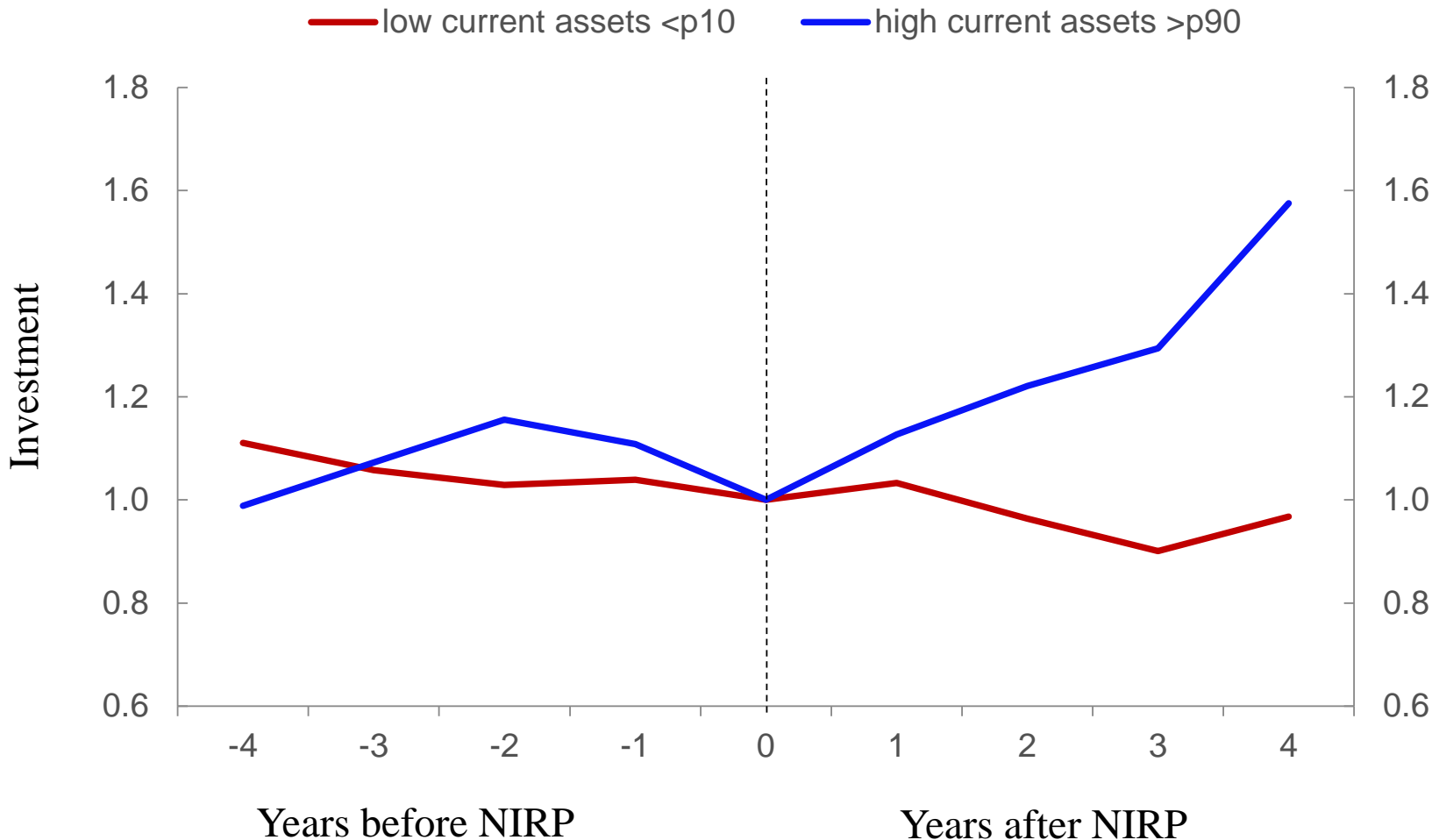
- ✓ Healthy banks originate more credit to firms
- ✓ Precautionary behavior limits firm investment

The Corporate Channel of Monetary Policy

Dependent Variable:	(1)	(2)	(3)	(4)	(5)
Investment					
Exposure*Post	0.178*** (0.057)	0.348*** (0.102)	0.575*** (0.109)	0.229*** (0.045)	0.335*** (0.126)
Exposure	0.872*** (0.110)	0.862*** (0.106)	1.013** (0.487)	1.017*** (0.171)	0.825*** (0.179)
Additional controls:					
Current assets (lag)	Yes	Yes	Yes	Yes	Yes
Current assets (lag)*Post	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	-	-	-	-
Bank-Sector-Time FE	-	Yes	-	Yes	Yes
Bank-Sector-City-Time FE	-	-	Yes	-	-
Observations	3,126,515	3,126,515	1,262,118	3,126,515	1,798,592
R-squared	0.245	0.282	0.439	0.282	0.307

- ✓ Cash-holdings drop
- ✓ No effects on leverage, maturity, or financial expenses

Clients of Negative Rates Banks



NIRP or Just High Cash Holdings?

Subsample of firms with high cash-holdings

	upper tercile of current assets				
Dependent Variable:	(1)	(2)	(3)	(4)	(5)
Investment					
Exposure*Post	1.988*** (0.452)	2.358*** (0.432)	1.670*** (0.363)	0.231** (0.110)	2.645*** (0.651)
Exposure	-0.229* (0.119)	-0.351** (0.152)	-0.030 (0.278)	0.242 (0.198)	-0.343 (0.206)
Additional Controls:					
Current assets (lag)	Yes	Yes	Yes	Yes	Yes
Current assets (lag)*Post	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	-	-	-	-
Bank-Industry-Time FE	-	Yes	-	Yes	Yes
Bank- Industry-City-Time FE	-	-	Yes	-	-
Observations	1,026,469	993,419	331,747	993,419	596,949
R-squared	0.235	0.296	0.456	0.296	0.324

Effects on Firm Performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	ROA	ROE	ROCE	Profit margin	EBITDA margin	EBIT margin	Cashflow /Op. Rev.
Exposure*Post	0.012 (0.009)	0.018*** (0.006)	0.022*** (0.008)	0.026** (0.011)	0.015** (0.006)	0.019** (0.009)	0.019* (0.010)
Exposure	0.031*** (0.010)	0.103** (0.042)	0.067*** (0.011)	-0.000 (0.006)	0.015** (0.006)	0.003 (0.005)	0.007 (0.008)
Additional controls:							
Current assets (lag)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Current assets (lag)*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,979,079	2,707,987	2,390,501	2,927,748	2,809,372	2,940,959	2,795,506
R-squared	0.472	0.385	0.428	0.483	0.559	0.484	0.525

- ✓ Precautionary behavior leads firms to hoard liquidity and apply large discount rate on investment opportunities.
- ✓ Negative interest rates increase cost of hoarding liquidity and tilt the decision in favor of investing.
- ✓ Profitability increases.

Conclusions

- In a recent interview to the FT, the President of the European Banking Federation, Mustier, suggested that the ECB should “*find ways of improving the “transmission mechanism” of negative rates to ensure that lenders pass them on to corporate customers, thus nudging them into investing their cash rather than keeping it on deposit*”.
- Our paper suggests that the effectiveness of the transmission mechanism below the ZLB depends on banks’ balance sheet strength
 - Sound banks are more likely to pass negative rates to their corporate depositors
- Firms with more cash-holdings exposed to banks offering negative rate invest more
 - If all banks were sound and offered negative rates on corporate deposits, there could be 13% higher aggregate investment