

Mixing QE and Interest Rate Policies at the Effective Lower Bound: Micro Evidence from the Euro Area

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Motivation

- ▶ Rate-based monetary stimulus increasingly limited
- ▶ Central banks employed unconventional monetary policies
 - ▶ Large-scale asset purchases (QE)
 - ▶ Negative interest rates
- ▶ QE and rate-setting monetary policy at the effective lower bound inextricably linked
- ▶ Unclear how negative rates and quantitative easing interact
 - ▶ Substitute or complements?

This Paper

- ▶ Bank-based transmission channel of monetary policy
- ▶ Euro area: Monetary-policy rates broke through zero lower bound (ZLB) in 2014 before the implementation of quantitative easing
 - ▶ Exploit Heterogeneity across Euro Area and Administrative data from Germany
- ▶ **Empirical evidence:** Adverse effect of QE exposure and higher funding costs on credit supply
- ▶ Real effects: ZLB on deposit rates eradicates positive employment effects of QE

Mechanism

- ▶ QE swaps securities for central-bank reserves on commercial banks' balance sheets
 - ▶ Negative rates on these reserves
- ▶ Similar pass-through to banks' liability side?
 - ▶ ZLB on retail deposit rates
(Heider et al., 2019, 2021)
- ▶ Adverse effect on bank net worth

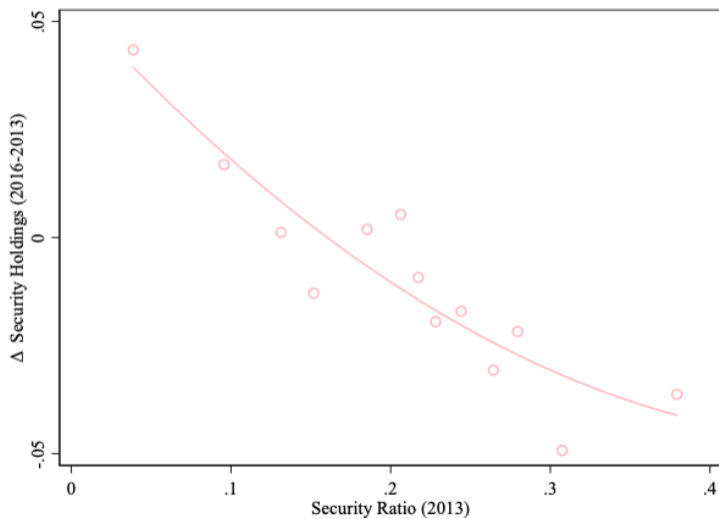
Data

- ▶ Euro Area
 - ▶ Syndicated-loan transactions from DealScan
 - ▶ Balance Sheet from Bankscope
 - ▶ Bank Stock Market Data from Datastream
 - ▶ Bank Capital Flow Data from BIS
- ▶ Germany
 - ▶ Administrative credit-registry from BAKIS-M: Germany
 - ▶ Securities Holdings Statistics from SHS-Base plus
 - ▶ Monthly Balance Sheet Statistics from BISTA

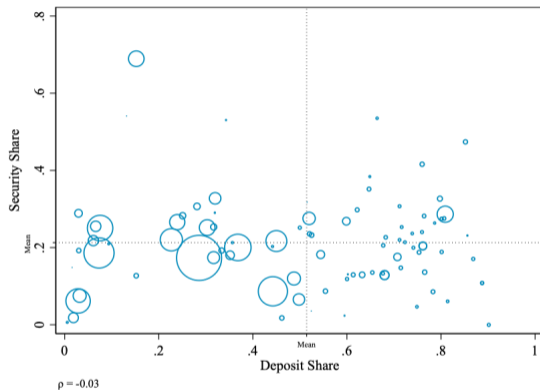
Empirical Setting

1. Time and country variation in the ECB's asset purchases
2. Banks' exposure to negative monetary-policy rates
 - ▶ Information on their funding structure, in particular their customer deposit share (Heider, Saidi, and Schepens, 2019)
 - ▶ High-deposit banks, unlike low-deposit banks, incur higher funding costs during the negative interest-rate period
3. Banks' exposure to QE
 - ▶ Ex-ante relative prevalence of securities on their books (Chakraborty, Goldstein, and MacKinlay, 2020; Rodnyansky and Darmouni, 2017)

Linking security ratios and the ECB's asset purchases



Deposit and Security Ratios



- ▶ Larger banks \Rightarrow lower deposit ratios
- ▶ Large and small banks similar exposure to asset purchases

Balancing Table

	(1)	(2)	(3)	(4)	(5)
	ln(Assets)	Capital Ratio	T1 Capital Ratio	RoA	RoC
Security Ratio	3.228 (3.865)	0.003 (0.096)	-0.021 (0.064)	-0.048 (0.030)	93.280 (223.547)
Deposit Ratio	-2.028 (1.532)	0.031 (0.030)	0.044** (0.020)	-0.012 (0.012)	-27.462 (69.741)
Security Ratio \times Deposit Ratio	-4.821 (6.988)	0.052 (0.153)	-0.004 (0.102)	0.085 (0.054)	47.590 (356.948)
R-squared	0.171	0.114	0.230	0.047	0.026
<i>N</i>	66	60	50	66	52

► Interaction not significantly related to other bank variables

Empirical strategy

Analysis at the loan level l :

$$\begin{aligned}\ln(Lending)_{i(l),j(l),t(l)} = & \beta_1 QE \times Security\ Ratio_i \times Deposit\ Ratio_i \\ & + \beta_2 QE \times Security\ Ratio_i \\ & + \beta_3 QE \times Deposit\ Ratio_i \\ & + \mu_i + \theta_{j,m(t)} + \phi_{c(i),m(t)} + \epsilon_{i,j,t}\end{aligned}$$

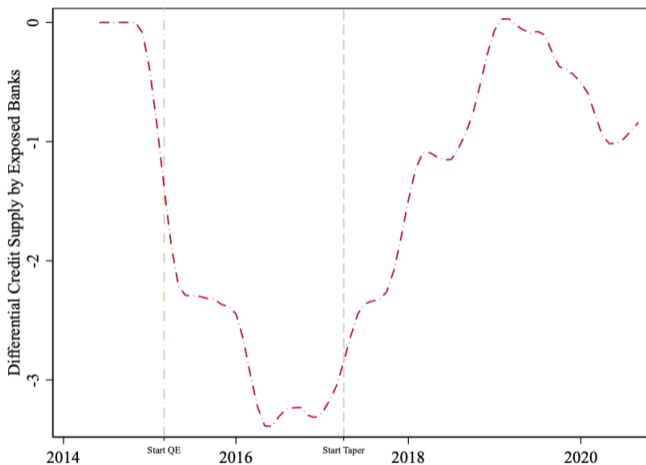
- ▶ $Lending_{i(l),j(l),t(l)}$ is the amount lent by bank i to borrower j at date t in loan package l
- ▶ QE is a standardized measure of ECB asset purchases
- ▶ Sample period: 2014 to 2020

Syndicated-lending Response by Banks with Different Exposure to QE and Negative Rates

	Dependent Variable: Lending							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
QE × Security Ratio × Deposit Ratio	-0.815** (0.309)	-0.938** (0.448)	-0.950** (0.468)	-0.949*** (0.347)	-0.954*** (0.332)	-0.633** (0.286)	-0.622** (0.273)	-2.006** (0.804)
R-squared	0.975	0.976	0.976	0.975	0.975	0.976	0.976	0.976
N	6,382	6,311	6,311	5,913	5,863	6,311	6,311	6,311
Bank FE	✓	✓	✓	✓	✓	✓	✓	✓
Borrower × Month-year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country × Month-year FE	—	✓	✓	✓	✓	✓	✓	✓
Specification	$\frac{App_{c(i),m(t)}}{BSecH_{c(i),2012}}$	$\frac{App_{c(i),m(t)}}{BSecH_{c(i),2012}}$	$\frac{App_{c(i),m(t)}}{BSecH_{c(i),m(t)-1}}$	$\ln(App_{c(i),m(t)})$	$\ln(App_{m(t)})$	$\ln(H_{c(i),m})$	$\ln(H_{m(t)})$	QEDummy

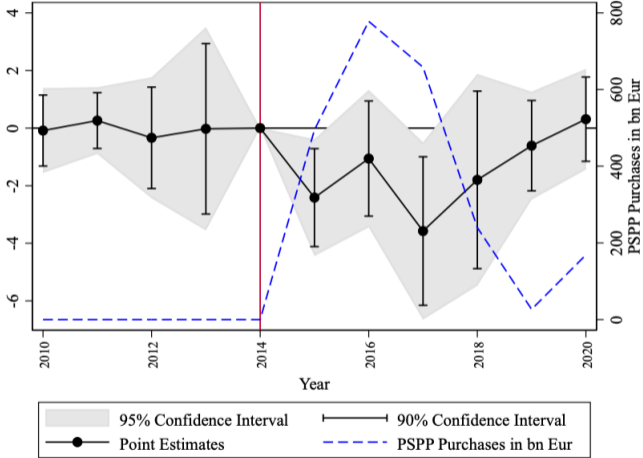
- ▶ Banks that are more exposed to QE and negative rates reduce their credit supply when QE is implemented

Estimated Credit Supply



- ▶ Bank with 10 pp. stronger exposure to QE and negative rates: Credit supply 30% lower at the peak of QE

Time-varying Coefficients



Equity Returns

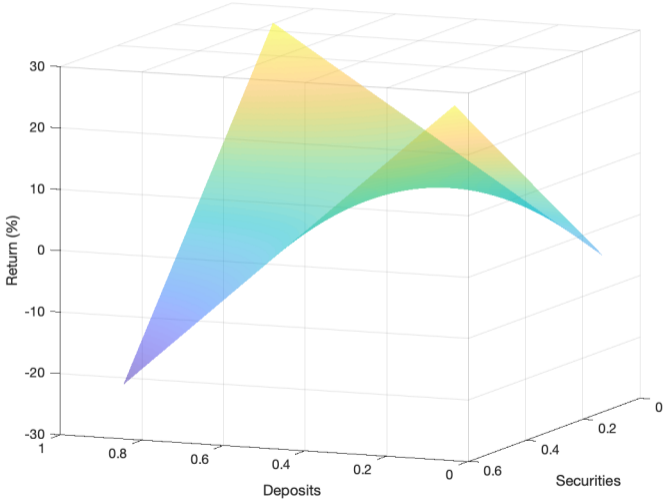
- ▶ Banks which are more strongly exposed to QE and Negative Rates may lend out less due to lower profitability
- ▶ Profits are only observed at lower frequency
- ▶ Equity returns can be indicative of profitability (English, Van den Heuvel, and Zakrajšek, 2018)
- ▶ To study the response of equity returns of high-deposit and high-security banks relative to other banks in response to asset purchases during a period of low interest rates, we estimate the following regression model:

$$\begin{aligned} \text{Return}_{i,m} = & \alpha_i + \alpha_m + \beta_1 QE_{c,m} \times \text{Security Ratio}_i + \beta_2 QE_{c,m} \times \text{Deposit Ratio}_i \\ & + \beta_3 QE_{c,m} \times \text{Security Ratio}_i \times \text{Deposit Ratio}_i + \epsilon_{i,m}, \end{aligned}$$

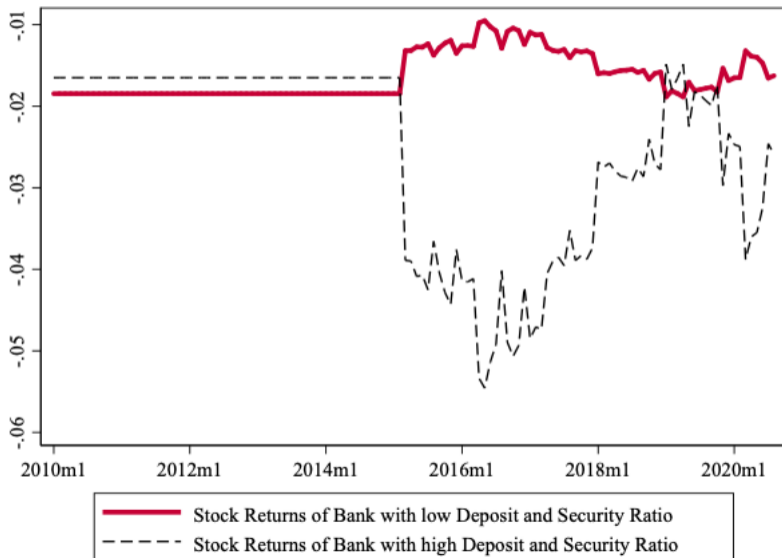
Effect on Profitability of Banks with Different Exposure to QE and Negative Rates

	Dependent Variable: Stock Return				
	(1)	(2)	(3)	(4)	(5)
QE × Security Ratio × Deposit Ratio	-0.341** (0.160)	-0.327** (0.145)	-0.314** (0.130)	-0.342*** (0.104)	-0.374** (0.166)
R-squared	0.010	0.025	0.323	0.337	0.342
<i>N</i>	2,013	2,013	2,013	2,013	1,925
Bank FE	-	✓	-	✓	✓
Time FE	-	-	✓	✓	✓
Interacted Controls	-	-	-	-	✓

Stock-return Response to QE Purchases



Estimated Stock Returns



Effect on Profitability of Banks with Different Exposure to QE and Negative Rates—Heterogeneity across Countries

	Dependent Variable: Stock Return			
	(1)	(2)	(3)	(4)
QE × Security Ratio × Deposit Ratio	-3.352*** (0.428)	-1.296** (0.494)	-0.380** (0.159)	-1.970*** (0.538)
QE × Security Ratio × Deposit Ratio × Risky	3.011*** (0.490)	1.000** (0.391)	0.663 (0.550)	0.542* (0.289)
R-squared	0.343	0.343	0.343	0.366
<i>N</i>	1,925	1,925	1,925	1,673
Bank FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Interacted Controls	✓	✓	✓	✓
Risky	Not Germany	Low Index	GIIPS	Bond Yields

Micro Evidence from Germany

- ▶ Administrative data from the Bundesbank allows to observe
 - ▶ Credit relationships with different counterparties—in particular (small) firms and other banks and the central bank
 - ▶ Bank-level variables at a higher frequency
 - ▶ Change in security holdings rather than pre-existing Exposure
 - ▶ Breakdown of depositor base by household vs. corporate

Refinement QE and negative-rates exposure

	Dependent Variable: Lending			
Deposit Ratio \times Δ In securities (one year)	0.127* (0.070)			
Deposit Ratio HH \times Δ In securities (one year)	0.130* (0.076)			
Deposit Ratio NFC \times Δ In securities (one year)	0.089 (0.229)			
Deposit Ratio \times Δ In securities (one quarter)	0.125 (0.082)			
Deposit Ratio HH \times Δ In securities (one quarter)	0.168** (0.081)			
Deposit Ratio NFC \times Δ In securities (one quarter)	-0.456** (0.205)			
R-squared	0.938	0.938	0.938	0.938
N	1,671,560	1,671,560	1,714,208	1,714,208
Bank \times Firm FE	✓	✓	✓	✓
Firm \times Time FE	✓	✓	✓	✓

- ▶ High-deposit banks lend less if their securities are bought
- ▶ Stronger effect of HH, rather than NFC, deposits ZLBD

Effect on Banks' Balance Sheets

- ▶ QE increases asset & **liability** side of central banks balance sheet
 - ▶ Consists mainly of bank reserves and currency in circulation.
- ▶ Central-bank reserves of commercial banks must increase in aggregate (holding currency in circulation fixed)
- ▶ Tax on banks that hold these reserves when deposit facility rate negative
- ▶ Individual banks may attempt to avoid paying negative rates on new reserves
 - ▶ Reducing liability side of its balance sheet requires interest (household) deposits < 0
 - ▶ Banks with less deposit funding \Rightarrow Stronger pass-through of monetary-policy

Effect on Balance Sheets of Banks with Different Exposure to QE and Negative Rates-Evidence from Germany

	<u>CB assets</u> Assets (1)	<u>CB liabilities</u> Assets (2)	<u>CB net assets</u> Assets (3)	<u>Deposits</u> Assets (4)
QE \times Security Ratio \times Deposit Ratio	0.030** (0.014)	0.001 (0.005)	0.024* (0.014)	0.013 (0.009)
R-squared	0.648	0.721	0.661	0.953
<i>N</i>	19,285	19,285	19,091	19,283
Bank FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓

- ▶ Negative deposit facility + asset swap of securities with central-bank reserves \Rightarrow Adverse shock to their net worth

Real Effects

- Firms borrowing from exposed banks \Rightarrow weaker employment growth

$$\Delta \ln(y_j) = \beta \text{Deposit\&SecurityExposure}_j + \gamma \text{DepositExposure}_j + \delta \text{Security Exposure}_j + \theta_{k(j)} + \epsilon_j$$

	$\Delta \ln(\text{Wage bill})$			$\Delta \ln(\text{Employment})$		
	(1)	(2)	(3)	(4)	(5)	(6)
Deposit & Security Exposure	-0.219 *** (0.068)	-0.189** (0.080)	-0.131 (0.092)	-0.260*** (0.077)	-0.219** (0.088)	-0.196* (0.103)
Deposit Exposure	0.051*** (0.013)	0.051*** (0.015)	0.051*** (0.017)	0.076*** (0.015)	0.077*** (0.017)	0.077*** (0.019)
Security Exposure	0.113*** (0.025)	0.096*** (0.030)	0.089*** (0.034)	0.076*** (0.029)	0.054 (0.033)	0.051 (0.038)
R-squared	0.046	0.168	0.222	0.033	0.158	0.208
N	6,098	5,791	5,163	6,145	5,840	5,208
Size FE	✓	-	-	✓	-	-
Industry FE	✓	-	-	✓	-	-
Region FE	✓	-	-	✓	-	-
Industry \times Region FE	-	✓	-	-	✓	-
Industry \times Size FE	-	✓	-	-	✓	-
Industry \times Region \times Size FE	-	-	✓	-	-	✓

Aggregate Employment Effects: Approach

- ▶ Using cross-sectional heterogeneity to quantify effects difficult
 - ▶ GE effects differenced out
- ▶ Assume that banks with no deposits and no securities are unaffected by negative rates and QE, respectively
- ▶ What would have been total employment growth in the absence of QE?
- ▶ Compare actual employment growth rate with counterfactual scenario in which only negative policy rates were implemented

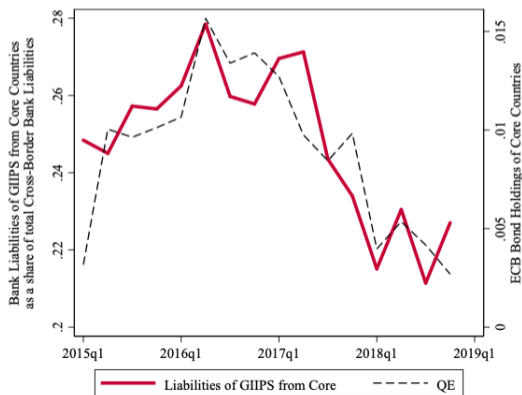
Aggregate Employment Effects: Result

- ▶ Counterfactual employment growth rate without QE is 4.24% and, as such, almost indistinguishable from the actual employment growth rate of 4.3%
- ▶ Positive employment effects of the credit-supply channel of QE are eradicated by the negative interaction of QE and negative monetary-policy rates
- ▶ Reason why QE has been more successful in spurring employment in the U.S. than in the euro area?

Cross-border Interbank Flows

Composition:

- ▶ ECB creates reserves in the Euro Area banking sector
- ▶ Can be reallocated across countries
- ▶ Pass-through is stronger in GIIPS



Conclusion

- ▶ We study consequences of the interaction between negative monetary-policy rates and large-scale asset purchases
- ▶ QE in the presence of negative interest rates
 - ⇒ **Reduction** credit supply by exposed banks
- ▶ Due to zero lower bound on retail deposit rates
- ▶ Important policy implications for monetary policy
 - ▶ QE can exacerbate the detrimental effects of negative interest-rate policies on banks' profitability
 - ⇒ **Caution** combining various unconventional policies
 - ▶ How to alleviate zero lower bound on **deposit** rates

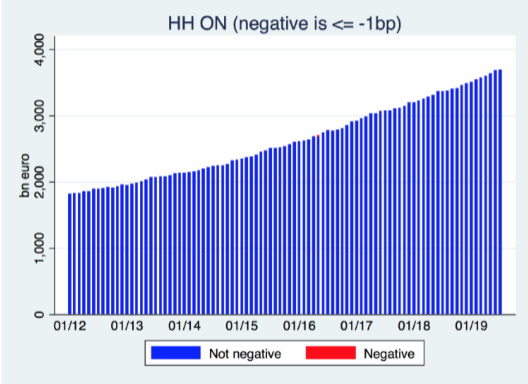
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Security Holdings of Banks with Different Exposure to QE and Negative Rates

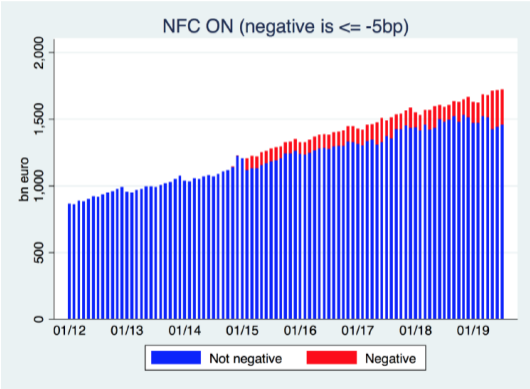
	Dependent Variable: Security Holdings					
	(1)	(2)	(3)	(4)	(5)	(6)
QE × Security Ratio	-0.150*** (0.047)	-0.162*** (0.046)	-0.266*** (0.077)	-0.290*** (0.075)	-0.112 (0.094)	-0.135 (0.099)
R-squared	0.952	0.974	0.932	0.950	0.955	0.985
<i>N</i>	3,625,419	3,602,180	1,797,212	1,787,733	1,825,439	1,814,447
Bank FE	✓	-	✓	-	✓	-
Security FE	✓	-	✓	-	✓	-
Time FE	✓	✓	✓	✓	✓	✓
Bank × Security FE	-	✓	-	✓	-	✓
Sample	Full	Full	Large Banks	Large Banks	Small Banks	Small Banks

No negative rates on ON household deposits



Back

Some negative rates on ON corporate deposits



Back