Expansionary Yet Different:
Credit Supply and Real Effects of Negative Interest Rate Policy

Online Appendix

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A.1 Additional Figures

Figure A1: Net Interbank Position and Liquidity in December 2013 and March 2014

Notes: The chart plots the correlation between the net interbank positions (calculated as the ratio of interbank loans minus interbank deposits with maturity up to one week, in percent of total assets) and liquidity (calculated as the ratio of securities over total assets, in percent) measured in December 2013 and March 2014. The variables are winsorized at the 1st and 99th percentiles. Source: Bank of Italy.

Figure A2: Net Interbank Position and Liquidity

Notes: The chart plots the distribution of: i) the net interbank position, measured as interbank loans minus interbank deposits with maturity of up to one week, in percent of total assets (panel a); and ii) liquidity, measured as securities in percent of total assets (panel b). Both variables are measured as of March 2014 and are winsorized at the 1st and 99th percentiles. The sample includes 95 banks. Source: Bank of Italy.

A.2 Additional Tables

Table A1: Negative Policy Rates and Bank Profitability

Notes: The table shows OLS estimates of a bank-level cross sectional regression. The dependent variables are: i) the change in return on equity (column 1), and ii) the change in the net interest margin over the six months following the introduction of NIRP, June-December 2014. The net interbank position, defined as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets; liquidity, defined as the ratio of securities over total assets; and retail deposits, computed as a share of total assets, are all measured as of end-March 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. Also the control variables are measured before the announcement of NIRP. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1) Δ ROE	(2) Δ NIM
Interbank position	0.3909 (7.1347)	0.1345 (0.1505)
Liquidity	0.7732 (7.2762)	0.1030 (0.1248)
Retail deposits	3.1337 (5.7906)	-0.0496 (0.0857)
Observations	90	90
Bank controls	Yes	Yes
R ²	0.1155	0.1490

Table A2: Negative Policy Rates and Fee Income on Bank Deposits

Notes: The table shows OLS estimates of a bank-level cross sectional regression. The dependent variable is the change in banks' income from fees on bank deposits over the six months following the introduction of NIRP, June-December 2014 (data on income from fees is available bi-annually). Retail deposits are measured as a share of total assets, as of end-March 2014. Bank control variables include: i) Net interbank position, defined as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets; ii) Liquidity, defined as the ratio of securities over total assets; iii) Size, defined as the logarithm of total assets; iv) Capital, defined as the ratio of TIER 1 capital over total assets; and v) NPL, defined as non-performing loans scaled by total assets. Also the control variables are measured before the announcement of NIRP. Data on income from fees are missing for 12 banks in our baseline sample. If we assume that these banks have no income from fees, results on the full sample of 95 banks do not change (e.g., the point estimates and significance level are almost identical). Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
	Change in fee income from bank deposits	
Retail deposits	0.0031*** (0.0007)	0.0024*** (0.0007)
Observations	83	83
Bank controls	No	Yes
R ²	0.2111	0.3886

Table A3: Descriptive Statistics

Notes: Panel A refers to bank-level variables. Net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets. Liquidity is the ratio of securities over total assets. Size is defined as the logarithm of total assets. Capital is the ratio of TIER 1 capital over total assets. NPL is non-performing loans scaled by total assets. Retail deposits are measured as a share of total assets. TLTRO is the ratio of total loans to euro area non-financial corporations and households—excluding loans to households for house purchase—over total assets, as of April 2014. Secured Repo is the ratio of secured repo funding over total assets. Liabilities vis-a-vis non resident is the ratio of foreign funding (deposits from non-residents) over total assets. Securities issues is the ratio of bank-issued securities over total assets. Interbank deposits is the ratio of interbank deposits over total assets. Windfall gain is the sum of individual revaluation gains over all the securities in the marked-to-market portfolios around NIRP as a fraction of a bank's total equity. All these variables are measured as of March 2014. Income fees over assets refer to fees on bank deposits and it is measured as of June 2014. Panel B refers to loan-level variables. $\Delta Loan$ is measured as log difference between the average total exposure of a given firm with a given bank in the post-NIRP period (July-September 2014) and the correspondent average total exposure in the pre-NIRP period (March-May 2014). Net rates are the average loan rates charged by a given bank to a given firm on credit lines and credit facilities, and on term loans. Panel C refers to firm-level variables. $\Delta Loan$ is the loan growth at the firm-month level, calculated as log difference between the post- and the pre-NIRP period. Net investment is the growth rate of fixed assets between 2014 and 2013. Wage bill growth is the growth rate of the wage bill between 2014 and 2013.

	Mean	St.Dev.	Median	Obs.
Panel A: Bank-level variables				
Net interbank position, March 2014	4.200	10.810	1.862	95
Liquidity, March 2014	28.670	13.950	25.940	95
Size	7.667	2.310	7.598	95
Capital	8.533	5.768	7.079	95
NPL	4.348	3.555	3.868	95
Retail deposits, March 2014	45.260	16.120	44.650	95
TLTRO	35.670	12.560	36.370	95
Secured Repo	2.918	8.172	0.000	95
Liabilities vis-a-vis non-resident	1.390	2.240	0.245	95
Securities issued	14.520	10.200	14.560	95
Interbank deposits	13.780	9.785	12.760	95
Windfall gain	1.378	1.525	0.919	95
Income fees	0.124	0.107	0.099	83
Panel B: Loan-level variables				
$\Delta Loan$	-2.137	20.435	0.000	495,942
Net rates, credit lines and overdraft facilities	8.375	3.129	7.928	205,091
Net rates, term loans	3.916	1.569	3.827	113,801
Panel C: Firm-level variables				
$\Delta Loan$	-1.693	20.380	-0.899	141,390
Net investment	11.463	77.175	-2.564	134,248
Wage bill growth	-1.123	31.991	1.258	127,297

Table A4: Negative Policy Rates, Net Interbank Position, and Liquidity

Notes: The table shows OLS estimates of a bank-level cross sectional regression. The dependent variable measures the change between March and September 2014 of banks': 1) net interbank position (column 1); 2) interbank loans with maturity up to one week over assets (column 2); 3) interbank deposits with maturity up to one week over assets (column 3); and liquidity, measured as the ratio of securities over total assets (column 4). Net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets, as of March 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of March 2014. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	Δ net interbank position after NIRP (1)	Δ interbank loans after NIRP (2)	Δ interbank deposits after NIRP (3)	Δ liquidity after NIRP (4)
Net interbank position	-0.2180** (0.0851)	-0.1644** (0.0741)	0.0536 (0.0545)	0.0530 (0.0501)
Liquidity	-0.0398 (0.0407)	-0.0080 (0.0369)	0.0318 (0.0214)	-0.1016** (0.0394)
Observations	95	95	95	95
Bank controls	Yes	Yes	Yes	Yes
R^2	0.1985	0.1643	0.0338	0.1509

Table A5: Net interbank position, Liquidity, and Bank Characteristics

Notes: The table shows OLS estimates of a bank-level cross sectional regression. The dependent variable is, alternatively, the net interbank position (column 1) and liquidity (column 2). The net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets, as of March 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of June 2014. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	Net interbank position (1)	Liquidity (2)
Size	-2.2878*** (0.4614)	-0.3338 (0.5773)
Capital	0.2630 (0.2178)	-0.8104*** (0.2526)
NPL	0.0725 (0.3030)	-1.8584*** (0.3580)
Observations	95	95
R ²	0.3340	0.2425

Table A6: Balancing of Observable Firm Characteristics

Notes: The table report, for each variable, the average values computed by quartile of bank exposure to NIRP, considering the net interbank position (Panel A) or liquidity (Panel B). Net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets. Liquidity is the ratio of securities over total assets. Firm size is the log of firm's assets; Z-score is the Altman Z-score (Altman, 1968) computed by CERVED; Equity/Debt is the ratio of the book value of equity to firm's debt; Profitability is the ratio of earnings before interest taxes, depreciation and amortization (EBITDA) to firm's assets. In parentheses we report the normalized differences (the difference between the quartile average and the average of the other three quartiles, normalized by the square root of the sum of the corresponding variances). According to the rule of thumb proposed by Imbens and Wooldridge (2009), two variables have "similar" means when the normalized difference is less than 0.25.

	1 st Quartile	2 nd Quartile	3 rd Quartile	4 th Quartile
Panel A. Net interbank position				
Firm size	7.639 (0.004)	7.721 (0.071)	7.547 (-0.075)	7.642 (0.006)
Z-score	5.118 (-0.048)	5.188 (0.001)	5.142 (-0.031)	5.315 (0.086)
Equity/Debt	0.528 (0.053)	0.487 (-0.009)	0.498 (0.008)	0.453 (-0.060)
Profitability	5.959 (0.005)	5.726 (-0.020)	6.144 (0.026)	5.792 (-0.013)
Panel B. Liquidity				
Firm size	7.602 (0.021)	7.681 (0.064)	7.568 (0.070)	7.723 (0.057)
Z-score	5.375 (0.102)	5.113 (0.081)	5.256 (0.060)	5.346 (0.086)
Equity/Debt	0.425 (0.083)	0.521 (0.069)	0.464 (0.054)	0.445 (0.057)
Profitability	5.443 (0.041)	5.924 (0.002)	5.958 (0.006)	5.698 (0.0190)

Table A7: Negative Policy Rates and Bank Credit Supply—Baseline regressions, all variables

Notes: The table presents OLS estimates of model 1. The dependent variable is loan growth at the bank-firm-month level, calculated as log difference between the post- and the pre-NIRP period. The length of the pre- and post-NIRP periods ranges between 3 and six months, centered around June 2014, which is excluded from the sample. Net interbank position is measured by the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets, as of March 2014. Size is defined as the logarithm of total assets. Capital is defined as the ratio of TIER 1 capital over total assets. NPL is defined as non-performing loans scaled by total assets. Retail deposits are measured as a share of total assets. All these variables are measured as of March 2014. TLTRO is the ratio of total loans to euro area non-financial corporations and households—excluding loans to households for house purchase—over total assets, as of April 2014. Standard errors, double clustered at the bank and firm level, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Window:	(1)	(2)	(3)	(4)	(5)
	± 3 month around June 2014				
Net interbank position	0.1438** (0.0610)		0.1283** (0.0597)	0.1249** (0.0605)	0.1232* (0.0631)
Liquidity		0.0586*** (0.0179)	0.0551*** (0.0179)	0.0648*** (0.0194)	0.0625*** (0.0208)
Size	0.1446** (0.0635)	0.2300*** (0.0611)	0.2378*** (0.0601)	0.3391*** (0.1163)	0.3313*** (0.1176)
Capital	-0.1749** (0.0796)	-0.0996* (0.0523)	-0.1328** (0.0542)	-0.1477** (0.0572)	-0.1615*** (0.0596)
NPL	-0.0889 (0.0686)	-0.0517 (0.0628)	-0.0604 (0.0625)	-0.0603 (0.0630)	-0.0467 (0.0739)
Retail deposits				0.0174 (0.0211)	0.0243 (0.0251)
TLTRO					-0.0141 (0.0308)
Observations	495942	495942	495942	495942	495942
Bank controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
R ²	0.3726	0.3727	0.3728	0.3728	0.3728
Window:	± 6 month around June 2014				
Net interbank position	0.1972** (0.0803)		0.1778** (0.0771)	0.1720** (0.0773)	0.1683** (0.0800)
Liquidity		0.0735** (0.0296)	0.0686** (0.0288)	0.0854*** (0.0322)	0.0803** (0.0354)
Size	0.1562 (0.1119)	0.2617** (0.1003)	0.2725*** (0.0989)	0.4467** (0.1767)	0.4298** (0.1803)
Capital	-0.1940 (0.1234)	-0.0952 (0.0930)	-0.1412 (0.0982)	-0.1668* (0.1002)	-0.1964* (0.1040)
NPL	-0.0810 (0.1202)	-0.0334 (0.1204)	-0.0453 (0.1201)	-0.0451 (0.1213)	-0.0158 (0.1278)
Retail deposits				0.0300 (0.0315)	0.0447 (0.0363)
TLTRO					-0.0303 (0.0460)
Observations	498234	498234	498234	498234	498234
Bank controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
R ²	0.4009	0.4009	0.4010	0.4010	0.4010

Table A8: Baseline regressions—Negative Policy Rates and Bank Credit Supply, 1-month Window

Notes: The table presents OLS estimates of model 1. The dependent variable is loan growth at the bank-firm-month level, calculated as log difference between the July 2014 (the post-NIRP period) and April 2014 (the pre-NIRP period). May and June 2014 are excluded from the sample. Net interbank position is measured by the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets, as of March 2014. Retail deposits are measured as a share of total assets, as of March 2014. TLTRO is the ratio of total loans to euro area non-financial corporations and households—excluding loans to households for house purchase—over total assets, as of April 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of March 2014. Standard errors, double clustered at the bank and firm level, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Window:	(1) ±1 month around May-June 2014	(2)	(3)	(4)	(5)
Net interbank position	0.1083** (0.0512)		0.0992* (0.0510)	0.0987* (0.0523)	0.0973* (0.0545)
Liquidity		0.0356*** (0.0112)	0.0329*** (0.0110)	0.0343** (0.0133)	0.0323** (0.0132)
Retail deposits				0.0025 (0.0145)	0.0084 (0.0206)
TLTRO					-0.0121 (0.0245)
Observations	487882	487882	487882	487882	487882
Firm FE	Yes	Yes	Yes	Yes	Yes
R ²	0.3553	0.3553	0.3554	0.3554	0.3554

Table A9: Negative Policy Rates and Bank Credit Supply—Robustness

Notes: The table presents OLS estimates of model 1, with the exception of column 6, which reports the weighted least square (WLS) estimates, taking the logarithm of loan size as weight. The dependent variable is loan growth at the bank-firm-month level, calculated as log difference between the post- and the pre-NIRP period. The length of the pre- and post-NIRP periods is three months, centered around June 2014, which is excluded from the sample, except in columns 7 and 8 (where the pre- and post-NIRP periods are centered around June-August 2014 and May-June 2014, respectively). Net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets, as of end-March 2014. In columns 5 the net interbank position and liquidity are measured in June 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of March 2014. Retail deposits are measured as a share of total assets. Secured Repo is the ratio of secured repo funding over total assets. Liabilities vis-a-vis non resident is the ratio of foreign funding (deposits from non-residents) over total assets. Securities issued is the ratio of bank-issued securities over total assets. Interbank deposits is the ratio of interbank deposits over total assets. All these variables are measured as of end-March 2014. In column 3 the sample excludes firms in the bottom half of the sample distribution of total assets, measured in March 2014. Windfall gain, included in column 4, is defined as the change in the value of securities in the marked-to-market portfolio over total equity. In column 7 the pre- and post-NIRP period are computed using a ± 3 month window around June-August 2014, which are excluded from the sample. In column 8, the pre- and post-NIRP period are computed using a ± 3 month window around May-June 2014, which are excluded from the sample. Standard errors, double clustered at the bank and firm level, are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Net interbank position								
Net interbank position, June 2014								
Liquidity	0.1325** (0.0561)			0.1327* (0.0676)		0.1025* (0.0608)	0.1414** (0.0697)	0.1607** (0.0661)
Liquidity, June 2014					0.1070** (0.0533)			
Retail Deposits	0.0836*** (0.0253)	0.0696*** (0.0191)	0.0561** (0.0221)	0.0558*** (0.0177)		0.0524*** (0.0199)	0.0697* (0.0375)	0.0749*** (0.0175)
Secured Repo		0.0200 (0.0207)	0.0171 (0.0222)		0.0611*** (0.0165)			
Liabilities vis-a-vis non-resident	0.0598* (0.0358)							
Securities issued	-0.0511 (0.0664)							
Interbank deposits	0.3049** (0.1261)							
Windfall gain	0.0802** (0.0381)							
	0.0248 (0.0431)							
				0.0982 (0.2901)				
Observations	495942	495942	269511	495942	495942	441684	483648	490397
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.3732	0.3727	0.3280	0.3728	0.3727	0.3531	0.3838	0.3767

Table A10: Negative Policy Rates, Net Interbank Position, and Liquidity, Placebos

Notes: The table shows OLS estimates of a bank-level cross sectional regression. The dependent variables are: i) the change in the net interbank position (columns 1 and 3), and ii) the change in liquidity (columns 2 and 4) over the six months following two rate cuts episodes, one in July 2012 (columns 1-2) and the second in November 2013 (columns 3-4). The net interbank position is defined as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets. Liquidity is defined as the ratio of securities over total assets. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. Also the control variables are measured in the quarter before the rate cut. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Episode:	Δ net interbank position DFR rate cut in July 2012 (1)	Δ liquidity (2)	Δ net interbank position MRO cut in November 2013 (3)	Δ liquidity (4)
Net interbank position	0.0791 (0.0957)	-0.0626 (0.0467)	0.0767 (0.0733)	-0.0012 (0.0580)
Liquidity	-0.0546* (0.0305)	-0.0126 (0.0393)	0.0556 (0.0383)	0.0261 (0.0451)
Observations	95	95	95	95
Bank controls	Yes	Yes	Yes	Yes
R^2	0.0973	0.0741	0.0897	0.0868

Table A11: Negative Policy Rates and Bank Credit Supply—Parallel Trends

Notes: The table presents OLS estimates of model 1. The dependent variable is loan growth at the bank-firm-month level, calculated as log difference between the post- and the pre- monetary policy announcement. In panel A, the length of the pre- and post-periods is three months, centered around: 1) December 2013 (column 1); 2) January 2014 (column 2); and February 2014 (column 3). We do not expand our sample beyond February 2014 as the ± 3 months window around March 2014 will include June 2014 (and the introduction of NIRP) in the post-period. In panel B, the length of the pre- and post-periods is six months, centered around: 1) September 2013 (column 1); 2) October 2013 (column 2); and November 2013 (column 3). We do not expand our sample beyond November 2013 as the ± 6 months window around December 2013 will include June 2014 (and the introduction of NIRP) in the post-period. In each model, the month of the policy announcement is excluded from the sample. Net interbank position in the interbank market is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets as of March 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of March 2014. Standard errors, double clustered at the bank and firm level, are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)
	Panel A: ± 3 months windows		
	Sep 2013-Mar 2014	Oct 2013-Apr 2014	Nov 2013-May 2014
Net interbank position	-0.0097 (0.0467)	0.0072 (0.0482)	0.0425 (0.0479)
Liquidity	-0.0950*** (0.0292)	-0.0678* (0.0367)	-0.0087 (0.0252)
Observations	508784	506734	507318
R^2	0.3787	0.3778	0.3762
	Panel B: ± 6 months windows		
	Mar 2013-Mar 2014	Apr 2013-Apr 2014	May 2013-May 2014
Net interbank position	0.0104 (0.0740)	0.0035 (0.0681)	0.0296 (0.0665)
Liquidity	-0.0125 (0.0221)	-0.0351 (0.0237)	-0.0530* (0.0279)
Observations	522720	518876	514457
Firm FE	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes
R^2	0.4061	0.4062	0.4061

The negative coefficients of liquidity in some specifications can be explained by the fact that, as discussed in Section 4.3, in November 2013 the ECB lowered the interest rate on the MRO without flattening the yield curve (see Figure 4, panel b).

Table A12: Negative Policy Rates and Non-Performing Loans

Notes: The table shows OLS estimates of a bank-level cross sectional regression. The dependent variable is the change in banks' non-performing loans (NPL) scaled by total assets over: (i) the 12 months period following the introduction of NIRP, March 2014-March 2015 (top panel), and (ii) the 60 months period following the introduction of NIRP, March 2014-March 2019 (bottom panel). Net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets, as of March 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of March 2014. Data on the change in banks' non-performing loans is missing for 1 bank in our baseline sample, as the bank is not operative in March 2015. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
Period: March 2014 - March 2015			
Net interbank position	-0.0150 (0.0119)		-0.0101 (0.0242)
Liquidity		0.0127 (0.0107)	0.0102 (0.0138)
Observations	94	94	94
R ²	0.4027	0.4046	0.4067
Period: March 2014 - March 2019			
Net interbank position	-0.0170 (0.0430)		-0.0020 (0.0442)
Liquidity		0.0313 (0.0314)	0.0307 (0.0319)
Observations	91	91	91
Bank controls	Yes	Yes	Yes
R ²	0.3759	0.3804	0.3804

Table A13: Negative Policy Rates and Gross Lending Rates

Notes: The table presents OLS estimates of model 1. The dependent variable is the change in gross lending rates, which include commissions and fees, at the bank-firm-month level, calculated as difference between the post- and the pre-NIRP period. The length of the pre- and post-NIRP period is of six months, centered around June 2014, which is excluded from the sample. Panel A reports the results for the change in gross lending rates on credit lines and overdraft facilities, while Panel B reports the results for term loans. Net interbank position is measured as the ratio of interbank loans minus interbank deposits with maturity up to one week, over total assets, as of end-March 2014. Liquidity is the ratio of securities over total assets as of March 2014. Retail deposits are measured as a share of total assets, as of March 2014. TLTRO is the ratio of total loans to euro area non-financial corporations and households—excluding loans to households for house purchase—over total assets, as of April 2014. Bank control variables include: i) Size, defined as the logarithm of total assets; ii) Capital, defined as the ratio of TIER 1 capital over total assets; and iii) NPL, defined as non-performing loans scaled by total assets. These three variables are measured as of March 2014. Standard errors, double clustered at the bank and firm level, are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)
Panel A: Credit lines and overdraft facilities, net rates				
Net interbank position	-0.1005*** (0.0282)		-0.0819*** (0.0157)	-0.0815*** (0.0174)
Liquidity		-0.0478*** (0.0136)	-0.0449*** (0.0122)	-0.0452*** (0.0143)
Retail Deposits				-0.0006 (0.0053)
Observations	188690	188690	188690	188690
Firm FE	Yes	Yes	Yes	Yes
R ²	0.3959	0.3974	0.3979	0.3979
Panel B: Term loans, net rates				
Net interbank position	-0.0063** (0.0030)		-0.0047* (0.0025)	-0.0051* (0.0026)
Liquidity		-0.0042** (0.0017)	-0.0040** (0.0016)	-0.0037* (0.0020)
Retail Deposits				0.0005 (0.0012)
Observations	113842	113842	113842	113842
Firm FE	Yes	Yes	Yes	Yes
R ²	0.4094	0.4102	0.4103	0.4103

A.3 U.S. QE: Evidence from Survey Data

We complement the evidence on U.S. QE episodes discussed in Section 4.6 with an analysis of microdata from the quarterly Senior Loan Officer Opinion Surveys (SLOOS) conducted by the Federal Reserve. The purpose of the survey is to gather qualitative and quantitative information about bank credit availability and loan demand, as well as on lending practices in the U.S. bank loan market.⁴³ We use the confidential bank-level responses to test if the probability with which banks report tightening C&I lending standards is relatively lower for more liquid banks in the two quarters after each QE announcement. These data have the benefit that we can control for concurrent shifts in loan demand directly using banks' own assessment of how loan demand changes each quarter. The smallest participating bank in the SLOOS has total assets of about \$2 billion and 75–80 banks participate in each survey round.

The dependent variable is a dummy variable taking value one for banks that reported that they tightened lending standards “somewhat” or “considerably” in response to the question “*Over the past three months, how have your bank’s credit standards for approving applications for C&I loans or credit lines—other than those to be used to finance mergers and acquisitions—to large and middle-market firms and to small firms changed?*” (and zero otherwise). Since the banks give separate responses for large versus small firms (with less than USD 50 million in annual sales), we stack the responses across the two size groups and across all surveys to obtain a panel at the bank-survey-borrower size level (where borrower size is either large or small firms). Then we regress the dependent variable on the key variable of interest—bank liquidity—and other balance sheet controls, including a dummy variable that takes value one for banks reporting stronger loan demand over the quarter (and zero otherwise). For each event, we study changes in lending standards in the two quarters before and after the QE announcement. Bank balance sheet variables are measured at quarter-end before the announcement.

As shown in Table A14, the results support the idea of a portfolio rebalancing channel. Banks with more liquid assets before QE are relatively less likely to tighten C&I lending standards after each QE event. The coefficient estimates are positive and significant across all specifications. Notwithstanding that these results are based on banks' self-assessments of changes in lending standards and loan demand, and on a sample skewed toward larger banks, we believe they are nevertheless suggestive of our channel.⁴⁴

⁴³For more information, see <https://www.federalreserve.gov/data/sloos/about.htm>.

⁴⁴In results not reported, we examine the QE3 event in September 2012, which was not followed by a flattening of the yield curve (Figure 5, panel C), as a placebo test. We find no systematic relation between ex ante bank liquidity and the probability of changing credit standards after that announcement.

Table A14: Portfolio Rebalancing after U.S. QE: Evidence from Survey Data

Notes: This table depicts the link between C&I lending standards of U.S. banks and liquidity after the QE1 and QE2 events taking place in 2008–2009 and 2010–2011 respectively. The dependent variable is a dummy variable taking value one for banks that report tightening C&I lending standards “somewhat” or “considerably” in each quarter (and zero otherwise). Columns 1–4 refer to the QE1 event (November 2008) and the data represent stacked survey responses during 2008:Q2–Q3 (pre-Q1 period) and 2008:Q4–2009:Q1 (post-QE1 period). Columns 5–8 refer to the QE2 event (August 2010) and the data represent stacked survey responses during 2010:Q1–Q2 (pre-QE2 period) and 2010:Q4–2011:Q1 (post-QE1 period). The data are at the bank-survey-borrower size group level, where borrower size group refers to either large and middle-market firms or small firms (with annual sales below \$50 million). All balance sheet characteristics are measured before the QE announcement, respectively in 2008:Q2 (columns 1–4) and 2010:Q2 (columns 5–8). All regressions include bank controls (size, capital, NPL, and retail deposits), a dummy variable that controls for shifts in loan demand and takes value 1 for banks that report an increase in loan demand over the quarter (and zero otherwise), survey fixed effects, and a dummy variable for observations that refer to large and middle-market firms (firm size FE). In columns 4 and 8 we control for realized gains (losses) on from securities holdings to allow for potential QE-induced valuation effects on bank balance sheets. Standard errors are clustered at the bank level. *** p<0.01, ** p<0.05, * p<0.1. Source: Federal Reserve SLOOS and Call Reports.

Episode:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	QE 1 (2008-2009)				QE 2 (2010-2011)			
Liquidity × Post	-1.6249*** (0.346)	-1.5174*** (0.419)	-1.5481*** (0.427)	-1.5710*** (0.419)	-0.3759*** (0.189)	-0.3815*** (0.189)	-0.3826*** (0.189)	-0.3827*** (0.190)
Liquidity × Post	0.3730 (0.943)	0.2532 (0.960)	1.2375 (0.902)	1.2680 (0.896)	-0.0894 (0.161)	-0.0869 (0.162)	-0.0381 (0.169)	-0.0286 (0.176)
Loan demand × Post		-0.2423 (0.173)	-0.1988 (0.174)	-0.1957 (0.173)		-0.0317 (0.033)	-0.0312 (0.033)	-0.0300 (0.032)
Loan demand		0.0239 (0.103)	-0.0010 (0.101)	-0.0059 (0.100)		-0.0052 (0.033)	-0.0049 (0.034)	-0.0053 (0.034)
Windfall gains				-1.2566 (1.067)				-0.2893 (0.434)
Bank controls	No	No	Yes	Yes	No	No	Yes	Yes
Bank state	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Survey (quarter) FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	424	422	422	422	440	439	439	439
R ²	0.289	0.294	0.322	0.325	0.141	0.145	0.149	0.150