

Online Appendixes to “How Would U.S. Banks Fare in a Negative Interest Rate Environment?”*

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The effectiveness of negative interest rates as a monetary policy tool depends importantly on the response of the banking sector. This paper offers unique new insights for U.S. banks by using supervisory data to examine bank-level expectations regarding the impact of negative rates on profitability through net interest margins. The main results show that the largest U.S. banks differ significantly in how they respond to negative interest rates. The most significant channel of adverse exposure comes from the pass-through of the negative policy rate to interest rates on short-term liquid assets held on the balance sheet. At the same time, on the liability side, banks that rely more heavily on short-term wholesale funding, including financing through the repo market, may benefit through a reduction in funding costs. In the aggregate, these effects likely wash out as liquidity provision is sufficiently well diversified across the banking sector as a whole.

JEL Codes: E43, E44, G21.

Appendix A. Summary Statistics

Table A.1 presents summary statistics for the data used in the estimation of the bank-specific NIM model given by equation (1) in the main text.

*The views expressed here are solely those of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System.

Table A.1. Summary Statistics for Data Used to Estimate Bank-Specific NIMs Model

	Mean	Median	St. Dev.	Min.	Max.	<i>N</i>
<i>Macrovariables</i>						
ΔGDP	2.34	2.70	2.50	−8.19	7.77	84
3M Treasury	2.10	1.25	2.09	0.02	6.02	84
10Yr–3M Treasury Spread	1.94	1.88	1.09	−0.25	3.76	84
<i>Bank-Specific Variables</i>						
BHC 1: NIMs	1.25	1.40	0.79	−0.96	2.41	35
Securities/Total Assets	11.64	12.45	2.20	5.66	15.39	35
Deposits/Total Liabilities	28.49	28.10	12.66	12.10	56.93	35
Equity/Total Assets	10.57	10.38	1.68	8.13	14.38	35
BHC 2: NIMs	4.40	4.14	0.66	3.38	5.85	35
Securities/Total Assets	7.27	3.36	7.51	2.49	28.54	35
Deposits/Total Liabilities	10.84	10.70	1.61	7.39	14.47	35
Equity/Total Assets	12.52	12.74	1.01	9.32	14.11	35
BHC 3: NIMs	2.77	2.71	0.56	1.94	4.08	84
Securities/Total Assets	14.44	14.52	2.80	7.74	19.01	84
Deposits/Total Liabilities	47.35	47.81	6.74	32.95	60.36	84
Equity/Total Assets	9.60	9.24	1.46	5.97	12.28	84
BHC 4: NIMs	3.80	3.82	0.39	3.17	4.69	84
Securities/Total Assets	20.42	20.84	2.90	12.92	26.21	84
Deposits/Total Liabilities	63.34	60.71	7.98	52.08	83.59	84
Equity/Total Assets	10.31	10.07	1.84	7.36	13.72	84
BHC 5: NIMs	3.75	3.98	0.99	−2.94	4.77	84
Securities/Total Assets	20.19	18.19	7.09	11.64	34.12	84
Deposits/Total Liabilities	67.43	67.45	8.31	54.82	89.10	84
Equity/Total Assets	12.58	10.11	5.11	6.76	23.00	84
BHC 6: NIMs	1.28	1.14	0.37	0.88	2.27	41
Securities/Total Assets	27.35	26.71	4.31	18.25	34.40	41
Deposits/Total Liabilities	25.61	27.47	5.99	12.05	34.17	41
Equity/Total Assets	11.66	10.92	1.62	9.78	15.81	41
BHC 7: NIMs	2.78	2.71	0.55	2.03	6.19	84
Securities/Total Assets	16.23	15.22	4.74	6.84	25.42	84
Deposits/Total Liabilities	49.66	46.70	12.05	31.19	70.30	84
Equity/Total Assets	9.65	9.63	2.05	5.92	12.84	84
BHC 8: NIMs	3.10	2.87	0.59	2.35	5.56	76
Securities/Total Assets	14.58	14.90	2.56	8.21	19.37	76
Deposits/Total Liabilities	14.32	10.74	6.78	5.89	26.33	76
Equity/Total Assets	8.85	8.33	1.99	5.44	12.88	76
BHC 9: NIMs	3.20	2.94	0.59	2.37	6.12	84
Securities/Total Assets	22.77	18.64	7.53	13.50	36.71	84
Deposits/Total Liabilities	63.12	66.37	18.96	6.67	89.57	84
Equity/Total Assets	13.61	13.87	2.45	8.75	19.16	84
BHC 10: NIMs	0.33	0.52	1.71	−5.72	3.22	36
Securities/Total Assets	7.12	6.30	3.05	1.85	15.09	36
Deposits/Total Liabilities	29.72	25.43	19.35	4.42	66.13	36
Equity/Total Assets	16.51	16.98	3.09	7.40	19.93	36

(continued)

Table A.1. (Continued)

	Mean	Median	St. Dev.	Min.	Max.	<i>N</i>
BHC 11: NIMs	6.31	6.60	1.18	4.86	12.20	52
Securities/Total Assets	18.62	19.33	2.81	10.17	23.01	52
Deposits/Total Liabilities	60.87	68.38	21.68	1.97	82.55	52
Equity/Total Assets	14.98	14.68	1.56	12.15	18.27	52
BHC 12: NIMs	0.80	0.79	0.12	0.58	1.08	24
Securities/Total Assets	3.11	0.32	3.80	0.18	11.11	24
Deposits/Total Liabilities	38.97	39.95	28.09	7.10	82.55	24
Equity/Total Assets	8.70	9.41	3.17	4.29	13.38	24
BHC 13: NIMs	8.08	8.32	1.01	4.73	9.04	35
Securities/Total Assets	6.90	5.87	4.57	1.89	24.48	35
Deposits/Total Liabilities	57.18	55.74	6.62	47.63	78.53	35
Equity/Total Assets	12.96	12.85	2.14	9.99	19.72	35
BHC 14: NIMs	3.58	3.62	0.46	2.82	4.95	84
Securities/Total Assets	21.64	20.82	8.17	9.29	34.01	84
Deposits/Total Liabilities	69.13	68.09	8.19	55.96	83.05	84
Equity/Total Assets	10.84	11.26	1.10	8.26	12.68	84
BHC 15: NIMs	3.46	3.39	0.53	1.08	4.77	84
Securities/Total Assets	15.56	15.91	4.25	6.96	23.79	84
Deposits/Total Liabilities	71.14	66.98	10.97	54.70	89.22	84
Equity/Total Assets	9.51	9.49	1.08	7.26	13.39	84
BHC 16: NIMs	2.24	2.20	0.26	1.78	2.96	84
Securities/Total Assets	11.78	12.51	3.84	3.70	17.96	84
Deposits/Total Liabilities	30.96	28.84	9.43	14.59	49.93	84
Equity/Total Assets	7.89	8.15	1.27	5.67	10.54	84
BHC 17: NIMs	3.31	3.30	0.56	1.57	4.71	84
Securities/Total Assets	13.31	9.70	5.61	7.40	23.93	84
Deposits/Total Liabilities	63.66	59.89	12.16	47.21	85.49	84
Equity/Total Assets	9.82	9.44	1.41	7.56	12.40	84
BHC 18: NIMs	0.34	0.33	0.32	-0.23	0.91	35
Securities/Total Assets	5.64	5.34	3.17	0	9.85	35
Deposits/Total Liabilities	13.68	11.46	4.94	7.78	21.58	35
Equity/Total Assets	8.64	8.93	0.86	6.74	9.67	35
BHC 19: NIMs	3.68	3.72	0.30	3.04	4.25	84
Securities/Total Assets	11.52	11.54	2.18	5.89	15.49	84
Deposits/Total Liabilities	69.72	64.51	12.20	52.82	89.71	84
Equity/Total Assets	11.18	10.82	1.43	7.00	13.55	84
BHC 20: NIMs	3.91	4.05	0.93	2.32	5.58	84
Securities/Total Assets	18.05	17.51	5.77	8.48	27.96	84
Deposits/Total Liabilities	71.75	72.44	8.45	56.96	83.02	84
Equity/Total Assets	10.81	10.38	1.97	7.50	14.40	84

(continued)

Table A.1. (Continued)

	Mean	Median	St. Dev.	Min.	Max.	<i>N</i>
BHC 21: NIMs	1.51	1.53	0.32	1.02	2.14	84
Securities/Total Assets	24.30	22.81	5.84	12.63	36.59	84
Deposits/Total Liabilities	31.46	32.36	5.94	18.11	43.61	84
Equity/Total Assets	7.65	7.69	0.56	6.10	9.04	84
BHC 22: NIMs	3.55	3.66	0.45	2.63	4.25	84
Securities/Total Assets	18.41	20.02	4.40	8.44	24.39	84
Deposits/Total Liabilities	68.22	68.80	7.25	54.82	78.80	84
Equity/Total Assets	11.36	11.57	1.74	8.03	13.99	84
BHC 23: NIMs	3.21	3.10	0.35	2.56	4.04	53
Securities/Total Assets	16.96	17.61	3.49	11.60	22.10	53
Deposits/Total Liabilities	75.64	75.54	11.33	57.93	91.21	53
Equity/Total Assets	13.37	13.32	0.67	11.69	14.92	53
BHC 24: NIMs	4.64	5.23	1.77	2.24	6.78	23
Securities/Total Assets	15.66	15.05	3.07	10.36	21.73	23
Deposits/Total Liabilities	55.63	51.09	8.70	47.13	72.33	23
Equity/Total Assets	17.11	16.99	1.50	15.09	19.78	23
BHC 25: NIMs	3.31	3.13	0.57	2.63	6.94	84
Securities/Total Assets	15.53	15.15	3.60	6.68	21.24	84
Deposits/Total Liabilities	67.19	62.04	11.73	52.27	88.22	84
Equity/Total Assets	10.75	10.36	1.45	8.20	13.49	84
BHC 26: NIMs	1.45	1.43	0.36	0.90	2.27	84
Securities/Total Assets	42.11	41.06	13.13	19.11	61.75	84
Deposits/Total Liabilities	13.29	9.77	10.54	0.86	37.43	84
Equity/Total Assets	7.63	7.42	1.58	4.56	11.27	84
BHC 27: NIMs	2.21	2.08	0.22	2.00	2.67	10
Securities/Total Assets	31.20	30.92	2.19	28.60	34.31	10
Deposits/Total Liabilities	83.73	79.24	7.43	78.22	94.75	10
Equity/Total Assets	12.59	12.76	0.73	11.55	13.66	10
BHC 28: NIMs	3.85	3.76	0.58	2.92	4.91	84
Securities/Total Assets	17.33	18.19	5.78	5.34	25.27	84
Deposits/Total Liabilities	62.97	63.26	7.43	78.22	94.72	84
Equity/Total Assets	10.34	10.33	0.83	9.04	11.80	84
BHC 29: NIMs	3.83	3.90	0.55	2.78	4.68	84
Securities/Total Assets	15.27	15.71	4.81	6.66	26.66	84
Deposits/Total Liabilities	62.79	62.17	5.68	49.52	72.50	84
Equity/Total Assets	9.79	9.94	1.19	7.22	11.41	84
BHC 30: NIMs	4.03	4.21	0.55	2012	4.94	84
Securities/Total Assets	14.09	12.90	5.90	6.93	27.72	84
Deposits/Total Liabilities	77.20	75.24	9.84	60.13	94.21	84
Equity/Total Assets	10.71	10.69	1.57	7.39	13.46	84

Source: Federal Reserve Bank of St. Louis FRED database; Federal Reserve Y9C.

Notes: BHC names have been anonymized. Bank numbers coincide with those in table B.1, but they do not necessarily coincide with those in table C.1.

Table A.2. Summary Statistics for Data Used to Explain Heterogeneity in Bank-Specific Sensitivity to Negative Interest Rates

	Mean	Median	St. Dev.	Min.	Max.	N
Sensitivity to Negative Rates	0.81	0.06	3.62	-4.61	8.69	30
Retail Deposits	63.67	68.18	23.62	13.42	90.04	30
Reserves	5.65	3.00	7.11	0.35	36.51	30
Short-Term Wholesale Funding	18.99	11.34	18.42	3.35	65.02	30
Net Repo Position	1.75	-0.16	5.86	-3.81	23.53	30
Duration Gap	32.87	34.14	9.03	12.22	48.41	29
Size	19.26	18.88	1.08	17.80	21.66	30
Trading Activity	17.31	16.08	8.32	0.21	37.92	30
Foreign C&I	9.64	5.35	13.48	0.12	69.21	30
Foreign Deposits	9.64	0.23	18.74	0	65.56	30
CET1 Ratio	12.71	11.56	4.60	9.49	34.71	30
Leverage Ratio	9.90	9.88	1.74	6.71	15.27	30
HQLA	19.63	17.60	8.27	8.34	42.98	30

Source: Federal Reserve Y9C; Data have been merger adjusted.

Table A.2 presents summary statistics for the data used in the estimation of equation (3), which tests the three hypothesized channels of exposure.

Appendix B. NIM Model

Table B.1 presents output of the bank-specific NIM model given by equation (1) in the main text.

Table B.1. Bank-by-Bank NIM Model Output

	<i>Con.</i>	<i>NIM</i> _{<i>t</i>-1}	Macrovariables			Bank-Specific Variables			<i>R</i> ²	<i>T</i>
			<i>3MO</i> _{<i>t</i>-1}	<i>Sprd</i> _{<i>t</i>-1}	Δ <i>GDP</i> _{<i>t</i>-1}	<i>SecRat</i> _{<i>t</i>-1}	<i>DepRat</i> _{<i>t</i>-1}	<i>Equity</i> _{<i>t</i>-1}		
BHC 1	0.94 (1.20)	-0.02 (0.19)	-0.63 (0.46)	0.08 (0.15)	0.08 (0.05)	3.15 (5.19)	4.30 (1.64)	-13.52 (9.07)	0.70	35
BHC 2	1.35 (1.83)	0.41 (0.15)	0.83 (0.37)	0.51 (0.19)	-0.04 (0.04)	-0.35 (1.30)	-0.39 (5.62)	0.13 (8.82)	0.67	35
BHC 3	0.84 (0.38)	0.64 (0.08)	0.07 (0.04)	0.06 (0.05)	0.00 (0.01)	-1.30 (0.86)	0.98 (0.39)	-4.29 (2.43)	0.89	84
BHC 4	1.28 (0.27)	0.67 (0.05)	0.02 (0.01)	0.07 (0.02)	0.02 (0.0)	-0.36 (0.46)	1.00 (0.36)	-7.96 (1.99)	0.94	84
BHC 5	-1.53 (1.35)	0.16 (0.11)	0.17 (0.12)	0.38 (0.17)	0.02 (0.04)	7.80 (2.88)	1.21 (1.42)	9.24 (3.27)	0.28	84
BHC 6	-0.54 (0.71)	0.06 (0.13)	0.19 (0.07)	0.16 (0.07)	-0.04 (0.01)	-1.00 (1.11)	1.52 (1.04)	10.60 (4.26)	0.79	41
BHC 7	1.17 (0.82)	0.17 (0.11)	0.06 (0.11)	0.08 (0.12)	0.00 (0.02)	2.97 (2.02)	-1.49 (1.16)	11.28 (7.42)	0.20	84
BHC 8	1.24 (0.63)	0.39 (0.13)	0.02 (0.09)	0.14 (0.11)	-0.02 (0.02)	-6.13 (3.96)	-8.10 (3.58)	27.40 (9.80)	0.59	76
BHC 9	1.16 (0.71)	0.42 (0.11)	0.07 (0.06)	0.06 (0.08)	0.02 (0.02)	1.62 (1.08)	-0.15 (0.44)	0.74 (3.01)	0.41	84
BHC 10	-1.66 (3.20)	0.44 (0.17)	0.20 (1.23)	0.62 (0.64)	-0.10 (0.14)	-8.62 (10.23)	5.27 (2.84)	-0.93 (12.72)	0.33	39
BHC 11	8.15 (1.65)	0.08 (0.07)	-0.01 (0.13)	-0.09 (0.11)	0.04 (0.03)	2.55 (5.28)	1.62 (0.40)	-25.43 (7.16)	0.69	52
BHC 12	0.40 (0.19)	0.59 (0.11)	-0.07 (0.04)	-0.01 (0.04)	-0.01 (0.01)	3.73 (4.16)	-1.96 (1.48)	2.94 (2.63)	0.66	60
BHC 13	8.28 (1.10)	0.53 (0.08)	1.67 (0.48)	-0.02 (0.11)	0.07 (0.03)	-1.05 (1.54)	-12.90 (2.70)	20.78 (7.34)	0.92	35
BHC 14	0.90 (0.46)	0.49 (0.10)	0.09 (0.04)	0.09 (0.06)	0.00 (0.01)	-0.59 (0.50)	-1.45 (0.70)	15.21 (4.12)	0.69	84
BHC 15	2.88 (0.97)	-0.10 (0.12)	0.13 (0.07)	0.17 (0.09)	0.01 (0.03)	3.79 (1.96)	-0.70 (1.15)	2.16 (8.90)	0.10	84
BHC 16	0.64 (0.21)	0.87 (0.08)	0.00 (0.02)	-0.01 (0.03)	-0.02 (0.01)	-0.13 (0.48)	0.30 (0.36)	-4.42 (2.36)	0.67	84

(continued)

Table B.1. (Continued)

	<i>Con.</i>	<i>NIM</i> _{<i>t</i>-1}	Macrovariables			Bank-Specific Variables			<i>R</i> ²	<i>T</i>
			<i>3MO</i> _{<i>t</i>-1}	<i>Sprd</i> _{<i>t</i>-1}	Δ <i>GDP</i> _{<i>t</i>-1}	<i>SecRat</i> _{<i>t</i>-1}	<i>DepRat</i> _{<i>t</i>-1}	<i>Equity</i> _{<i>t</i>-1}		
BHC 17	1.53 (0.86)	0.58 (0.10)	0.10 (0.05)	0.09 (0.06)	0.01 (0.01)	2.26 (1.48)	-0.30 (0.69)	-6.74 (5.06)	0.63	84
BHC 18	0.93 (0.99)	-0.10 (0.20)	0.05 (0.15)	-0.09 (0.10)	0.02 (0.02)	1.60 (2.96)	6.26 (1.95)	-15.38 (10.01)	0.73	35
BHC 19	0.81 (0.31)	0.83 (0.06)	0.01 (0.02)	0.01 (0.02)	0.01 (0.0)	-0.75 (0.56)	0.00 (0.18)	-1.42 (1.60)	0.91	84
BHC 20	-0.25 (0.53)	0.78 (0.07)	0.17 (0.06)	0.15 (0.06)	-0.01 (0.01)	0.44 (1.0)	0.18 (0.57)	2.22 (2.46)	0.91	84
BHC 21	0.23 (0.13)	0.66 (0.07)	0.07 (0.02)	0.05 (0.02)	-0.01 (0.0)	-0.08 (0.21)	0.24 (0.19)	-0.11 (1.88)	0.94	84
BHC 22	0.34 (0.30)	0.93 (0.03)	0.01 (0.02)	0.03 (0.02)	-0.01 (0.01)	0.20 (0.35)	0.24 (0.37)	-3.06 (1.41)	0.94	84
BHC 23	0.60 (0.37)	0.70 (0.08)	0.11 (0.03)	0.04 (0.03)	0.02 (0.01)	1.98 (1.42)	0.24 (0.36)	-3.10 (1.99)	0.95	53
BHC 24	-2.22 (5.73)	0.99 (0.41)	1.26 (0.87)	0.90 (0.61)	-0.24 (0.10)	-10.52 (8.30)	5.21 (8.03)	-2.26 (17.27)	0.86	23
BHC 25	0.24 (0.79)	0.31 (0.10)	0.15 (0.07)	0.08 (0.09)	0.02 (0.02)	3.64 (2.05)	0.26 (0.87)	7.13 (5.31)	0.49	84
BHC 26	0.22 (0.18)	0.94 (0.06)	0.00 (0.02)	-0.02 (0.03)	0.00 (0.01)	0.31 (0.15)	0.03 (0.17)	-3.11 (1.82)	0.88	84
BHC 27	0.53 (0.87)	0.33 (0.37)	0.76 (0.36)	-0.19 (0.12)	-0.05 (0.05)	-27.16 (16.54)	10.47 (3.20)	3.55 (19.82)	0.79	13
BHC 28	0.30 (0.22)	0.89 (0.04)	0.02 (0.02)	0.04 (0.03)	0.00 (0.0)	-0.51 (0.35)	-0.03 (0.19)	0.59 (1.64)	0.98	84
BHC 29	0.33 (0.19)	0.94 (0.04)	0.02 (0.02)	0.04 (0.03)	-0.01 (0.0)	0.34 (0.32)	-0.64 (0.54)	1.24 (2.15)	0.97	84
BHC 30	0.33 (0.49)	0.80 (0.06)	0.08 (0.03)	0.07 (0.03)	-0.01 (0.01)	-0.13 (0.36)	0.51 (0.40)	-1.86 (1.72)	0.94	84

Source: Author's calculations.

Notes: BHC names have been anonymized. Bank numbers coincide with those in table B.1, but they do not necessarily coincide with those in table C.1. Coefficient estimates are reported in the first row for each bank and robust standard errors are reported below each estimate in parentheses.

Appendix C. Robustness

Tables C.1–C.7 present a series of robustness tests for each stage of the analysis. Table C.1 presents the coefficient estimates and associated t-statistics for the negative rate dummy in equation (3) under the baseline model (model 1) as well as a variety of different assumptions about the specification of the underlying NIMs model (presented in models 2–6) and different assumptions for the the specification of equation (3), which explains the projection differences (presented in models 7–12). For the results in models 2–6, the approach is to reestimate equation (1) introducing one variable at a time to the baseline specification and capture the bank-specific coefficients. Then, I used these bank-specific coefficients, along with the bank-provided scenario projections for the variable of interest, to construct a new vector of projection differences. Using this new set of projection differences, I reestimated equation (3) and report the resulting coefficient estimate as well as the t-statistic on the negative rate dummy in the table. For models 7–12, I used the projection differences from the baseline model and reestimated equation (3), including each variable in the new specification.

Tables C.2–C.6 present robustness results for the estimation of equation (4) and the associated test of each transmission channel.

Finally, table C.7 presents the coefficient estimate of interest (and associated robust standard error) in equation (4) for a given hypothesized transmission channel (the columns in the table) for each of the models detailed in table C.1. Model 1 presents the baseline estimates reported in table 2 in the main paper. Panel A shows how these baseline estimates differ under an alternative specification for the underlying NIM model (models 2–6). Panel B assumes the baseline NIM model but controls for different interest rate configurations (models 7–9) in the estimation of equation (3). Finally, panel C assumes the baseline NIM model but controls for different regulatory capital and liquidity ratios (models 10–12) in equation (3).

Table C.1. Alternative Specifications for Bank-Specific NIMs Model

	Alternative Specifications for Equation (1)											
	Baseline Model (1)		Unemployment (2)		House Prices (3)		CRE Prices (4)		VIX (5)		Stock Prices (6)	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
BHC 1	-0.66	-3.83	-0.72	-3.88	-0.71	-3.91	-0.67	-3.85	-0.65	-3.80	-0.66	-3.82
BHC 2	-0.42	-3.16	-0.46	-3.18	-0.35	-3.18	-0.40	-3.15	-0.65	-3.26	-0.43	-3.20
BHC 3	-0.30	-3.96	-0.36	-3.43	-0.34	-3.57	-0.41	-3.32	-0.44	-3.54	-0.30	-3.93
BHC 4	-0.21	-2.77	-0.21	-2.79	-0.24	-2.74	-0.21	-2.83	-0.24	-2.84	-0.21	-2.77
BHC 5	-0.16	-1.63	-0.22	-1.97	-0.18	-1.74	-0.22	-1.98	-0.21	-1.97	-0.15	-1.52
BHC 6	-0.15	-4.61	-0.35	-6.46	-0.36	-5.96	-0.18	-5.06	-0.29	-5.91	-0.15	-4.74
BHC 7	-0.11	-2.89	-0.02	-0.47	-0.16	-3.37	-0.09	-2.41	-0.10	-2.55	-0.11	-2.74
BHC 8	-0.07	-1.60	-0.06	-1.46	-0.05	-1.09	-0.08	-1.92	-0.06	-1.26	-0.07	-1.61
BHC 9	-0.07	-1.34	-0.11	-1.99	-0.01	-0.22	-0.12	-2.14	-0.01	-0.24	-0.07	-1.34
BHC 10	-0.06	-0.96	-0.20	-1.72	-0.06	-0.97	-0.08	-1.02	-0.15	-1.56	-0.05	-0.82
BHC 11	-0.05	-2.13	-0.07	-2.29	-0.15	-2.73	-0.05	-2.13	0.02	2.30	-0.05	-2.08
BHC 12	-0.05	-2.03	0.06	1.21	-0.08	-3.29	-0.02	-0.75	-0.02	-0.66	-0.05	-2.18
BHC 13	-0.05	-1.09	-0.06	-1.40	-0.15	-5.26	-0.06	-1.69	-0.05	-1.36	-0.05	-1.14
BHC 14	-0.04	-0.85	-0.06	-1.20	0.06	3.41	-0.02	-0.60	-0.07	-1.29	-0.06	-1.33
BHC 15	-0.02	-0.55	-0.02	-0.51	0.11	1.55	-0.06	-1.43	0.07	1.55	-0.02	-0.57
BHC 16	0.03	0.86	0.02	0.69	0.05	1.12	0.02	0.50	0.06	1.27	0.03	0.86
BHC 17	0.05	2.88	0.00	0.27	0.09	4.08	0.01	0.40	0.13	6.82	0.05	2.88
BHC 18	0.13	4.60	0.22	3.79	0.20	4.11	0.16	4.26	0.23	3.83	0.15	4.43
BHC 19	0.14	2.44	0.11	1.74	0.18	2.22	0.14	2.49	0.13	2.00	0.11	2.12
BHC 20	0.17	0.68	0.09	0.38	0.15	0.58	0.11	0.46	0.10	0.37	0.17	0.66
BHC 21	0.18	8.69	0.40	4.90	1.33	3.77	0.28	7.05	0.16	7.86	0.18	8.32
BHC 22	0.20	2.88	0.11	2.49	-0.05	-3.18	0.13	2.58	-0.01	-0.47	0.22	3.55
BHC 23	0.25	2.86	0.38	5.13	0.27	4.49	0.33	3.81	0.27	5.10	0.25	2.86
BHC 24	0.29	2.35	0.44	8.28	0.65	6.80	0.60	7.44	0.53	9.38	0.40	8.62
BHC 25	0.32	2.14	0.54	5.63	0.67	4.80	0.53	5.84	0.33	5.82	0.50	6.11
BHC 26	0.40	8.62	0.35	2.47	0.30	1.99	0.51	2.57	2.09	4.63	0.28	1.93
BHC 27	0.51	6.12	0.25	2.10	0.22	1.96	0.29	2.31	0.16	1.70	0.33	2.50
BHC 28	0.96	4.28	1.16	4.43	-0.35	-3.58	0.88	4.19	1.01	4.54	0.95	4.32
BHC 29	2.42	3.74	-1.41	-0.87	-4.47	-1.69	2.96	5.37	1.20	0.99	2.17	3.65
BHC 30	2.75	4.57	2.66	4.60	2.78	4.58	2.77	4.60	2.86	4.62	3.05	4.87

(continued)

Table C.1. (Continued)

		Alternative Specifications for Equation (3)												
		Different Yield Curve Configurations			Regulatory Capital and Liquidity Ratios									
		“Low for Long” (7)		Steeper Curve (8)		Level Shift Up (9)		CET1 Ratio (10)		Leverage Ratio (11)		HQLA (12)		
Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	
BHC 1	-0.66	-3.82	-0.80	-14.68	-0.66	-3.82	-0.66	-3.82	-0.66	-3.82	-0.66	-3.82	-0.66	-3.82
BHC 2	-0.42	-3.16	-0.65	-11.97	-0.42	-3.16	-0.42	-3.16	-0.42	-3.16	-0.42	-3.16	-0.42	-3.16
BHC 3	-0.34	-3.05	-0.34	-4.54	-0.30	-4.67	-0.35	-4.84	-0.30	-3.95	-0.30	-3.95	-0.30	-3.95
BHC 4	-0.23	-3.05	-0.25	-3.43	-0.21	-2.76	-0.21	-2.76	-0.21	-2.76	-0.21	-2.76	-0.21	-2.76
BHC 5	-0.16	-1.62	-0.34	-3.78	-0.16	-1.62	-0.16	-1.62	-0.16	-1.62	-0.16	-1.62	-0.16	-1.62
BHC 6	-0.13	-3.02	-0.20	-4.97	-0.11	-4.51	-0.14	-3.92	-0.14	-3.92	-0.14	-3.92	-0.14	-3.92
BHC 7	-0.10	-2.00	-0.10	-2.05	-0.11	-2.89	-0.11	-2.89	-0.11	-2.89	-0.11	-2.89	-0.11	-2.89
BHC 8	-0.07	-1.60	-0.10	-2.18	-0.07	-1.60	-0.07	-1.60	-0.07	-1.60	-0.07	-1.60	-0.07	-1.60
BHC 9	-0.07	-1.33	-0.09	-1.90	-0.07	-1.33	-0.07	-1.33	-0.07	-1.33	-0.07	-1.33	-0.07	-1.33
BHC 10	-0.10	-2.25	-0.06	-0.97	-0.06	-0.96	-0.06	-0.96	-0.06	-0.96	-0.06	-0.96	-0.06	-0.96
BHC 11	-0.07	-3.53	-0.04	-1.08	-0.05	-2.13	-0.05	-2.13	-0.05	-2.13	-0.05	-2.13	-0.05	-2.13
BHC 12	-0.06	-2.99	-0.05	-1.59	-0.05	-1.93	-0.05	-1.93	-0.05	-1.93	-0.05	-1.93	-0.05	-1.93
BHC 13	-0.02	-0.50	-0.05	-1.04	-0.05	-1.09	-0.05	-1.09	-0.05	-1.09	-0.05	-1.09	-0.05	-1.09
BHC 14	-0.04	-0.85	-0.08	-2.11	-0.04	-0.85	-0.04	-0.85	-0.04	-0.85	-0.04	-0.85	-0.04	-0.85
BHC 15	-0.03	-0.55	-0.16	-2.39	-0.02	-0.55	-0.02	-0.55	-0.02	-0.55	-0.02	-0.55	-0.02	-0.55
BHC 16	0.06	2.44	0.03	0.65	0.03	0.86	0.03	0.86	0.03	0.86	0.03	0.86	0.03	0.86
BHC 17	0.06	3.52	0.07	2.53	0.05	2.88	0.05	2.87	0.05	2.87	0.05	2.87	0.05	2.87
BHC 18	0.14	4.85	0.15	4.45	0.13	4.59	0.13	4.59	0.13	4.59	0.13	4.59	0.13	4.59
BHC 19	0.14	2.44	0.21	6.93	0.14	2.44	0.14	2.44	0.14	2.44	0.14	2.44	0.14	2.44
BHC 20	0.12	0.48	0.13	0.50	0.15	0.61	0.05	0.18	0.05	0.18	0.04	0.14	0.03	0.11
BHC 21	0.25	4.49	0.16	2.55	0.18	8.67	0.18	8.67	0.18	8.67	0.18	8.67	0.18	8.67
BHC 22	0.23	4.76	0.23	3.05	0.20	2.88	0.20	2.88	0.20	2.88	0.20	2.88	0.20	2.88
BHC 23	0.22	3.12	0.25	2.72	0.24	2.85	0.31	2.54	0.25	2.88	0.25	2.88	0.27	2.66
BHC 24	0.37	2.60	0.40	2.39	0.29	2.35	0.41	3.02	0.41	3.02	0.41	3.02	0.41	3.02
BHC 25	0.32	2.14	0.11	0.74	0.32	2.14	0.32	2.14	0.32	2.14	0.32	2.14	0.32	2.14
BHC 26	0.40	8.60	0.43	9.52	0.40	8.60	0.40	8.60	0.40	8.60	0.40	8.60	0.40	8.60
BHC 27	0.51	6.10	0.51	4.82	0.51	6.10	0.51	6.10	0.51	6.10	0.51	6.10	0.51	6.10
BHC 28	0.96	4.27	1.19	10.80	0.96	4.27	0.96	4.27	0.96	4.27	0.96	4.27	0.96	4.27
BHC 29	2.42	3.73	2.39	2.15	2.42	3.73	2.42	3.73	2.42	3.73	2.42	3.73	2.42	3.73
BHC 30	2.75	4.56	3.55	10.53	2.75	4.56	2.75	4.56	2.75	4.56	2.75	4.56	2.75	4.56

Source: Author's calculations.
 Note: Estimation uses robust standard errors.

Table C.2. Robustness of Results on Exposure through Retail Deposits

	Robustness						
	Trading	Foreign Exposure			Regulatory Constraints		
		(1)	(2)	(3)	(4)	(5)	(6)
Constant	-1.43 (1.73)	2.53 (2.51)	1.68 (2.96)	1.84 (2.54)	4.83 (2.82)	5.02 (6.62)	3.74 (2.63)
Retail Deposits	3.52 (2.75)	-0.69 (3.01)	-0.29 (3.92)	-0.44 (3.45)	-1.73 (2.97)	-1.35 (3.22)	0.96 (3.11)
Trading Activity		-3.18 (9.60)					
Foreign C&I			1.93 (5.39)				
Foreign Deposits				2.46 (2.93)			
CET1 Ratio					-15.67 (10.78)		
Leverage Ratio						-23.53 (52.94)	
HQLA							-16.16 (10.67)
Processing Bank		-2.22 (1.35)	-2.05 (1.77)	-3.35* (1.56)	-2.85* (1.35)	-3.03 (2.01)	1.44 (2.70)
G-SIB		-2.19 (1.37)	-2.86* (1.21)	-2.77** (1.03)	-2.76** (1.01)	-3.07 (1.49)	-2.05 (1.00)
R ²	0.05	0.15	0.15	0.15	0.19	0.16	0.20
Obs.	30	30	30	30	30	30	30

Source: Author's calculations.
Notes: Estimation uses robust standard errors which are reported in parentheses below each coefficient estimate. Asterisks (*, **, and ***) denote significance at the 0.05, 0.025, and 0.01 level, respectively.

Table C.3. Robustness of Results on Exposure through Reserves

	Robustness						
	Trading		Foreign Exposure		Regulatory Constraints		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	1.80* (1.08)	5.09*** (1.58)	2.09* (0.96)	2.22* (0.96)	1.43 (2.51)	-2.36 (3.77)	3.18 (2.48)
Reserves	-17.43*** (5.31)	-22.72*** (5.91)	-16.10*** (5.61)	-14.26** (5.17)	-18.68 (14.10)	-20.29*** (6.29)	-11.00 (10.73)
Trading Activity		-16.80* (7.28)					
Foreign C&I			4.91 (2.79)				
Foreign Deposits				2.87 (2.07)			
CET1 Ratio					8.32 (20.88)		
Leverage Ratio						47.07 (31.94)	
HQLA							-6.08 (16.06)
Processing Bank		-0.150 (1.07)	-0.77 (1.01)	-2.59 (1.37)	-0.93 (1.43)	0.06 (1.45)	-0.27 (2.84)
G-SIB		-0.34 (1.17)	-3.30*** (0.94)	-2.60*** (0.79)	-2.26** (0.90)	-1.51 (1.19)	-2.26** (0.88)
R ²	0.12	0.28	0.24	0.22	0.22	0.24	0.22
Obs.	30	30	30	30	30	30	30

Source: Author's calculations.

Notes: Estimation uses robust standard errors which are reported in parentheses below each coefficient estimate. Asterisks (*, **, and ***) denote significance at the 0.05, 0.025, and 0.01 level, respectively.

Table C.4. Robustness of Results on Exposure through Short-Term Wholesale Funding

	Robustness						
	(1)	Trading		Foreign Exposure		Regulatory Constraints	
		(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.69 (0.68)	1.40 (0.90)	1.39 (0.91)	3.22 (1.92)	3.45 (5.60)	3.90 (2.40)	
Wholesale Funding	12.96*** (2.47)	9.70** (3.99)	10.35*** (3.26)	9.53*** (3.36)	10.22*** (3.20)	5.48 (5.40)	
Trading Activity							
Foreign C&I		1.01 (4.28)					
Foreign Deposits			2.48 (2.50)				
CET1 Ratio				-13.74 (11.56)			
Leverage Ratio					-19.12** (52.06)		
HQLA						-13.66 (12.17)	
Processing Bank		-2.05 (1.05)	-3.35** (1.53)	-2.29* (0.96)	-2.50 (1.52)	0.65 (2.59)	
G-SIB		-2.18 (1.31)	-2.59*** (0.86)	-2.23** (0.88)	-2.55 (1.26)	-2.24* (0.96)	
R ²	0.03	0.17	0.17	0.20	0.17	0.20	
Obs.	30	30	30	30	30	30	

Source: Author's calculations.

Notes: Estimation uses robust standard errors which are reported in parentheses below each coefficient estimate. Asterisks (*, **, and ***) denote significance at the 0.05, 0.025, and 0.01 level, respectively.

Table C.5. Robustness of Results on Exposure through Net Repo Position

	Robustness						
	Trading		Foreign Exposure		Regulatory Constraints		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	1.15 (0.73)	3.78*** (1.23)	1.42 (0.90)	1.68 (0.88)	-1.78 (3.57)	-3.85 (4.60)	2.88 (3.11)
Net Repo Position	-21.96*** (4.63)	-31.41*** (6.39)	-27.70*** (4.70)	-22.99*** (4.91)	-49.35* (22.77)	-34.18*** (8.18)	-17.42 (16.66)
Net Repo Position × G-SIB	3.34*** (5.12)	39.50*** (11.49)	23.08*** (5.30)	20.50*** (5.68)	39.23* (17.87)	32.88*** (10.77)	10.86 (25.60)
Trading Activity		-14.05* (6.71)					
Foreign C&I			6.08* (2.79)				
Foreign Deposits				2.46 (2.48)			
CET1 Ratio					28.77 (25.26)		
Leverage Ratio						53.91 (39.46)	-6.77 (18.34)
HQLA							-0.90 (3.73)
Processing Bank		-1.34 (0.89)	-1.67 (1.20)	-3.25 (1.58)	-1.87 (1.21)	-0.94 (1.47)	-2.06 (1.21)
G-SIB		-1.50* (0.97)	-3.58*** (0.88)	-2.67*** (0.82)	-2.19* (0.92)	-1.71 (1.13)	
R ²	0.11	0.27	0.25	0.23	0.25	0.25	0.23
Obs.	30	30	30	30	30	30	30

Source: Author's calculations.

Notes: Estimation uses robust standard errors which are reported in parentheses below each coefficient estimate. Asterisks (*, **, and ***) denote significance at the 0.05, 0.025, and 0.01 level, respectively.

Table C.6. Robustness of Results on Exposure through Yield Curve Compression

	Robustness						
	Trading		Foreign Exposure		Regulatory Constraints		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	3.05 (2.03)	6.22* (2.68)	3.43 (2.77)	4.01 (2.65)	-0.51 (7.18)	-0.78*** (5.86)	5.82 (4.02)
Duration Gap	-6.32 (6.50)	-7.67 (7.30)	-5.70 (8.08)	-6.87 (7.89)	-2.97 (10.04)	-5.20 (8.18)	-8.16 (8.20)
Trading Activity		-12.89** (5.34)					
Foreign C&I			4.69 (3.18)				
Foreign Deposits				1.31 (2.87)			
CET1 Ratio					27.98 (37.01)		
Leverage Ratio						41.75*** (37.87)	
HQLA							-8.27 (15.52)
Processing Bank		-2.77* (1.24)	-2.59 (1.75)	-3.73* (1.59)	-2.33 (2.03)	-2.05 (1.98)	-1.62 (3.23)
G-SIB		-0.56 (1.32)	-3.13* (1.49)	-2.15 (1.27)	-2.67 (1.33)	-1.59 (1.25)	-1.77 (1.40)
R ²	0.03	0.25	0.22	0.20	0.22	0.22	0.21
Obs.	29	29	29	29	29	29	29

Source: Author's calculations.
Notes: Estimation uses robust standard errors which are reported in parentheses below each coefficient estimate. Asterisks (*, **, and ***) denote significance at the 0.05, 0.025, and 0.01 level, respectively.

Table C.7. Additional Robustness Checks

	$H1_0 : \hat{\beta}_{L_d} = 0$		$H2_0 : \hat{\beta}_{A_s} = 0; \hat{\beta}_{L_s} = 0$			$H3_0 : \hat{\beta} = 0$
	Retail Deposits	Reserves	Short-Term Wholesale Funding	Net Repo Position	Net Repo Position × G-SIB	Maturity Gap
(1) Baseline Model	-0.87 (3.16)	-14.74* (6.28)	10.19*** (3.13)	-25.42*** (7.39)	20.60*** (7.45)	-6.52 (7.89)
<i>A. Alternative Specifications for Equation (1)</i>						
(2) Unemployment	-1.81 (2.88)	-15.34** (5.53)	12.80*** (3.08)	-24.80*** (6.53)	36.95*** (5.25)	-4.57 (7.43)
(3) House Prices	-4.78 (2.53)	-13.27* (5.80)	15.05*** (3.10)	-21.99*** (6.63)	20.60 (13.55)	-11.99 (6.29)
(4) CRE Prices	-0.01 (2.86)	-15.38** (6.08)	10.96*** (3.06)	-26.00*** (7.16)	26.96*** (6.54)	-5.84 (7.76)
(5) VIX	-0.63 (2.98)	-17.41*** (5.79)	9.93*** (3.41)	-27.28*** (7.33)	29.62*** (6.09)	-5.79 (7.49)
(6) Stock Market Index	-0.88 (3.14)	-14.16* (6.37)	10.31*** (3.13)	-25.09** (7.31)	19.11** (7.07)	-6.46 (7.97)
<i>B. Alternative Specifications for Equation (3): Yield Curve Configurations</i>						
(7) Low for Long	-0.88 (2.90)	-13.75* (5.49)	9.66*** (2.94)	-22.52*** (6.73)	18.00* (8.93)	-4.64 (8.47)
(8) Steeper Yield Curve	-0.88 (2.90)	-13.75* (5.49)	9.66*** (2.94)	-65.46*** (9.23)	64.18*** (7.50)	-11.64 (17.48)
(9) Level Shift up in Yield Curve	-0.87 (3.14)	-14.70** (6.25)	10.15*** (3.11)	-25.36*** (7.36)	64.18*** (7.50)	-11.64 (17.48)
<i>C. Alternative Specifications for Equation (3): Regulatory Capital and Liquidity Ratios</i>						
(10) CET1 Ratio	-0.73 (3.14)	-14.41** (6.23)	9.97*** (3.07)	-25.10*** (7.32)	21.38*** (7.00)	-6.92 (7.85)
(11) Leverage Ratio	-0.74 (3.11)	-14.42** (6.17)	9.84*** (3.05)	-24.96*** (7.30)	22.32*** (6.84)	-6.98 (7.85)
(12) HQLA	-0.74 (3.11)	-14.42** (6.17)	9.84*** (3.05)	-24.96*** (7.30)	22.32*** (6.84)	-6.98 (7.85)

Source: Author's calculations.

Notes: Estimation uses robust standard errors which are reported in parentheses below each coefficient estimate. Asterisks (*, **, and ***) denote significance at the 0.05, 0.025, and 0.01 level, respectively.