

# Internet Appendix: Bank Liquidity Creation, Systemic Risk and Basel Liquidity Regulations

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## Abstract

This is the appendix to the paper *Bank Liquidity Creation, Systemic Risk, and Basel Liquidity Regulations*, which can be downloaded from [https://www.newyorkfed.org/research/staff\\_reports/sr852](https://www.newyorkfed.org/research/staff_reports/sr852) or from [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3199876](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3199876).

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## A Section 4 of Paper

### A.1 Data Sources

The repo haircut data is from the SEC Edgar website before 2010 and from the Federal Reserve Bank of New York since then.<sup>1</sup> Haircuts for the secondary loan market are from the Loan Syndications & Trading Association.<sup>2</sup> The OIS and Tbill data are from Bloomberg.

### A.2 Estimating Insured, Core and Transactions Deposits and Liquidity Weight of Total Deposits

We follow Acharya and Mora (2015) and define insured deposits as non-retirement deposit accounts (RCONF049) plus retirement deposit accounts (RCONF045) of \$250,000 or less. To this amount, Bai, Krishnamurthy and Weymuller (2018) adds the first \$250,000 in accounts above the limit multiplied by the number of such deposit accounts. However, the FDIC insurance cap is *per owner per bank* (see <https://www.fdic.gov/deposit/deposits/faq.html>), and so if an owner has multiple accounts with more than \$250,000 with a bank, only the first \$250,000 is covered. Since we lack data on individual depositor accounts, we could not estimate this additional component, and excluded it from our estimates.

We follow Bai et al. (2018) in assuming a maturity of 10 years and 1 year for insured and uninsured deposits, respectively. Then, the maturity of total deposits is the weighted average of the maturities of insured and uninsured deposits, equal to 5.93 years. The weights are the average shares of insured and uninsured deposits in total deposits, equal to 0.55 and 0.45, respectively, in our sample.

Following (Acharya and Mora (2015)), core deposits are the sum of transaction deposits, saving deposits, and time deposits less than \$250,000.

Transactions deposits include interest-bearing demand deposits, NOW and ATS accounts.

### A.3 Descriptive Statistics of Sample

In this section, we discuss the descriptive statistics of our sample. Panel A of Table A.1 shows summary statistics for the asset side of bank balance sheets. We have 113 banks in our sample, of which 12 are full-banks, about 14 are mod-banks and about 88 are midsized banks. The average assets of full, mod and midsized banks were \$894 billion, \$98 billion and \$11 billion, respectively, before 2013. The average asset size increases over the sample for all

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<sup>1</sup>[https://www.newyorkfed.org/banking/tpr\\_infr\\_reform\\_data.html](https://www.newyorkfed.org/banking/tpr_infr_reform_data.html)

<sup>2</sup>See [www.lsta.org](http://www.lsta.org).

size groups. The average *LMI* and *LMIN* decreased for LCR banks from period to period; for midsized banks, *LMIN* increased from *2013-2014* to *2015+*. The last four columns show that the different trends in *LMIN* is in part due to relatively lower holdings of illiquid asset shares by LCR banks. Thus, the mean HQLA share increases throughout for LCR banks but decreases throughout for midsized banks. Further, midsized banks' illiquid asset share increases from period to period while there is no such trend for LCR banks. Notably, the non-HQLA liquid asset share does not share the same trend as HQLA; indeed, full banks' non-HQLA share *decreases* throughout, suggesting that these trends are LCR-specific rather than a shift in bank liquidity preferences.

Panel B of Table A.1 shows summary statistics for individual assets that are eligible as HQLA. Notable is the continued reliance on reserves by the full-banks, constituting close to 9% of assets since 2015. Also the average GNMA shares for mod-banks rise from period to period, while their share of GSE MBS declines; by comparison, midsized banks' shares of both GNMA and GSE MBS generally decline. This is notable since LCR rules favor GNMA over GSE MBS. Panel C of Table A.1 shows summary statistics for semi-liquid and illiquid loans. All illiquid loans and C&I loan shares are higher for all groups, while the opposite is true for small business C&I loan shares. For other loans, shares are generally decreasing for LCR banks but increasing for midsized banks.

Panel A of Table A.2 shows summary statistics for the liability side of bank balance sheets. For liquid liabilities, we observe a reduction in shares of LCR banks from *2013-2014* to *2015+* and an increase in mean shares for midsized banks during the same period. The mean share of off-balance-sheet liabilities decreases for full-banks from period to period while the opposite is true for midsized banks. Panel B of the table shows short-term funding items. Overnight funding (repo and fed funds) and commercial paper generally show declining average shares for all groups. For  $OBM \leq$  one-year maturity, LCR banks' mean shares decrease every period but that of midsized banks increase.

Table A.1: Descriptive Statistics of On-Balance Sheet Assets

The table shows the means of on-balance sheet assets of banks. *LMI* is the liquidity creation measure and *LMIN* is *LMI* divided by assets. High Quality Liquid Assets (HQLA) is an LCR-defined category; see Table 1 in the text. The asset liquidity categories are defined in Table 2 in the text. *Mod-Banks* are LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *Full-Banks*, also subject to LCR, are internationally active or have assets  $\geq$  \$250 billion. *midsized banks* are not subject to LCR and have assets between \$3 billion and \$50 billion.

Panel A: Asset Side Summary									
Size Group	Period	Number of Banks	Assets (billions)	LMI (Billions)	LMIN Share	HQLA Share	Non-HQLA		
							Liquid Assets Share	Semiliq. Assets Share	Illiquid Assets Share
All Banks	2009-2012	113.00	115	-41.98	-36.21	23.06	8.08	21.05	48.12
	2013-2014	113.00	122	-50.18	-38.47	21.75	8.06	20.84	49.31
	2015+	113.00	131	-54.71	-37.59	20.74	7.39	20.46	51.09
Full-Banks	2009-2012	12.00	894	-332.77	-37.63	16.87	29.95	24.53	29.63
	2013-2014	12.00	944	-396.88	-41.32	19.64	28.45	22.04	30.16
	2015+	12.00	984	-425.39	-43.53	21.77	27.11	20.54	30.65
Mod-Banks	2009-2012	13.53	98	-30.88	-31.43	16.19	5.84	25.90	53.18
	2013-2014	13.14	107	-37.95	-35.67	16.51	6.53	25.53	51.87
	2015+	13.92	121	-43.39	-36.29	18.50	6.00	23.19	52.66
Midsized Banks	2009-2012	87.47	11	-3.80	-36.76	24.98	5.43	19.83	49.88
	2013-2014	87.86	12	-4.66	-38.49	22.82	5.50	19.98	51.55
	2015+	87.08	15	-5.43	-36.98	20.96	4.89	20.01	53.66
Panel B: High Quality Liquid Assets (Share of Total Assets)									
Size Group	Period	Reserves	Treasury Securities	Agency Debt	GNMA MBS	GSE MBS	GSE Debt	Equities	Muni
All Banks	2009-2012	3.60	0.95	0.19	1.43	5.65	3.11	0.23	2.69
	2013-2014	2.75	1.22	0.30	1.37	4.91	2.41	0.16	3.08
	2015+	2.50	1.61	0.37	1.23	5.01	1.46	0.11	3.04
Full-Banks	2009-2012	6.39	2.43	0.03	0.99	3.06	2.01	0.34	1.17
	2013-2014	8.48	3.39	0.05	1.16	3.10	1.18	0.11	1.07
	2015+	8.91	4.30	0.05	1.51	4.06	0.57	0.07	1.03
Mod-Banks	2009-2012	3.23	0.40	0.16	0.62	5.52	1.38	0.45	0.69
	2013-2014	2.61	0.42	0.33	1.63	4.61	0.68	0.09	0.78
	2015+	2.21	1.52	0.53	2.55	4.06	0.55	0.10	0.85
Midsized Banks	2009-2012	3.27	0.84	0.22	1.61	6.02	3.52	0.18	3.21
	2013-2014	1.99	1.04	0.33	1.36	5.20	2.84	0.18	3.69
	2015+	1.67	1.25	0.39	0.98	5.29	1.73	0.11	3.67
Panel C: Semiliquid and Illiquid Loans (Share of Total Assets)									
Size Group	Period	All Loans	All Illiquid Loans	Comm. & Industrial	Comm. Real Estate	All Semiliquid Loans	Res. Real Estate	Consumer	Small Business C&I
All Banks	2009-2012	59.71	38.65	12.30	22.56	21.05	15.98	4.86	2.98
	2013-2014	61.55	40.71	13.85	21.74	20.84	15.61	4.99	2.72
	2015+	63.49	43.03	14.38	23.22	20.46	15.05	5.24	2.55
Full-Banks	2009-2012	42.48	17.95	7.17	4.67	24.53	12.51	11.54	0.87
	2013-2014	42.18	20.15	8.14	4.14	22.04	10.70	10.73	0.73
	2015+	41.99	21.46	9.67	4.33	20.54	8.86	11.25	0.75
Mod-Banks	2009-2012	66.19	40.29	17.31	17.68	25.90	18.94	6.86	1.93
	2013-2014	67.19	41.65	20.35	14.55	25.53	18.65	6.69	1.74
	2015+	65.28	42.10	20.59	13.99	23.19	16.66	6.46	1.62
Midsized Banks	2009-2012	61.07	41.24	12.23	25.78	19.83	15.99	3.63	3.44
	2013-2014	63.36	43.38	13.66	25.22	19.98	15.83	3.95	3.14
	2015+	66.16	46.15	14.04	27.30	20.01	15.65	4.21	2.95

Table A.2: Descriptive Statistics of On- and Off-Balance Sheet Liabilities

The table shows the means of on- and off-balance sheet liabilities of banks. *LMI* is the liquidity creation measure and *LMIN* is *LMI* divided by assets. High Quality Liquid Assets (HQLA) is an LCR-defined category; see Table 1 in the text. The asset liquidity categories are defined in Table 2 in the text. *Mod-Banks* are LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *Full-Banks*, also subject to LCR, are internationally active or have assets  $\geq$  \$250 billion. midsized banks are not subject to LCR and have assets between \$3 billion and \$50 billion.

Panel A: Liability Side Summary					
Size Group	Period	Liquid	Semi-Liquid	Illiquid	Off Balance Sheet
All Banks	2009-2012	51.72	27.49	13.59	25.90
	2013-2014	58.44	19.91	14.08	28.01
	2015+	59.58	18.19	14.26	28.70
Full-Banks	2009-2012	41.10	24.92	20.34	66.18
	2013-2014	46.07	18.73	21.58	65.39
	2015+	45.12	19.02	21.66	65.08
Mod-Banks	2009-2012	54.92	24.42	16.61	35.71
	2013-2014	65.94	14.62	16.15	39.11
	2015+	65.16	15.84	15.99	37.64
Midsized Banks	2009-2012	52.68	28.32	12.20	18.85
	2013-2014	59.00	20.86	12.75	21.24
	2015+	60.68	18.45	12.97	22.25

Panel B: Short-Term Funding (Share of Total Assets)					
Size Group	Period	ON Repo	ON FedFunds	Commercial Paper	OBM $\leq$ 1Y
All Banks	2009-2012	4.51	0.45	0.15	2.63
	2013-2014	3.32	0.38	0.14	2.38
	2015+	2.56	0.26	0.07	3.07
Full-Banks	2009-2012	8.00	0.37	1.12	5.01
	2013-2014	7.66	0.10	1.06	3.81
	2015+	6.00	0.04	0.56	3.46
Mod-Banks	2009-2012	1.45	0.59	0.17	3.48
	2013-2014	1.19	0.48	0.22	2.00
	2015+	1.28	0.26	0.07	2.42
Midsized Banks	2009-2012	4.51	0.44	0.01	2.17
	2013-2014	3.04	0.41	0.01	2.24
	2015+	2.29	0.29	0.00	3.12

Panel C: Semiliquid and Illiquid Liabilities (Share of Total Assets)					
Size Group	Period	Transaction Accounts	Insured Deposits	Uninsured Deposits	OBM $>$ 1Y
All Banks	2009-2012	3.63	41.10	30.21	4.84
	2013-2014	4.93	40.41	33.28	3.74
	2015+	5.78	38.36	35.69	3.53
Full-Banks	2009-2012	1.77	19.38	28.38	12.35
	2013-2014	2.24	20.44	32.17	10.14
	2015+	2.94	20.85	33.40	11.14
Mod-Banks	2009-2012	1.83	38.70	33.23	6.66
	2013-2014	2.28	39.21	40.09	3.97
	2015+	2.53	36.67	38.56	5.59
Midsized Banks	2009-2012	4.16	44.63	30.11	3.54
	2013-2014	5.69	43.51	32.62	2.83
	2015+	6.69	41.21	35.62	2.15

## A.4 LCR, Liquidity Creation and Liquidity Weights

We express LCR (equation 1 in the text) as the difference in liquidity weighted assets and liabilities, by taking log of the expression. For convenience, denote Level 2A as Level 2 and Level 2B as Level 3:

$$\begin{aligned} \text{Log}(LCR_{i,t}) &= \text{Log}(HQLA_{it}) - \text{Log}(ENCO30_{it}) \quad (1) \\ HQLA_{it} &= \sum_{j=1}^3 \lambda_j^{LCR} \sum_{k=1}^{n_j} A_{ijk} \\ ENCO30_{it} &= \sum_{o=1}^s \lambda_o^{LCR} ENCO30_{iot} \end{aligned}$$

where for bank  $i$  in quarter  $t$ ,  $\lambda_j^{LCR}$  is the liquidity weight for level  $j$  of HQLA,  $A_{ijk}$  is the BV of asset  $k$  in level  $j$ , and  $\lambda_o^{LCR}$  is the LCR outflow rate attached to liability  $o$ .

For simplicity, assume that LCR implies separate requirements on assets and outflows, say, a minimum  $H^*$  of HQLA and a maximum  $O^*$  of outflows at time  $t$ :

$$\begin{aligned} HQLA_{it} &\geq H_{it}^* \quad (2) \\ ENCO30_{it} &\leq O_{it}^* \end{aligned}$$

Suppose that each bank has liquidity preference that's accurately reflected by  $LMI$ .<sup>3</sup> Then, a bank's  $LMI$ -weighted HQLA portfolio at  $t=0$  is given by:

$$HQLA_{i0} = \sum_{j=1}^3 \sum_{k=1}^{n_j} \lambda_{jk0}^{LMI} A_{ijk0} \quad (3)$$

where, for asset  $k$  in level  $j$ ,  $\lambda_{jk0}$  is the  $LMI$  weight and  $A_{ijk0}$  is the BV of the asset. Suppose that the bank's HQLA portfolio is initially short of that required by LCR at time  $t$ :

$$HQLA_{i0} < H_{it}^* = \sum_{j=1}^3 \sum_{k=1}^{n_j} \lambda_j^{LCR} A_{ijk} \quad (4)$$

To satisfy LCR, the bank needs additional HQLA per unit of total assets equal to:

$$\Delta h_{it} = \frac{H_{it}^*}{A_{it}} - \frac{HQLA_{i0}}{A_{i0}} = \sum_{j=1}^3 \sum_{k=1}^{n_j} \{w_{ijk0}(\lambda_j^{LCR} - \lambda_{jk0}^{LMI}) + \lambda_j^{LCR}(w_{ijk} - w_{ijk0})\} > 0 \quad (5)$$

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<sup>3</sup>Since  $LMI$  is a market-implied weight, this may be plausible for banks in the aggregate. But individual banks are likely to have different preferences than the market. We ignore this issue in our discussion.

where  $w_{ijkt} = \frac{A_{ijkt}}{A_{it}}$  is the portfolio weight of asset  $k$ .

**Effect of LCR and LMI weight differences on asset choice.** For level 1 assets,  $\lambda_j^{LCR}$  and  $\lambda_{jk}^{LMI}$  are close. The LCR weight is 1 while the *LMI* weights are 0.96 or 1 (Table 2 in text) for an average difference of 0.03 (see Table 1 in text). When  $\lambda_j^{LCR} \simeq \lambda_{jk}^{LMI}$ , equation 5 simplifies to:

$$\Delta h_{it} = \frac{H_{it}^*}{A_{it}} - \frac{HQLA_{i0}}{A_{i0}} \simeq \lambda_j^{LCR}(w_{ijkt} - w_{ijk0}) \} > 0 \quad (6)$$

The derivative of 6 with respect to  $w_{ijkt}$  is  $\lambda_j^{LCR}$  which, by assumption, is close to the bank's own liquidity preference  $\lambda_{jk}^{LMI}$ . Thus, the bank has a strong incentive to increase the weight of Level 1 assets. When  $\lambda_j^{LCR} < \lambda_{jk}^{LMI}$ , the first term in equation (5) is negative and so the bank has to increase  $w_{ijkt}$  a lot to fill its HQLA gap. Moreover, the marginal value to the bank of increasing the asset weight  $\lambda_j^{LCR}$  is low. Examples are the Level 2a and 2b assets, for which the LCR weights are lower than the LMI weights by an average of 0.11 and 0.29, respectively (see Table 1 in the text).

**Effect of LCR and LMI weight differences on liability choice.** If the bank starts with too much 30-day outflows, it has to reduce them by the following amount:

$$\Delta o_{it} = \frac{O_{it}^*}{A_{it}} - \frac{ECNO_{i0}}{A_{i0}} = \sum_{o=1}^s \{w_{is0}(\lambda_o^{LCR} - \lambda_{s0}^{LMI}) + \lambda_o^{LCR}(w_{ist} - w_{is0})\} < 0 \quad (7)$$

The bank has an incentive to increase the weight of liabilities with LCR outflow rates that are below the LMI weights. From Table 1 Panel B and Table 3 of the text, these are liquid liabilities that are stable and have maturities greater than 30 days.

**Effect on liquidity creation, with fixed asset size.** Then, if HQLA assets are to increase by  $\Delta h_{it}$ , then non-HQLA assets are to decrease by the same amount. Similarly, on the liabilities side, to meet LCR requirements, weights on some liquid liabilities must decrease. Therefore, liquidity creation is lower, by equation (3) in the text. This effect is mitigated if banks adjust in other ways, as discussed in the text.

**Effect of balance sheet expansion** Suppose HQLA assets increases by  $\Delta h_{it}$ , but non-HQLA assets stay the same, so that total assets also increase by  $\Delta h_{it}$ . Then liabilities must also increase by  $\Delta h_{it}$ . As discussed in the text, the effect on liquidity creation depends on how this additional liability is funded.

## A.5 Discussion of Parallel Trends

To examine parallel trends, we estimate the following regression:

$$\Delta Y_{it} = \alpha_0 + \alpha_i + \alpha_t + \sum_{t \neq k} \delta_j \text{Full-Banks}_{it} I(t) + \sum_{t \neq k} \gamma_j \text{Mod-Banks}_{it} I(t) + \sum_{j=1}^4 \beta_{ij} X_{ijt} + \epsilon_{it} \quad (8)$$

$Y$  is the outcome variable. *Full-Banks* (*Mod-Banks*) is a dummy variable that equals 1 if the bank is a full (mod) bank.  $X_{i,j}$  are bank-level controls.  $I$  is an indicator variable equal to 1 for all quarters except when  $t = k = 2013Q1$ , the last quarter of the pre-LCR period. The coefficients of interest are  $\delta_j$  and  $\gamma_j$ . For consistency with the parallel trends assumption, we expect that, for  $j < k$ , the coefficients are not statistically different from zero in the pre-LCR period. The coefficients for  $j > k$  indicate trends in the outcome variable.

In the following charts, we plot the coefficients  $\delta_j$  and  $\gamma_j$  for periods  $t < k$  and  $t > k$  (omitting  $t = 2013Q1$ , the “event” quarter), and the associated confidence interval. For parallel trends to hold, we expect that, in the pre-LCR period, the confidence bands straddle the zero-line in each quarter, and especially for the quarters just prior to 2013Q2.



Figure A.1: Parallel Trends: LMI and LMIN

The figure shows dynamic coefficients from estimating equation (8) for  $LMI$  and  $LMIN$  of full- and mod-banks.

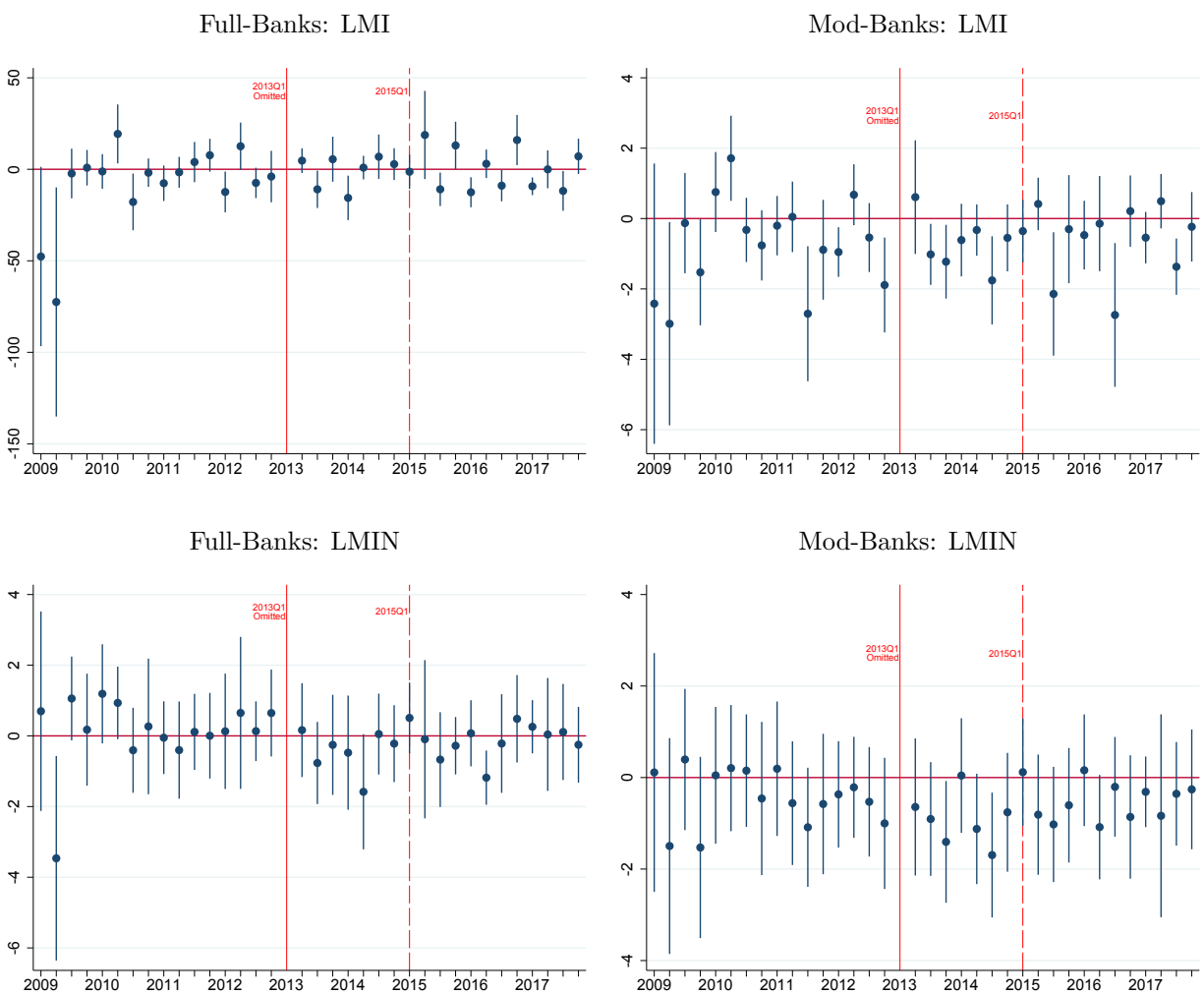


Figure A.2: Parallel Trends: Liquid and Illiquid Assets, and Liquid Liabilities

The figure shows dynamic coefficients from estimating equation (8) for liquid and illiquid assets, and liquid liabilities shares, as shares of assets of full- and mod-banks.

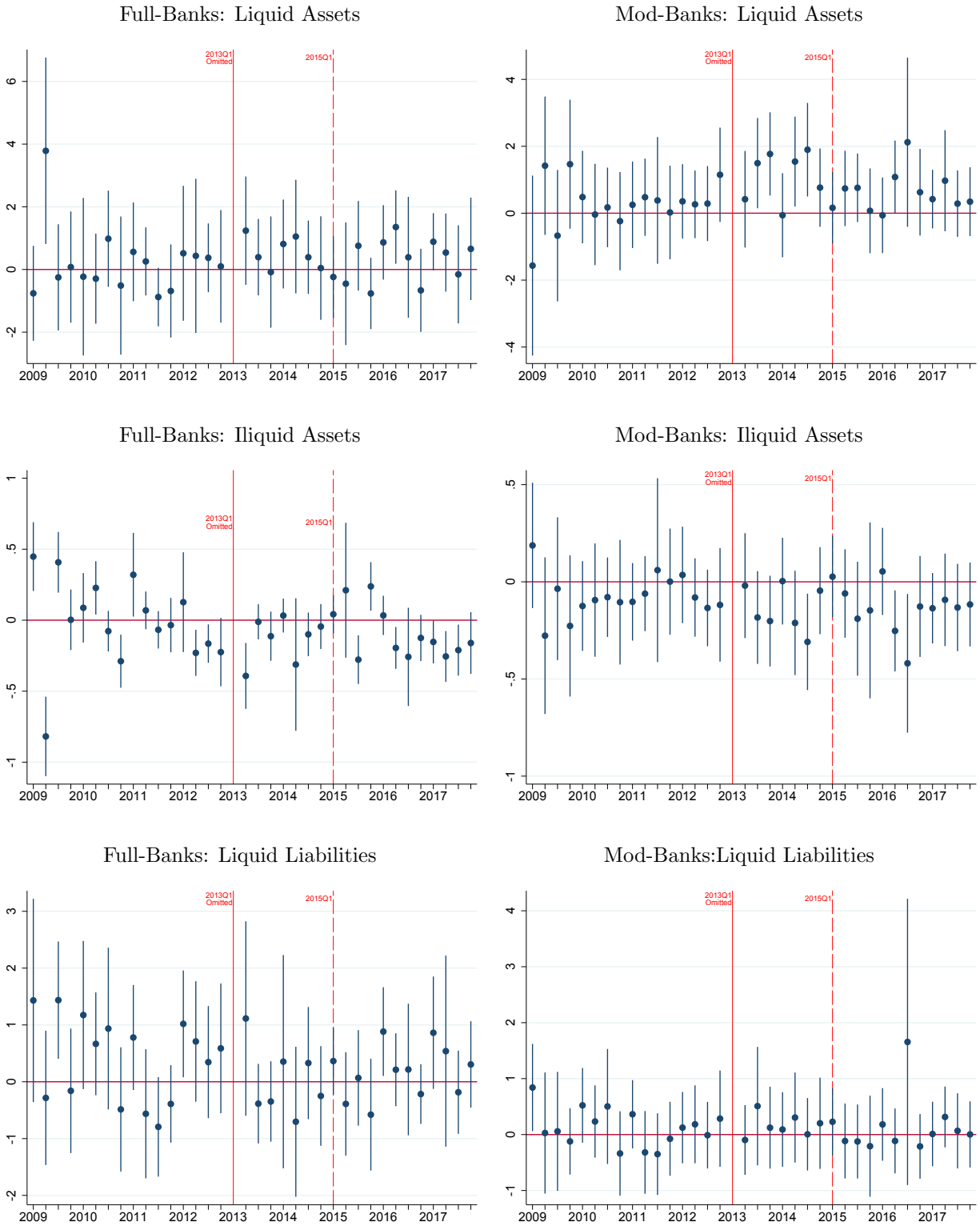


Figure A.3: Parallel Trends: Structured Products and HQLA

The figure shows dynamic coefficients from estimating equation (8) for structured products and HQLA, as shares of assets of full- and mod-banks.

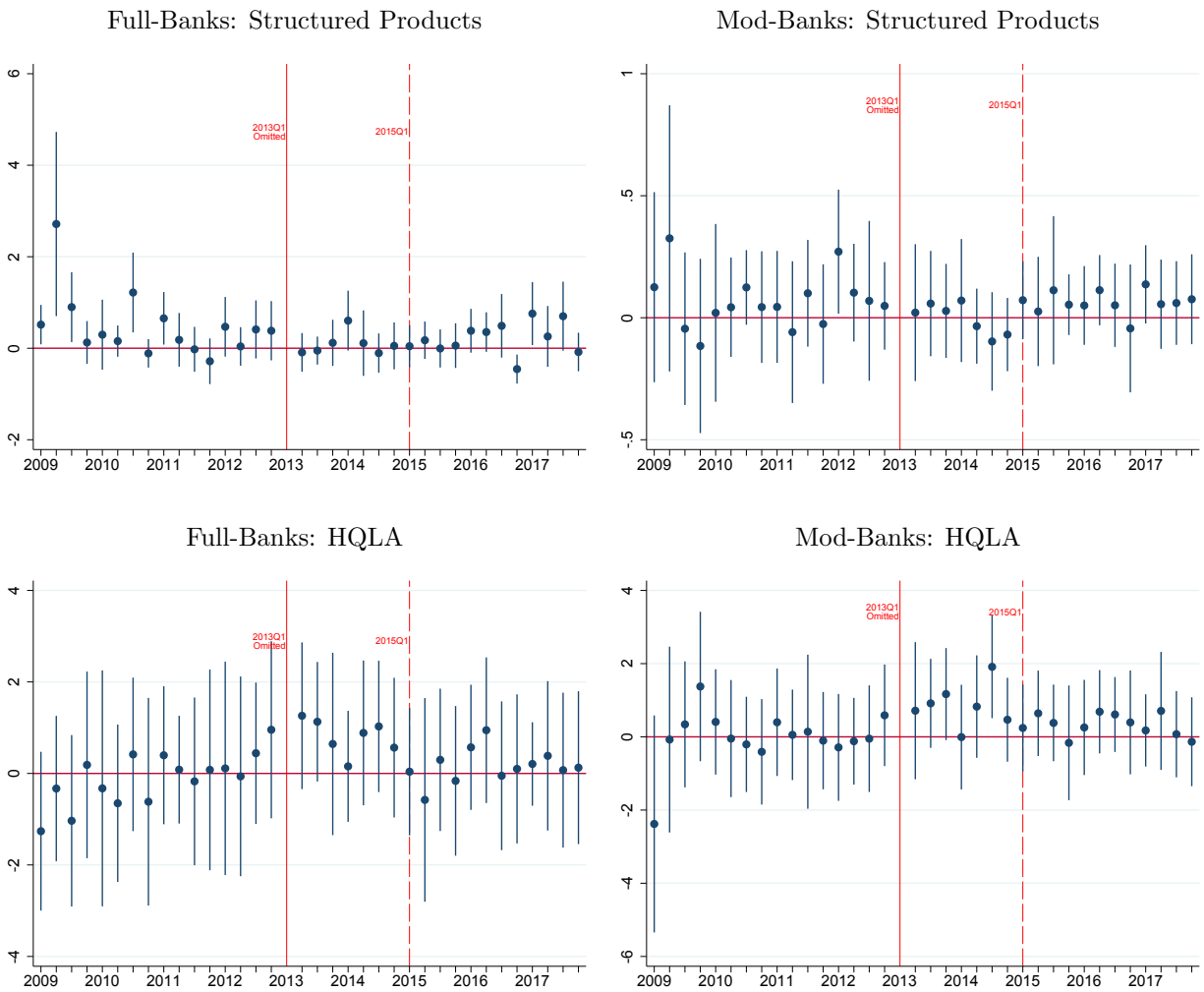


Figure A.4: Parallel Trends: Overnight Repo and Transactions Deposits

The figure shows dynamic coefficients from estimating equation (8) for overnight repo and transactions deposits, as shares of assets of full- and mod-banks.

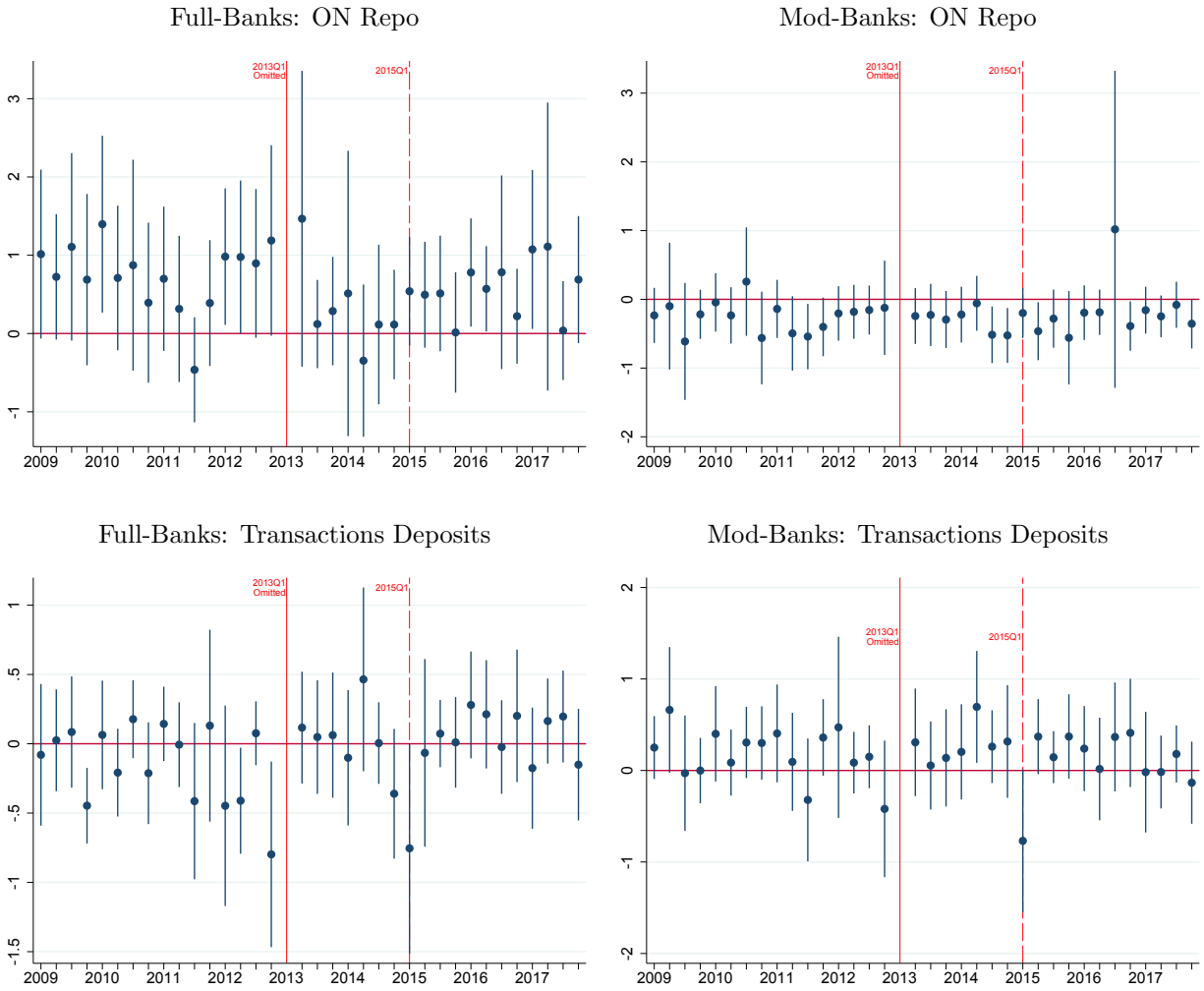


Figure A.5: Parallel Trends: Insured and Uninsured Deposits

The figure shows dynamic coefficients from estimating equation (8) for insured and uninsured deposits, as shares of assets of full- and mod-banks.



Figure A.6: Parallel Trends: Other Borrowed Money of Short and Long Maturities

The figure shows dynamic coefficients from estimating equation (8) for other borrowed money of less than and greater than one-year maturity, as shares of assets of full- and mod-banks.

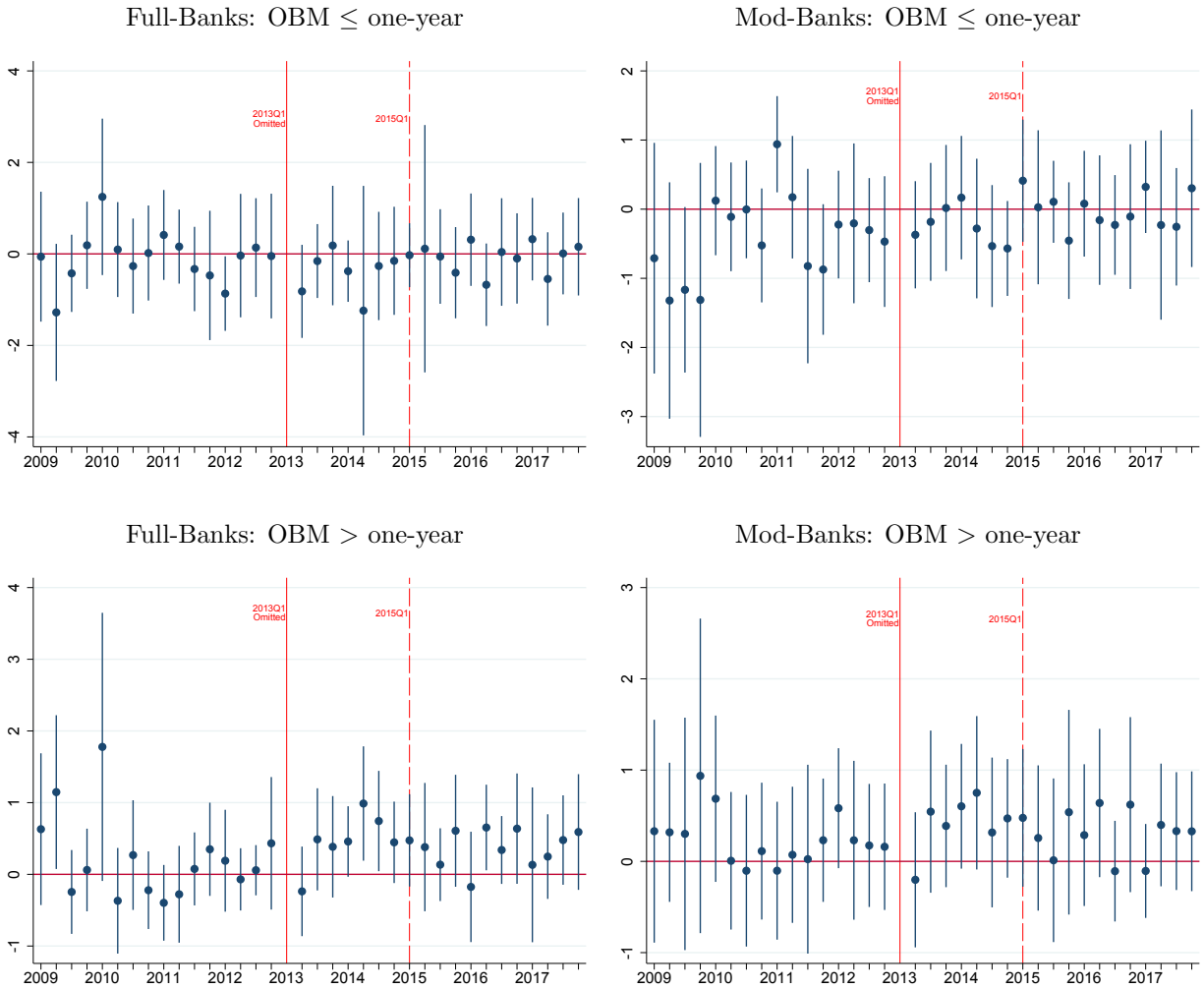


Figure A.7: Parallel Trends: All Loans

The figure shows dynamic coefficients from estimating equation (8) for all loans, as shares of assets of full- and mod-banks. Mod-banks are further separated into those between \$50B ( $Mod - Banks < \$100B$ ) and \$100B of assets and those with assets of \$100B or over ( $Mod - Banks \geq \$100B$ ).

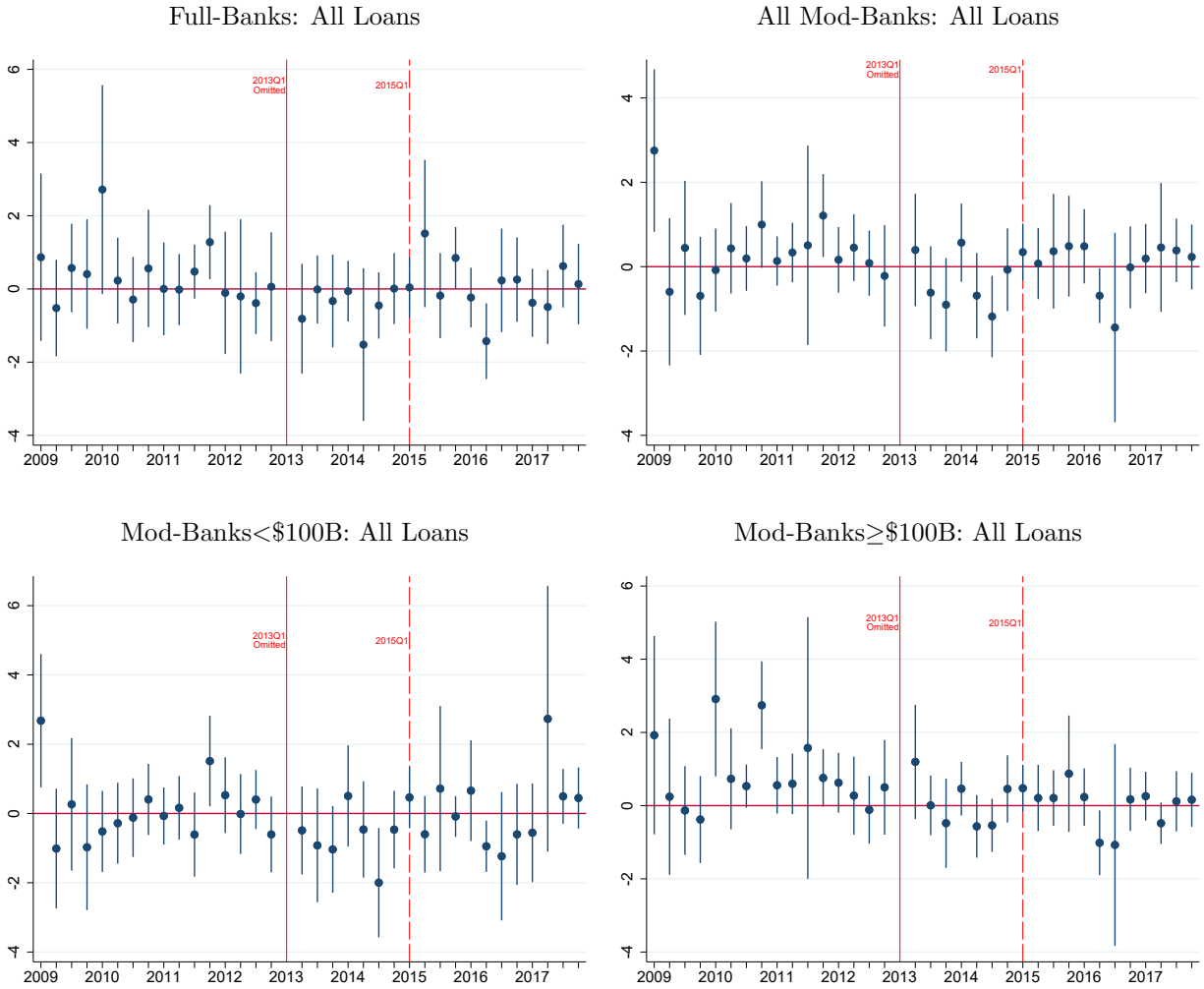


Figure A.8: Parallel Trends: C&I Loans

The figure shows dynamic coefficients from estimating equation (8) for C&I loans, as shares of assets of full- and mod-banks.

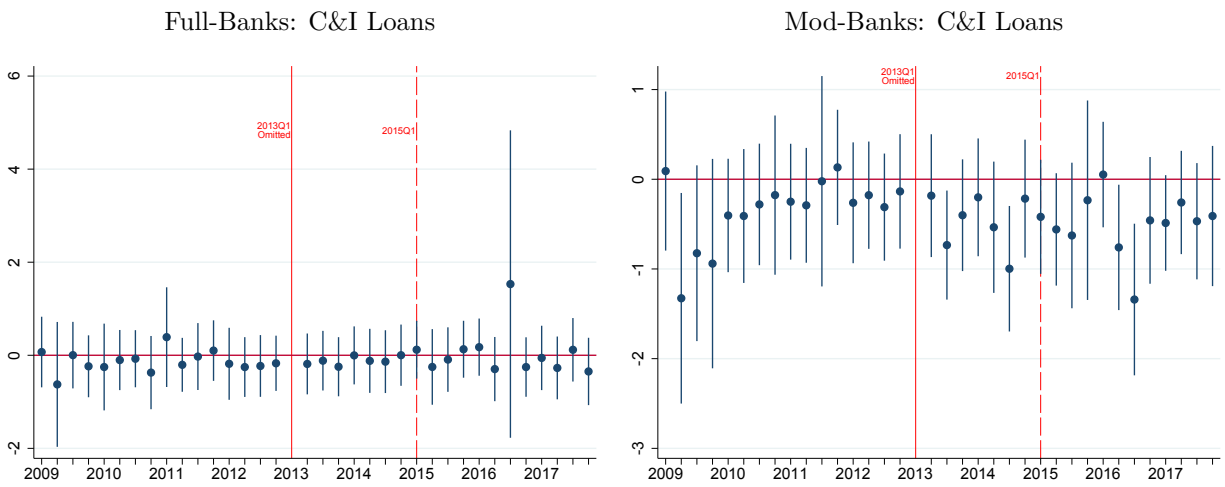




Figure A.9: Parallel Trends: CRE and RRE Loans

The figure shows dynamic coefficients from estimating equation (8) for CRE and RRE loans, as shares of assets of full- and mod-banks.

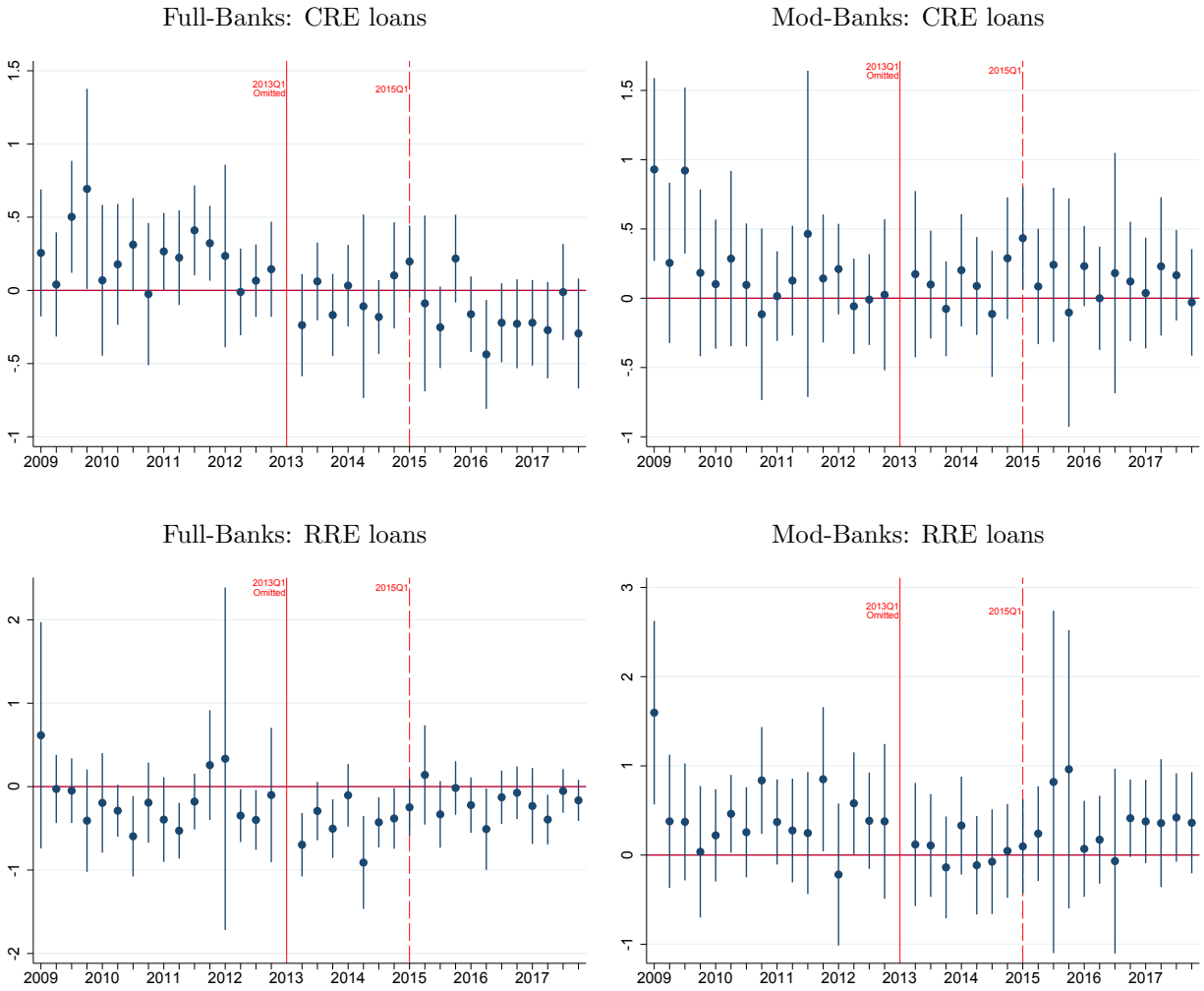


Figure A.10: Parallel Trends: Small Business Loans and Standards

The figure shows dynamic coefficients from estimating equation (8) for small business loans and standards of GSIBs, non-GSIB full-banks and mod-banks.



Figure A.11: Parallel Trends: Firesale Risk and its Illiquidity Component, and Complexity

The figure shows dynamic coefficients from estimating equation (8) for firesale risk and its illiquidity component, and complexity risk, of full- and mod-banks.

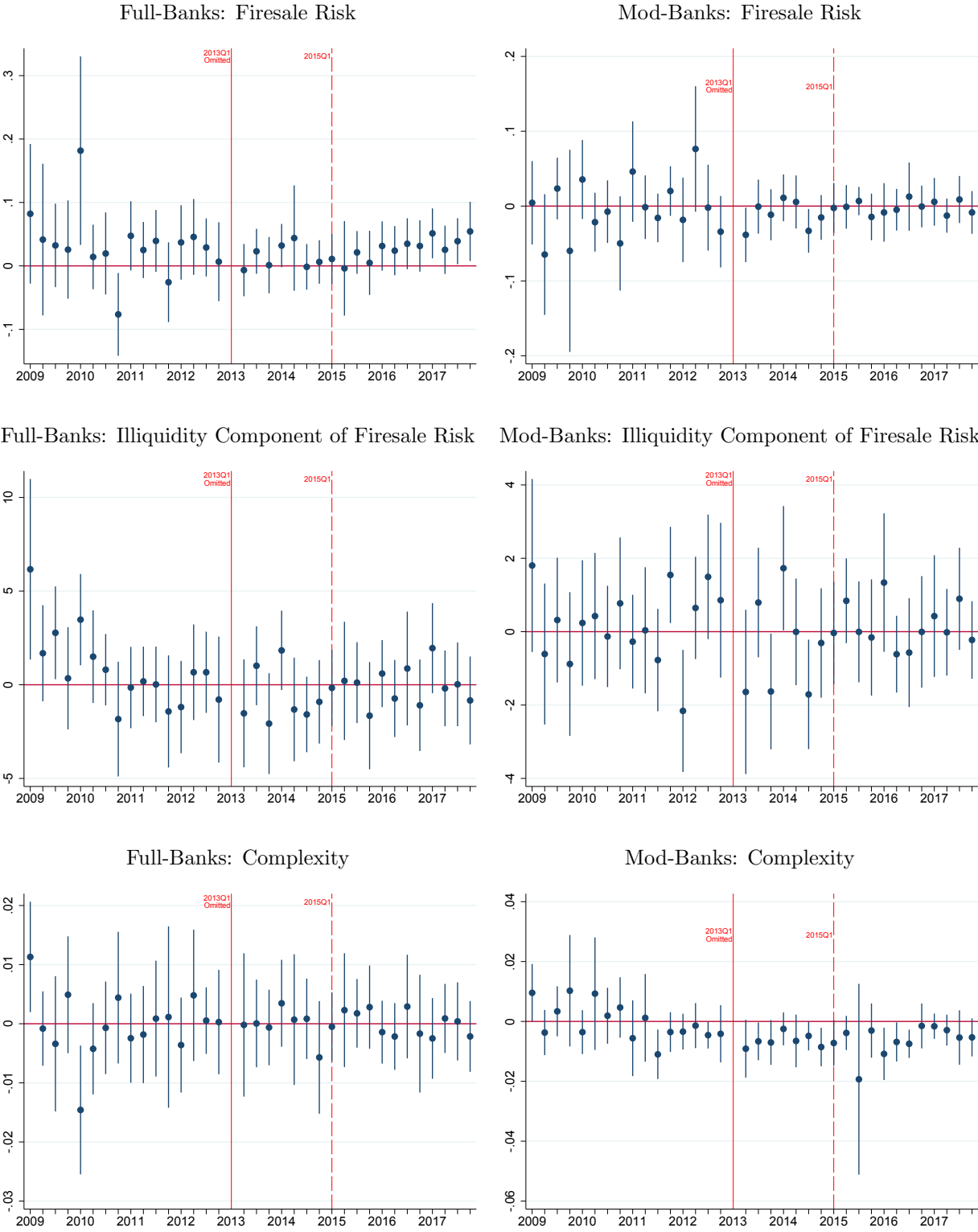


Figure A.12: Parallel Trends: GNMA and GSE MBS

The figure shows dynamic coefficients from estimating equation (8) for GNMA and GSE MBS, as a share of assets of full- and mod-banks.

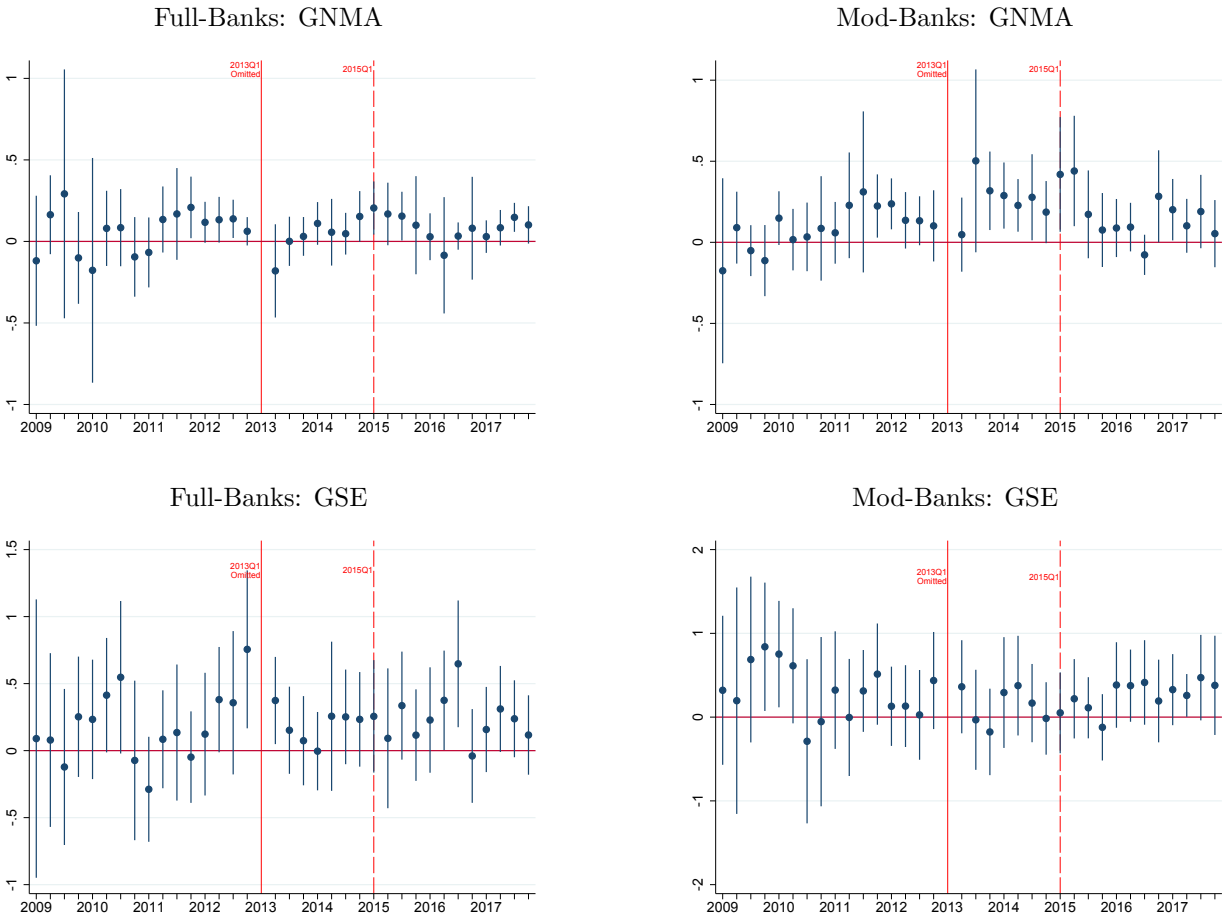
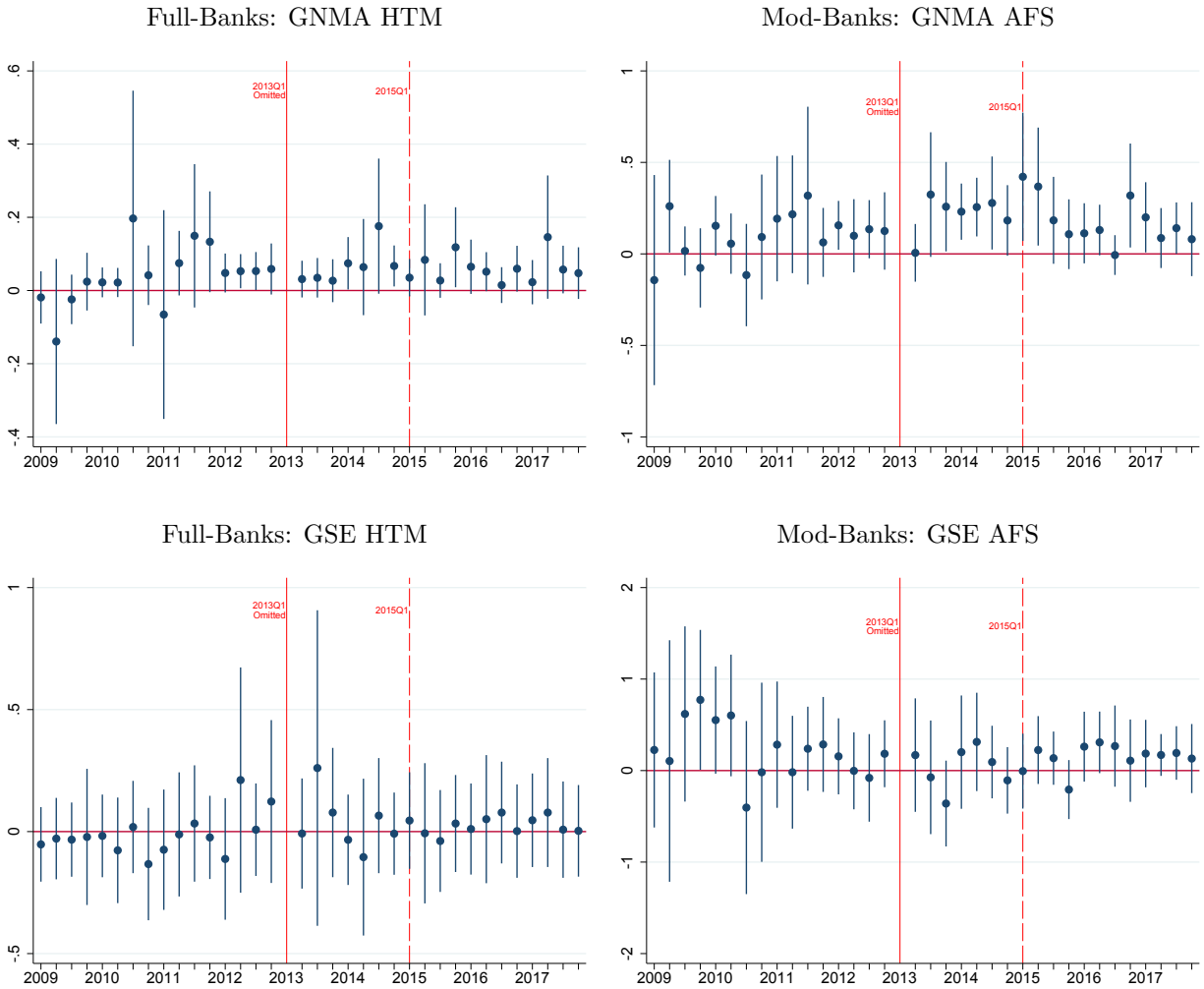


Figure A.13: Parallel Trends: AFS and HTM holdings GNMA MBS

The figure shows dynamic coefficients from estimating equation (8) for Available-for-sale (AFS) and Held-to-maturity (HTM) holdings of GNMA MBS, as a share of assets of full- and mod-banks.



## B. Section 5 of Paper

Table B.1: Liquidity Creation in the Banking Sector

The table shows results from a regression with the liquidity creation per bank per quarter as the dependent variable. In the first four columns, the liquidity creation measure is *LMI*, calculated using only on-balance sheet items, in billions of dollars. In the last four columns, the dependent variable is *LMIN* equal to *LMI* divided by assets. *Post-LCR* is 1 from 2013 Q2 to 2017 Q4 and zero otherwise. *2013-2014* is 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters. The Chicago Fed's National Financial Conditions Index (NFCI) is a financial indicator for risk, credit and leverage; higher values indicate worse financial conditions. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively.

	<i>LMI</i> in Billion Dollars				<i>LMIN</i> = <i>LMI</i> Per Asset			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post- <i>LCR</i>	-10.97*** (-2.63)				-1.60*** (-3.21)			
2013-2014		-8.20** (-2.32)	-3.68 (-1.41)	-1.64*** (-2.70)		-2.25*** (-5.53)	-0.10 (-0.28)	-0.03 (-0.09)
2015+		-12.59*** (-2.73)	-8.46** (-2.21)	-2.12*** (-2.82)		-1.22** (-2.12)	0.74 (1.35)	0.94* (1.75)
Lagged dependent variable				0.00*** (13.64)				0.00*** (6.39)
NFCI			6.15*** (2.88)	-1.48** (-2.36)			2.92*** (10.94)	2.68*** (9.60)
Constant	-41.97*** (-19.04)	-41.97*** (-19.04)	-42.00*** (-19.11)	-7.16** (-2.55)	-36.20*** (-137.42)	-36.20*** (-137.40)	-36.21*** (-137.69)	-35.11*** (-133.47)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table B.2: Liquidity Creation by LCR and Non-LCR Banks: Without Bank Controls

The table shows results from panel regressions for the change in  $LMIN$ , equal to the Liquidity Mismatch Index  $LMI$  divided by assets. We exclude the bank level controls when estimating the regression. Dummy variables are defined as:  $Post-LCR=1$  from 2013 Q2 to 2017 Q4;  $2013-2014=1$  from 2013 Q2 to 2014 Q4;  $2015+=1$  from 2015 Q1 to 2017 Q4;  $LCR-Bank=1$  for banks that had to implement the LCR rule;  $Mod-Banks=1$  for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion; and  $Full-Banks=1$  for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The Chicago Fed's National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values mean tighter financial conditions. CET1 is the common equity tier 1 capital ratio. Non-performing loans and core deposits are shares of loans and assets, respectively. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters.

	(1)	(2)	(3)	(4)	(5)
Post-LCR	0.81*** (11.65)				
2013-2014			0.96*** (10.64)		0.63*** (6.70)
2015+			0.72*** (10.12)		0.37*** (4.97)
LCR Bank	-0.05 (-0.57)	-0.71 (-1.38)			
Mod-Bank			-0.01 (-0.12)		
Full-Bank			-0.10 (-0.73)		
LCR Bank x Post-LCR	-0.26** (-2.34)	-0.27** (-2.38)			
Mod-Bank x 2013-2014			-0.49** (-2.29)	-0.56*** (-2.65)	-0.57*** (-2.73)
Full-Bank x 2013-2014			-0.41** (-2.29)	-0.42** (-2.34)	-0.42** (-2.35)
Mod-Bank x 2015+			-0.11 (-0.96)	-0.17 (-1.20)	-0.18 (-1.28)
Full-Bank x 2015+			-0.20 (-1.22)	-0.21 (-1.27)	-0.21 (-1.27)
nfc_i_diff					2.20*** (10.25)
Constant	-0.69*** (-12.85)	-3.87*** (-10.52)	-0.69*** (-12.84)	-4.03*** (-12.62)	-0.32*** (-7.56)
Bank F.E.	No	Yes	No	Yes	Yes
Time F.E.	No	Yes	No	Yes	No

Table B.3: Liquidity Creation by LCR and Non-LCR Banks, Adding Event Date of 2011Q1

The table shows results from panel regressions for the change in  $LMIN$ , equal to the Liquidity Mismatch Index  $LMI$ , divided by assets. Dummy variables are defined as:  $Post-LCR=1$  from 2011 Q1 to 2017 Q4;  $2011-2013Q1=1$  for the period 2011Q1-2013Q1.  $2013Q2-2014=1$  from 2013 Q2 to 2014 Q4;  $2015+=1$  from 2015 Q1 to 2017 Q4;  $LCR-Bank=1$  for banks that had to implement the LCR rule;  $Mod-Banks=1$  for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion; and  $Full-Banks=1$  for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The Chicago Fed's National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values mean tighter financial conditions. CET1 is the common equity tier 1 capital ratio. Non-performing loans and core deposits are shares of loans and assets, respectively. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters.

	(1)	(2)	(3)
2011-2013Q1			0.46*** (4.54)
2013Q2-2014			0.97*** (7.51)
2015+			0.68*** (5.66)
LCR Bank x Post-LCR	-0.17 (-0.82)		
Mod-Bank x 2011-2013Q1		-0.24 (-0.87)	-0.24 (-0.88)
Full-Bank x 2011-2013Q1		0.25 (0.77)	0.13 (0.35)
Mod-Bank x 2013Q2-2014		-0.63** (-2.17)	-0.63** (-2.23)
Full-Bank x 2013Q2-2014		-0.25 (-0.74)	-0.45 (-1.23)
Mod-Bank x 2015+		-0.22 (-0.91)	-0.22 (-0.93)
Full-Bank x 2015+		0.01 (0.02)	-0.09 (-0.25)
Lag $\Delta$ Tier 1 Capital Ratio	-1.46 (-0.55)	-1.91 (-0.68)	-5.45*** (-4.26)
Lag $\Delta$ Share Nonperforming Loans	-0.09 (-1.24)	-0.09 (-1.24)	-0.08 (-1.08)
Lag $\Delta$ Net Interest Margin	-0.21 (-0.61)	-0.21 (-0.61)	0.19 (0.58)
Lag $\Delta$ Core Deposits	0.01 (0.82)	0.01 (0.77)	0.02 (1.31)
$\Delta NFCI$			1.97*** (7.88)
Constant	-5.63*** (-16.98)	-5.63*** (-17.01)	-0.68*** (-8.29)
Bank F.E.	Yes	Yes	Yes
Time F.E.	Yes	Yes	No



Table B.4: Liquidity Creation by LCR and Non-LCR Banks: On and Off Balance Sheet Items

The table shows results from panel regressions for the change in  $LMIN$ , equal to the Liquidity Mismatch Index  $LMI$ , calculated using both on and off-balance sheet items, divided by assets. Dummy variables are defined as:  $Post-LCR=1$  from 2013 Q2 to 2017 Q4;  $2013-2014=1$  from 2013 Q2 to 2014 Q4;  $2015+=1$  from 2015 Q1 to 2017 Q4;  $LCR-Bank=1$  for banks that had to implement the LCR rule;  $Mod-Banks=1$  for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion; and  $Full-Banks=1$  for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The Chicago Fed's National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values mean tighter financial conditions. CET1 is the common equity tier 1 capital ratio. Non-performing loans and core deposits are shares of loans and assets, respectively. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters.

	(1)	(2)	(3)	(4)	(5)
Post-LCR	0.82*** (10.82)				
2013-2014			0.97*** (10.48)		0.66*** (6.87)
2015+			0.72*** (8.93)		0.36*** (4.40)
LCR Bank	-0.06 (-0.50)	-1.00 (-1.55)			
Mod-Bank			-0.05 (-0.48)		
Full-Bank			-0.06 (-0.31)		
LCR Bank x Post-LCR	-0.25* (-1.91)	-0.20 (-1.58)			
Mod-Bank x 2013-2014			-0.44** (-2.07)	-0.51** (-2.43)	-0.51** (-2.49)
Full-Bank x 2013-2014			-0.53** (-2.37)	-0.39* (-1.77)	-0.53** (-2.38)
Mod-Bank x 2015+			-0.05 (-0.41)	-0.11 (-0.77)	-0.11 (-0.76)
Full-Bank x 2015+			-0.19 (-0.88)	-0.13 (-0.68)	-0.16 (-0.77)
Lag $\Delta$ Tier 1 Capital Ratio	-4.27*** (-3.40)	-1.37 (-0.51)	-4.79*** (-3.70)	-1.91 (-0.68)	-5.79*** (-4.49)
Lag $\Delta$ Share Nonperforming Loans	-0.34*** (-4.22)	-0.09 (-1.20)	-0.34*** (-4.11)	-0.09 (-1.23)	-0.13 (-1.66)
Lag $\Delta$ Net Interest Margin	0.19 (0.60)	-0.20 (-0.58)	0.19 (0.62)	-0.21 (-0.62)	0.16 (0.46)
Lag $\Delta$ Core Deposits	0.01 (0.62)	0.01 (0.80)	0.01 (0.51)	0.01 (0.80)	0.02 (1.31)
$\Delta NFCI$					2.36*** (10.11)
Constant	-0.75*** (-13.22)	-5.41*** (-14.11)	-0.75*** (-13.14)	-5.63*** (-17.00)	-0.37*** (-8.16)
Bank F.E.	No	Yes	No	Yes	Yes
Time F.E.	No	Yes	No	Yes	No

Table B.5: Liquidity Creation by LCR and Non-LCR Banks: the *BB* Measure

The table shows results from a panel regression for the change in *BBN*, equal to the liquidity creation measure of Berger and Bouwman (2009), divided by assets. *BB* is calculated using only on-balance-sheet items. *Post-LCR* is 1 from 2013 Q2 to 2017 Q4 and zero otherwise. *2013-2014* is 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *LCR-Bank* is a dummy variable equal to 1 for banks that were required to implement the LCR rule. *Mod-Banks* is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *Full-Banks* is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks have assets between \$3 billion and \$50 billion. The Chicago Fed's National Financial Conditions Index (NFCI) is a financial indicator for risk, credit and leverage. The sample is 2009 to 2017 and there are 4,064 bank-quarters.

	(1)	(2)	(3)	(4)	(5)
Post-LCR	0.17*				
	(1.70)				
2013-2014			0.36***		0.35***
			(3.31)		(3.14)
2015+			0.04		0.03
			(0.39)		(0.25)
LCR Bank	0.11	-1.41**			
	(0.89)	(-2.39)			
Mod-Bank			0.22		
			(1.37)		
Full-Bank			-0.02		
			(-0.16)		
LCR Bank x Post-LCR	-0.50***	-0.49***			
	(-3.54)	(-3.46)			
Mod-Bank x 2013-2014			-0.75***	-0.85***	-0.85***
			(-2.88)	(-3.57)	(-3.56)
Full-Bank x 2013-2014			-0.67***	-0.70***	-0.68***
			(-3.19)	(-3.14)	(-3.23)
Mod-Bank x 2015+			-0.47***	-0.56***	-0.55***
			(-2.77)	(-4.37)	(-4.23)
Full-Bank x 2015+			-0.26	-0.27	-0.27
			(-1.54)	(-1.54)	(-1.60)
Lag $\Delta$ Tier 1 Capital Ratio	-1.07	-1.62	-1.77	-2.48	-1.64
	(-0.79)	(-0.53)	(-1.24)	(-0.77)	(-1.21)
Lag $\Delta$ Share Nonperforming Loans	-0.04	-0.01	-0.03	-0.01	-0.01
	(-0.41)	(-0.07)	(-0.30)	(-0.09)	(-0.10)
Lag $\Delta$ Net Interest Margin	-0.50	-0.44	-0.49	-0.46	-0.53
	(-1.38)	(-1.27)	(-1.36)	(-1.32)	(-1.43)
Lag $\Delta$ Core Deposits	-0.04*	-0.05**	-0.04**	-0.05**	-0.04**
	(-1.93)	(-2.26)	(-2.05)	(-2.26)	(-2.22)
$\Delta NFCI$					0.15
					(0.57)
Constant	0.20***	0.22	0.20***	-0.10	0.26***
	(2.71)	(0.61)	(2.75)	(-0.32)	(4.71)
Bank F.E.	No	Yes	No	Yes	Yes
Time F.E.	No	Yes	No	Yes	No

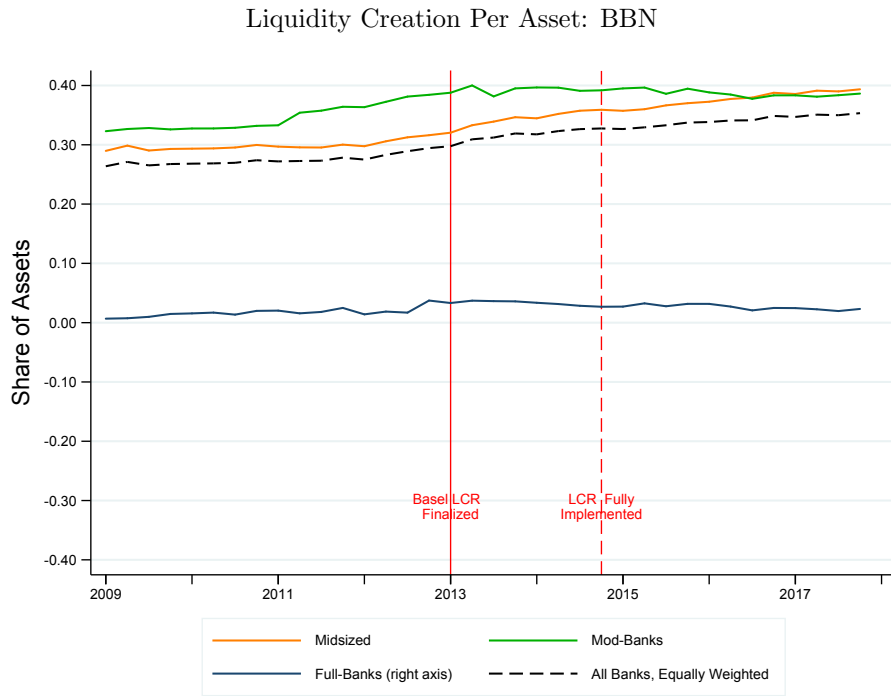
Figure B.1: Book Values of Liquid and Illiquid Asset and Liability, as Shares of Bank Assets: LCR and non-LCR Banks

The figures show the changes in the book-values of liquid and illiquid assets (top panel) and liquid and illiquid liabilities (bottom panel) for LCR and non-LCR banks, as shares of total assets. The liquidity categories are defined in Table ?? . Semi-liquid assets and liabilities are not shown. Banks that have assets greater than \$50 billion are required to implement the LCR rule; full LCR banks are internationally active or have assets greater than \$250 billion and modified LCR banks have assets  $\geq$  \$50 billion and less than \$250 billion. Midsized banks with assets between \$3 billion and \$50 billion are not subject to the LCR rule. The sample is 2009 Q1 to 2017 Q4.



Figure B.2: Liquidity Creation using the *BB* Measure

The figure plots the average per bank of *BBN*, equal to the liquidity creation measure of Berger and Bouwman (2009) *BB*, divided by assets. *BB* is calculated using on-balance-sheet items only (denoted *catnonfat* in Berger and Bouwman (2009)). The average is over all banks (dashed line) or over banks in different size groups. Banks with assets greater than \$50 billion are required to implement the LCR rule; full LCR banks (plotted on right vertical axis) are internationally active or have assets greater than \$250 billion and modified LCR banks have assets  $\geq$  \$50 billion and less than \$250 billion. Midsized banks with assets between \$3 billion and \$50 billion are not subject to the LCR rule. We exclude from the sample small banks with assets less than \$3 billion. The sample is 2009 Q1 to 2017 Q4.



## C. Section 6 of Paper

Table C.1: Liquidity Creation by LCR and Non-LCR Banks: Insured and Uninsured Deposits

The table shows results from a panel regression for the change in  $LMIN$ , equal to the Liquidity Mismatch Index  $LMI$  divided by assets.  $LMI$  is calculated using only on-balance-sheet items.  $Post-LCR$  is 1 from 2013 Q2 to 2017 Q4 and zero otherwise.  $2013-2014$  is 1 from 2013 Q2 to 2014 Q4 and  $2015+$  is 1 from 2015 Q1 to 2017 Q4.  $LCR-Bank$  is a dummy variable equal to 1 for banks that were required to implement the LCR rule.  $Mod-Banks$  is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion.  $Full-Banks$  is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks have assets between \$3 billion and \$50 billion. The Chicago Fed's National Financial Conditions Index (NFCI) is a financial indicator for risk, credit and leverage; higher values indicate worse financial conditions. The sample is 2009 Q1 to 2017 Q4 with a total of 3,405 bank-quarters.

	(1)	(2)	(3)	(4)	(5)
Post-LCR	1.57*** (16.38)				
2013-2014			1.79*** (15.99)		1.06*** (10.11)
2015+			1.43*** (14.06)		0.56*** (5.93)
LCR Bank	0.16 (0.94)	-0.82*** (-4.15)			
Mod-Bank			0.03 (0.25)		
Full-Bank			0.26 (0.98)		
LCR Bank x Post-LCR	-0.52*** (-2.59)	-0.33** (-2.03)			
Mod-Bank x 2013-2014			-0.51* (-1.81)	-0.54** (-2.17)	-0.55** (-2.13)
Full-Bank x 2013-2014			-0.95*** (-3.02)	-0.43* (-1.70)	-0.92*** (-3.01)
Mod-Bank x 2015+			-0.28 (-1.46)	-0.25 (-1.47)	-0.31* (-1.75)
Full-Bank x 2015+			-0.48 (-1.56)	-0.35 (-1.51)	-0.37 (-1.22)
Lag $\Delta$ Tier 1 Capital Ratio	-12.39*** (-7.48)	2.01 (0.87)	-13.30*** (-7.76)	1.75 (0.73)	-15.84*** (-9.47)
Lag $\Delta$ Share Nonperforming Loans	-0.64*** (-3.62)	-0.15 (-1.50)	-0.63*** (-3.55)	-0.15 (-1.55)	-0.07 (-0.43)
Lag $\Delta$ Net Interest Margin	0.97** (2.18)	-0.09 (-0.30)	1.00** (2.23)	-0.11 (-0.34)	0.94* (1.89)
Lag $\Delta$ Core Deposits	0.05 (1.22)	0.00 (0.07)	0.05 (1.13)	0.00 (0.08)	0.07 (1.61)
$\Delta NFCI$					5.51*** (18.29)
Constant	-1.32*** (-17.92)	-16.53*** (-27.69)	-1.32*** (-17.84)	-16.71*** (-28.99)	-0.37*** (-6.71)
Bank F.E.	No	Yes	No	Yes	Yes
Time F.E.	No	Yes	No	Yes	No

Table C.2: Book Value Changes of Individual Assets in HQLA Portfolio

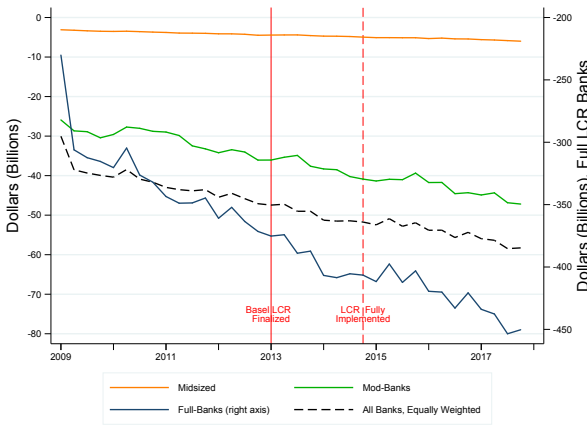
The table shows results from estimating the panel regression 8 for changes in the book values of individual HQL assets.  $2013-2014$  is 1 from 2013 Q2 to 2014 Q4 and  $2015+$  is 1 from 2015 Q1 to 2017 Q4. *Mod-Banks* is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *Full-Banks* is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks have assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4 with a total of 4,064 bank-quarters.  $t$  statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively.

	$\Delta$ Level 1 Assets				$\Delta$ Level 2A Assets		$\Delta$ Level 2B Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Reserves	Treasuries	Agency Debt	GNMA MBS	GSE MBS	GSE Debt	Equities	Muni
Mod-Bank x 2013-2014	0.35** (2.60)	0.01 (0.09)	0.05*** (3.00)	0.18** (2.45)	-0.14 (-0.97)	0.05 (0.71)	-0.02 (-1.20)	0.11*** (3.45)
Full-Bank x 2013-2014	0.53** (2.42)	-0.04 (-0.33)	0.02** (2.29)	-0.03 (-0.52)	0.01 (0.16)	-0.00 (-0.02)	0.02 (0.50)	0.08*** (3.03)
Mod-Bank x 2015+	-0.03 (-0.28)	0.06 (1.23)	0.00 (0.46)	0.09* (1.88)	-0.01 (-0.13)	0.04 (0.78)	-0.01 (-0.56)	0.09*** (2.96)
Full-Bank x 2015+	0.04 (0.33)	-0.01 (-0.14)	0.00 (0.54)	0.03 (0.54)	0.07 (0.96)	0.10 (1.60)	0.04 (1.02)	0.07*** (2.69)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

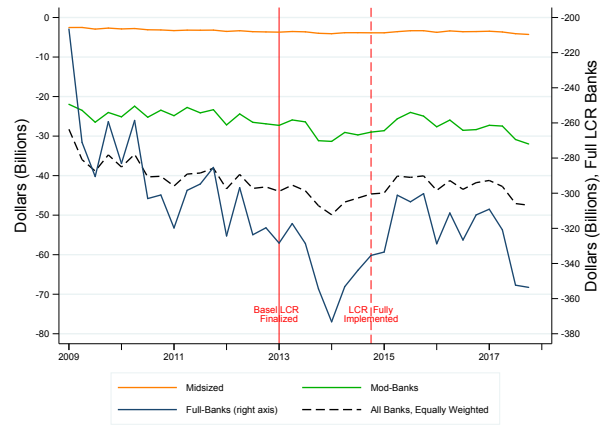
Figure C.1: Liquidity Creation by LCR and non-LCR Banks, With Insured and Uninsured Deposits

The figure plots the average per bank of  $LMI$ , the liquidity creation in billions of dollars, and  $LMIN=LMI/Assets$ , for all banks (dashed line) and by banks in different size groups. The left-hand (right-hand chart) of each panel shows liquidity creation when insured and uninsured deposits have the same (different) liquidity weights. Banks with assets greater than \$50 billion are required to implement the LCR rule; full LCR banks (plotted on right vertical axis) are internationally active or have assets greater than \$250 billion and modified LCR banks have assets  $\geq$  \$50 billion and less than \$250 billion. Midsized banks with assets between \$3 billion and \$50 billion are not subject to the LCR rule.  $LMI$  is calculated using on-balance-sheet items only. We exclude from the sample small banks with assets less than \$3 billion. The sample is 2009 Q1 to 2017 Q4.

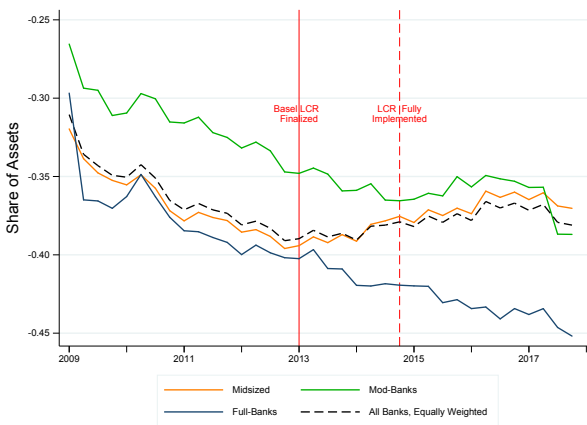
Liquidity Creation in Billions of Dollars  $LMI$ : Same Liquidity Weight for all Deposits



Liquidity Creation in Billions of Dollars  $LMI$ : Different Liquidity Weights for Insured and Uninsured Deposits



Liquidity Creation Per Asset  $LMIN$ : Same Liquidity Weight for all Deposits



Liquidity Creation Per Asset  $LMIN$ : Different Liquidity Weights for Insured and Uninsured Deposits





## D. Section 7 of Paper

Table D.1: GNMA and GSE MBS Shares, With MBS Market Controls: LCR and Non-LCR Banks

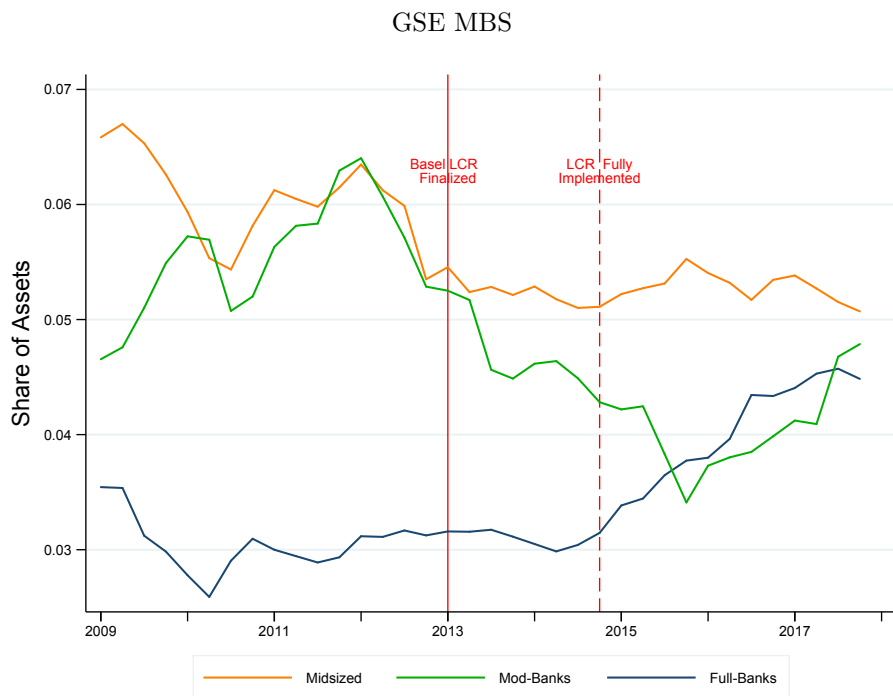
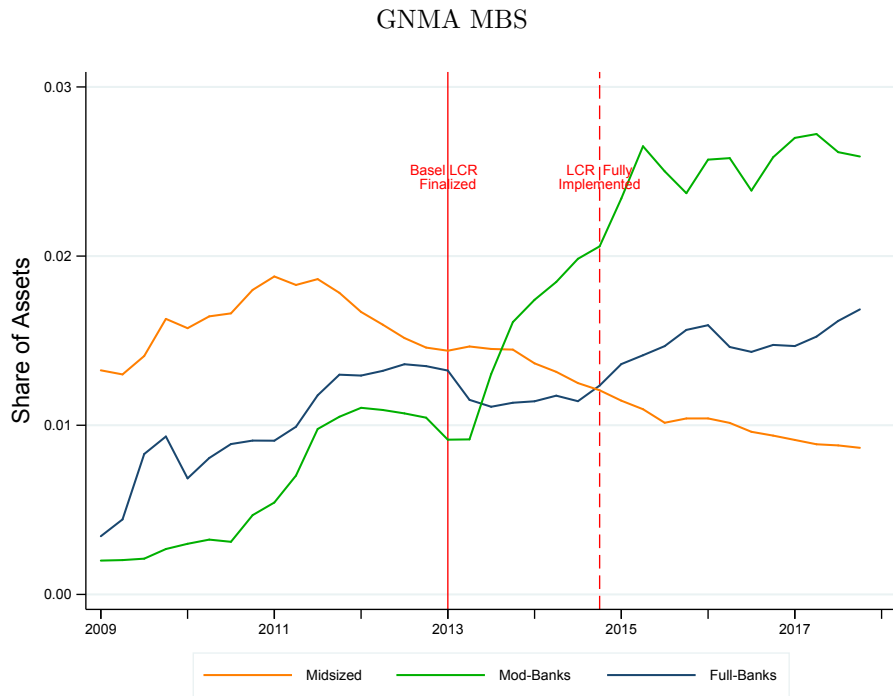
The table shows results from panel regressions of the change in the book values of GNMA and GSE MBS, as shares of total assets. *2013-2014* is a dummy variable equal to 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *Mod-Banks* is a dummy variable equal to 1 for banks with assets  $\geq$  \$50 billion and less than \$250 billion. *Full-Banks* is a dummy variable equal to 1 for internationally active banks or those with assets greater than \$250 billion. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. *GNMA MBS Issuance share* is the share of GNMA MBS issuances in total (GSE+GNMA) MBS issuances. The data is from the Securities Industry and Financial Markets Association (SIFMA). *GNMA-GSE MBS Spread* is the GNMA - GSE current coupon spread for the 30Y maturity. Since GSE includes Freddie and Fannie, the GSE 30 year current coupon is an average of the Freddie and Fannie current coupons. The data is from Bloomberg. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively.

	Overall	
	(1) $\Delta$ GNMA	(2) $\Delta$ GSE
Mod-Bank x 2013-2014	0.18** (2.49)	-0.15 (-1.09)
Full-Bank x 2013-2014	-0.02 (-0.43)	0.00 (0.00)
Mod-Bank x 2015+	0.10* (1.75)	-0.06 (-0.54)
Full-Bank x 2015+	0.02 (0.32)	0.08 (1.13)
2013-2014	-0.04* (-1.70)	0.05 (0.68)
2015+	-0.04* (-1.68)	0.11** (2.30)
$\Delta$ GNMA MBS Issuance Share	0.27 (0.96)	-1.72*** (-2.97)
$\Delta$ GNMA-GSE MBS Spread	-0.14 (-0.79)	-0.26 (-0.80)
Bank F.E.	Yes	Yes
Time F.E.	No	No
Bank Controls	Yes	Yes



Figure D.1: Book Values of GNMA MBS and GSE MBS, as Shares of Bank Assets: LCR and non-LCR Banks

The figure shows the book values of GNMA (top panel) and GSE MBS (bottom panel) by size group for consolidated bank holding companies. Banks that have assets greater than \$50 billion are required to implement the LCR rule; full LCR banks are internationally active or have assets greater than \$250 billion and modified LCR banks have assets  $\geq$  \$50 billion and less than \$250 billion. Midsized banks with assets between \$3 billion and \$50 billion are not subject to the LCR rule. The sample is 2009 Q1 to 2017 Q4.



## E Section 8 of Paper

### E.1 Effect on Bank Lending when Banks Cite Regulation, Supervision or Accounting Standards as the Cause of Changes in Standards or Terms

The SLOOS survey asks banks to give the reason for tightening or easing standards or terms, with one response being “increased concerns about the effects of legislative changes, supervisory actions, or changes in accounting standards.” Since the question doesn’t separate standards and terms, we first define tighter or easier terms. For terms, questions refer to several specific terms such as loan covenants and cost of credit lines. We code each answer as -1 (looser), 0 (no change) or 1 (tighter) and sum these for each bank. Terms are considered tighter (looser) if the sum is positive (negative). We have 1,186 observations for terms after merging with the Y-9C data.

We next define *StanTerm* as 1 or tighter (-1 or easier) if both standards and terms are tightener (easier), or one’s tighter (easier) while the other is “no change.” It is 0 or same when both standards and terms are unchanged. In case of conflicts (e.g. standards tighter but terms easier), *StanTerm* is missing. If standard (term) is missing, but term (standard) is not, then *StanTerm* has the same value as term (standard).

When *StanTerm* is 1 *and* banks give the reason for tightening or easing as “increased concerns about the effects of legislative changes, supervisory actions, or changes in accounting standards,” we define a dummy variable *RegTight* as 1. When *StanTerm* is -1 and banks cite this reason, the dummy *RegEase* is 1.

In Table E.1, we regress *StanTerm* on *RegTight* and *RegEase* times the LCR bank and LCR event dummies. The coefficients of these triple interaction terms indicate the additional effect when banks cite the 3 factors for changing standards or terms. With the combined terms and standards sample, there are no significant LCR effects on *Stanterm* (column 1). However, after adding the triple interaction terms, we find that the coefficients on *RegTight* are positive and significant since 2015, while those of *RegEase* are negative and significant in 2013-2014 (column 2).

Table E.1: Lending Standards Related to Regulation: LCR and non-LCR Banks

The table show results from estimating a panel regression of changes in bank lending standards to large and small firms, related to regulation. Standards are coded as -1 (looser), 0 (no change) and 1 (tighter). *Regtight* (*Regease*) is a dummy variable equal to 1 when banks state they tightened (eased) standards due to regulation. *2013-2014* is a dummy variable equal to 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *LCR-Bank* is a dummy variable for banks with assets greater then \$50 billion. The omitted group is *Mid-Sized* banks with assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4.

	Small		Large	
	(1)	(2)	(3)	(4)
LCR Bank x 2013-2014	0.07 (0.74)	0.09 (0.94)	0.10 (1.05)	0.08 (0.86)
LCR Bank x 2015+	0.16 (1.33)	0.15 (1.23)	0.26* (2.00)	0.23* (1.80)
LCR-Bank x 2013-2014 x RegTight Dummy		-0.02 (-0.25)		1.07*** (5.32)
LCR-Bank x 2015+ x RegTight Dummy		0.45** (2.60)		0.83*** (4.37)
LCR-Bank x 2013-2014 x RegEase Dummy		-0.49*** (-4.77)		-0.16** (-2.44)
LCR-Bank x 2015+ x RegEase Dummy		-0.35 (-1.16)		-0.56** (-2.53)
Constant	0.77*** (8.48)	0.77*** (8.50)	0.79*** (9.03)	0.79*** (9.13)
Bank F.E.	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes
Observations	1294	1294	1294	1294

Table E.2: Securitization Income: LCR and non-LCR Banks

The table shows results from estimating panel regressions for changes in the securitization income, expressed as a dummy variable, and as shares of assets and loans. The coefficients are scaled by 100 for visibility. The securitization dummy is equal to 1 if the securitization income is positive, and 0 otherwise. *2013-2014* is 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *LCR-Bank* is a dummy variable equal to 1 for banks that were required to implement the LCR rule. *Mod-Banks* is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *Full-Banks* is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks have assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4 with a total of 4,064 bank-quarters. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively.

	Dummy		Asset Share		Loan Share	
	(1)	(2)	(3)	(4)	(5)	(6)
LCR Bank x 2013-2014	0.41 (0.29)		0.00 (1.12)		0.00 (0.51)	
LCR Bank x 2015+	1.94*** (3.34)		0.01* (1.79)		0.02** (2.07)	
Mod-Bank x 2013-2014		0.82 (1.37)		0.01 (1.60)		0.01 (1.48)
Full-Bank x 2013-2014		-0.04 (-0.01)		-0.00 (-0.89)		-0.00 (-0.16)
Mod-Bank x 2015+		1.06* (1.80)		0.01* (1.84)		0.01* (1.81)
Full-Bank x 2015+		3.02*** (3.32)		0.01 (1.46)		0.02* (1.90)
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table E.3: Book Value Changes of Loan Amounts: G-SIBs versus Other LCR Banks

The table shows results from panel regressions of changes in the book values of loans, as shares of total assets. The loan securitization dummy is 1 if the bank had positive securitization income and 0 if it was not. Other dummy variables are as follows. *Post-LCR* is 1 from 2013 Q2 to 2017 Q4 and zero otherwise. *2013-2014* is 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *LCR-Bank*=1 for banks that had to implement the LCR rule. *Mod-Banks* is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *G-SIB* is 1 for global systemically important banks. *Full-Banks* is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion, excluding G-SIBs. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively. Abbreviations used: C&I=Commercial & Industrial; CRE=Commercial real estate; RRE=Residential real estate.

	(1)	(2)	(3)	(4)	(5)
	$\Delta$ All Loans	$\Delta$ RRE	$\Delta$ CRE	$\Delta$ C&I	$\Delta$ C&I Small Business
Mod-Bank x 2013-2014	-0.69*** (-2.64)	-0.34*** (-3.02)	-0.10 (-0.84)	-0.16* (-1.71)	-0.03 (-1.50)
Full (Non-GSIB) x 2013-2014	-0.92*** (-5.49)	-0.46*** (-2.69)	-0.26** (-2.42)	-0.04 (-0.35)	-0.01 (-0.23)
G-SIB x 2013-2014	-0.53** (-2.32)	-0.16 (-1.51)	-0.28*** (-3.63)	0.02 (0.22)	-0.03* (-1.86)
Mod-Bank x 2015+	-0.24 (-1.08)	-0.02 (-0.15)	-0.05 (-0.49)	-0.19* (-1.94)	-0.00 (-0.09)
Full (Non-GSIB) x 2015+	-0.61*** (-2.85)	-0.21 (-1.45)	-0.36*** (-3.92)	0.33 (1.65)	0.03 (0.41)
G-SIB x 2015+	-0.05 (-0.37)	0.08 (0.81)	-0.36*** (-5.34)	0.06 (0.71)	-0.03** (-2.16)
Lagged $\Delta$ Securitization Dummy	0.17 (1.10)	0.03 (0.46)	0.03 (0.45)	-0.01 (-0.16)	0.04* (1.82)
Time F.E.	Yes	Yes	Yes	Yes	Yes
Bank F.E.	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes



Table E.4: Book Value Changes of Loan Amounts: Consumer and Credit Card Loans

The table shows results from panel regressions of changes in the book values of consumer loans and credit card loans, as shares of total assets. The loan securitization dummy is 1 if the bank had positive securitization income and 0 if it was not. Other dummy variables are as follows. *Post-LCR* is 1 from 2013 Q2 to 2017 Q4 and zero otherwise. *2013-2014* is 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *LCR-Bank*=1 for banks that had to implement the LCR rule. *Mod < 100B* is 1 for LCR banks with assets between \$50 billion and \$100 billion. *Mod >= 100B* is 1 for LCR banks with assets between \$100 billion and \$250 billion. *Full-Banks* is 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)
	$\Delta$ Consumer Loans	$\Delta$ Credit Card Loans
Mod<100B x 2013-2014	-0.10 (-0.82)	-0.00 (-0.29)
Mod>=100B x 2013-2014	-0.02 (-0.30)	0.06 (1.18)
Full-Bank x 2013-2014	0.02 (0.20)	0.00 (0.05)
Mod-Bank x 2015+	0.02 (0.30)	0.01 (0.98)
Full-Bank x 2015+	0.10 (1.12)	-0.05 (-0.56)
Lagged $\Delta$ Securitization Dummy	0.07 (1.06)	0.07 (1.47)
Time F.E.	Yes	Yes
Bank F.E.	Yes	Yes
Bank Controls	Yes	Yes

Table E.5: Purging C&I Lending Standards of Loan Demand, Risk Aversion and Macro Conditions

The table shows regressions of changes in standards of loans to large and small firms on loan demand, macro and financial conditions, and risk conditions. The sample is 2009 Q1 to 2017 Q4.

	Standards	
	(1) Small	(2) Large
Lag Dependent Variable	0.18*** (3.42)	0.22*** (4.15)
Lag $\Delta$ Loan Demand	0.02 (0.76)	0.01 (0.64)
Lag $\Delta$ Core Loans	-0.01** (-2.35)	-0.01 (-1.40)
Lag $\Delta$ Loan Loss Provision	0.18 (1.64)	0.26** (2.56)
Lag GDP Expectation	0.05 (1.53)	0.01 (0.33)
Lag Unemployment Expectation	0.13* (1.88)	0.15** (2.61)
Lag TBill Expectation	0.01 (0.10)	0.13*** (2.80)
Lag TBond Expectation	0.05 (0.42)	0.09 (0.85)
Lag $\Delta$ Real GDP	0.00 (0.09)	-0.00* (-1.82)
Lag $\Delta$ Unemployment rate	0.00 (0.17)	-0.03 (-1.12)
Lag $\Delta$ FedFunds Rate	-0.11 (-1.10)	-0.01 (-0.17)
Lag $\Delta$ VIX	0.01* (1.90)	0.00 (1.18)
Constant	-0.04 (-0.69)	-0.07 (-1.31)
Bank F.E.	Yes	Yes
Time F.E.	No	No
Bank Controls	Yes	Yes
Observations	924	1031

Table E.6: Book Value Changes of Loans, Using Shorter Sample of Standards

The table shows results from a panel regression of the change in the book values of semi-liquid and illiquid loans, as shares of total assets, using the sample available for loan standards. The securitization dummy is 1 if the loan was securitized and 0 if it was not. *2013-2014* is a dummy variable equal to 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *Mod-Banks* is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *G – SIB* is one for global systemically important banks. *Full-Banks* is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion, excluding G-SIBs. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively. Abbreviations used: CRE=Commercial real estate; RRE=Residential real estate.

	$\Delta$ All Loans		$\Delta$ Illiquid Loans			$\Delta$ Semi-Liquid Loans			(9) $\Delta$ Small Business C&I Loans
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
			All	C&I	CRE	All	RRE	Consumer	
LCR Bank x 2013-2014	-0.71*** (-3.14)								
Mod-Bank x 2013-2014		-0.79*** (-2.83)	-0.20 (-0.98)	-0.19* (-1.77)	-0.02 (-0.17)	-0.59*** (-3.64)	-0.38*** (-3.07)	-0.20** (-2.26)	-0.03 (-1.12)
Full (Non-GSIB) x 2013-2014		-0.91*** (-3.96)	-0.16 (-0.65)	0.04 (0.41)	-0.14 (-0.91)	-0.75*** (-3.91)	-0.53*** (-2.75)	-0.22** (-2.29)	0.01 (0.16)
G-SIB x 2013-2014		-0.42 (-1.57)	-0.21 (-1.26)	0.02 (0.21)	-0.17 (-1.41)	-0.21 (-1.21)	-0.12 (-0.97)	-0.01 (-0.04)	-0.02 (-0.56)
LCR Bank x 2015+	-0.79*** (-4.21)								
Mod-Bank x 2015+		-0.91*** (-4.35)	-0.52*** (-2.89)	-0.32*** (-2.68)	-0.17 (-1.37)	-0.40*** (-2.96)	-0.21* (-1.92)	-0.18** (-2.61)	-0.05 (-1.63)
Full (Non-GSIB) x 2015+		-0.93*** (-4.69)	-0.46** (-2.59)	0.02 (0.29)	-0.42*** (-3.36)	-0.47** (-2.62)	-0.32* (-1.79)	-0.16 (-1.66)	0.01 (0.14)
G-SIB x 2015+		-0.49** (-2.51)	-0.46*** (-3.04)	-0.03 (-0.35)	-0.42*** (-4.44)	-0.03 (-0.24)	0.04 (0.32)	-0.00 (-0.03)	-0.06** (-2.42)
Lagged $\Delta$ Securitization Dummy	0.01 (0.06)	0.00 (0.02)	-0.08 (-1.09)	-0.07 (-1.66)	-0.03 (-0.68)	0.08 (0.79)	0.02 (0.33)	0.07 (0.93)	0.02 (0.74)
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Figure E.1: Book Values of Loans, as Shares of Bank Assets: LCR and non-LCR Banks

The figure shows the changes in loan categories by size group for consolidated bank holding companies. The top panel shows the changes in consumer and industrial (C&I) for all firms and for small businesses, and the bottom panel shows the changes in and residential real estate (RRE) and commercial real estate (CRE) loans. Banks that have assets greater than \$50 billion are required to implement the LCR rule; full LCR banks are internationally active or have assets greater than \$250 billion and modified LCR banks have assets greater than \$50 billion. For small business C&I, the full-LCR group excludes the G-SIBs, which are shown separately. Midsized banks with assets between \$3 billion and \$50 billion are not subject to the LCR rule. The sample is 2009 Q1 to 2017 Q4.

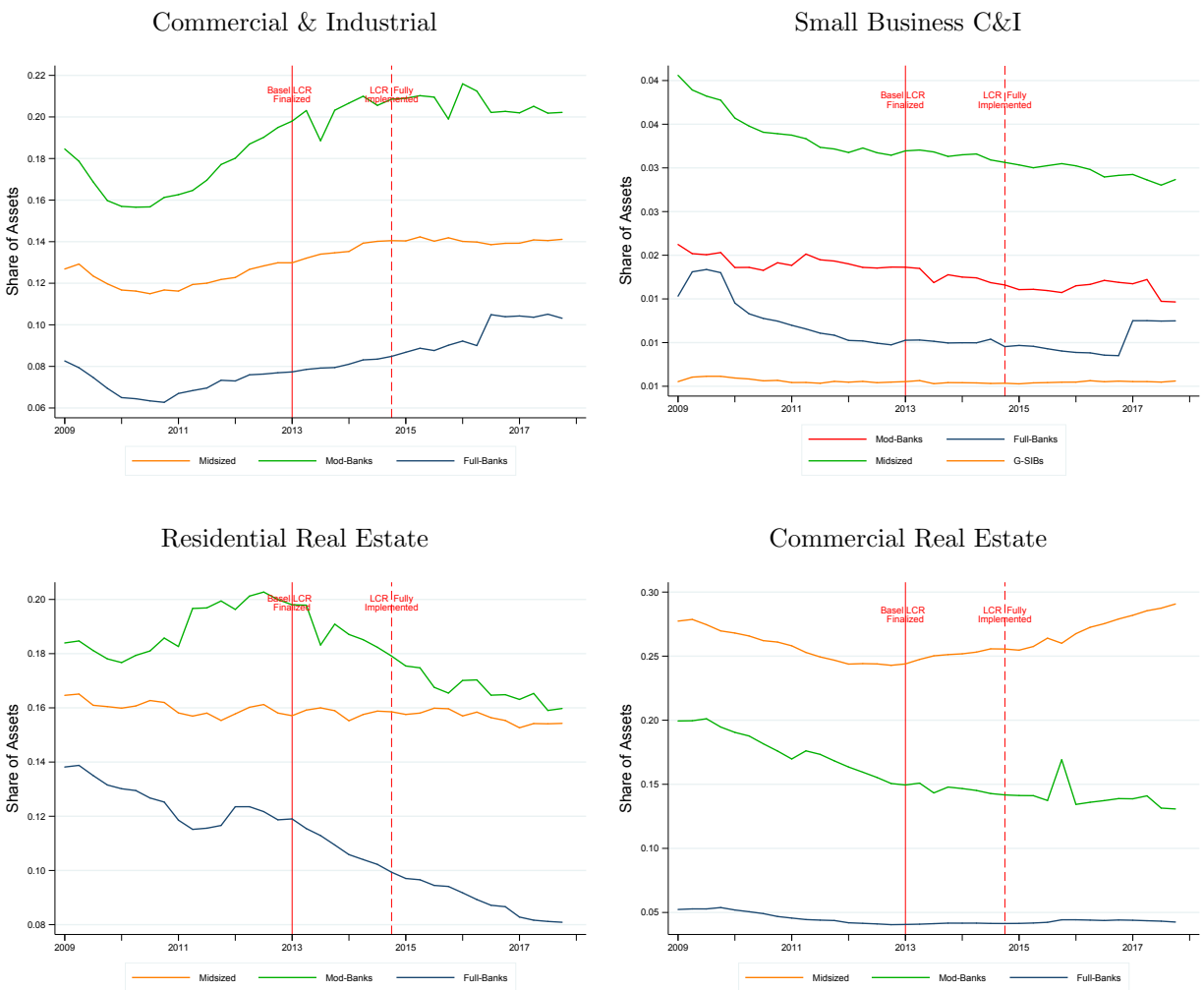
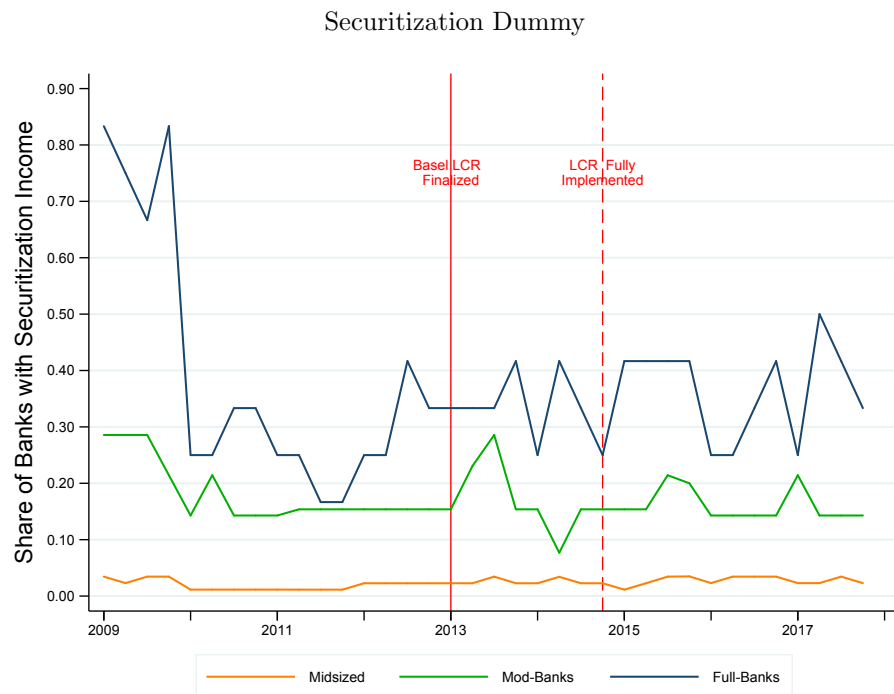


Figure E.2: Securitization of LCR and non-LCR Banks

Panel A of the figure shows securitization income by size group for consolidated bank holding companies. Panel B plots a securitization dummy, equal to 1 if the securitization income is positive, and 0 otherwise. Full-banks are internationally active or have assets greater than \$250 billion and mod-banks have assets  $\geq$  \$50 billion and less than \$250 billion. Midsized banks with assets between \$3 billion and \$50 billion are not subject to the LCR rule. The sample is 2009 Q1 to 2017 Q4.



## F Section 9 of Paper

### F.1 Estimating Net Benefits from LCR

Net benefits from LCR equal the reduction in LCR banks' contributions to fire-sale losses minus the social losses from reduced bank lending.

$$NetBenefit_{g,p} = \Delta \left[ \frac{Fire - Sale}{Assets} \right]_{g,p} * Mean(Assets)_{g,p} - \Delta LoanLoss_{g,p} \quad (1)$$

where  $g=LCR, Full, Mod$  is the LCR bank group and  $p=2013Q2-2017$  or sub-periods thereof. The estimated  $\Delta(Fire - Sale/Assets)$  is from columns 1-2 of Table 11. We multiply by the average post-LCR assets of banks in group  $g$  to obtain the total fire-sale losses  $Fire - Sale$ . The social losses from reduced lending is  $LoanLoss$ .

To approximate the costs of LCR, we use LCR banks' private losses which is equal to the foregone income from lower lending by LCR banks, relative to non-LCR banks. We assume that, absent LCR, the average pre-LCR ratio of net loan income to loans of LCR banks would remain the same during the post-LCR period. Then, the foregone loan income of LCR banks is obtained by multiplying this pre-LCR ratio by the estimated reduction in lending by LCR banks during the post-LCR period, relative to non-LCR banks:

$$\Delta LoanLoss_{g,p} = Mean \left[ \frac{(NII - LLP) * (1 - Tax)}{Loans} \right]_{g,Pre-LCR} * \Delta \left[ \frac{Loans}{Assets} \right]_{g,p} * Mean(Assets)_{g,p} \quad (2)$$

$NII$  is the net interest income,  $LLP$  is the provision for loan and lease losses, and  $Tax$  is the corporate income tax rate. We subtract  $LLP$  since this an expense item that reduces taxable income.  $Tax$  is the annualized ratio of "Applicable income taxes" over the "income (loss) before applicable income taxes and discontinued operations."<sup>4</sup>  $\Delta(Loans/Assets)$  is estimated from regressions like those reported in Table 9 in the text, but re-estimated using the shorter fire-sale risk sample. Two regressions are estimated: one for all LCR banks and a second for full-banks and mod-banks. We multiply by the average post-LCR assets to obtain the total reduction in lending.

Table F.1 report the inputs (2). For full-banks in the pre-LCR period, the average  $(NII-LLP)/Loan$  was 96 bp before tax and 69 bp after tax.

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<sup>4</sup>These are Y-9C categories. We sum the quarterly tax and income over the year, and then take the ratio.  $Tax$  is clustered around 30%, close to the statutory rate. As there were some outliers, we winsorize the distribution of  $Tax$  to the interval [22%, 38%].

Table F.1: Inputs into Calculating Income Foregone from Reduced Lending

The table shows the inputs into calculating income foregone from reduced lending, as expressed in equation (2). The income foregone is assumed to be the net interest income (NII) minus provisions for loan and lease losses (LLP). Absent LCR, the ratio of income foregone to loans is assumed to be the same as in the pre-LCR period.

Mean, Pre-LCR Period					
Bank Group	NII-LLP (\$ Billions)	After-Tax NII-LLP (\$ Billions)	Loans (\$ Billions)	$\frac{NII-LLP}{Loans}$ (Basis Points)	$\frac{After-Tax\ NII-LLP}{Loans}$ (Basis Points)
LCR-Banks	2.02	1.45	221.66	91	66
Full-Banks	3.25	2.33	337.71	96	69
Mod-Banks	0.42	0.31	69.20	60	44

Table F.2: Changes in Off-Balance Sheet Liabilities: LCR and non-LCR Banks

The table shows results from panel regressions of changes in liquidity-weighted off-balance sheet liabilities, as shares of total assets. Dummy variables are as follows. *2013-2014* is 1 from 2013 Q2 to 2014 Q4 and *2015+* is 1 from 2015 Q1 to 2017 Q4. *Mod-Banks* is a dummy variable equal to 1 for LCR banks with assets  $\geq$  \$50 billion and less than \$250 billion. *G-SIB* is 1 for global systemically important banks. *Full-Banks* is a dummy variable equal to 1 for LCR banks that are internationally active or have assets  $\geq$  \$250 billion, excluding G-SIBs. The omitted group is midsized non-LCR banks with assets between \$3 billion and \$50 billion. The sample is 2009 Q1 to 2017 Q4 with a total of 4,068 bank-quarters. *t* statistics are shown in parenthesis. \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, and 1% level, respectively.

	Liquidity-Weighted Off Balance Sheet Liabilities	
	(1) All Liabilities	(2) Net Derivative Liabilities
Mod-Bank x 2013-2014	0.04*** (3.66)	-0.00*** (-2.85)
Full (Non-GSIB) x 2013-2014	0.19*** (3.30)	-0.00 (-1.56)
G-SIB x 2013-2014	0.11*** (4.09)	-0.00*** (-2.78)
Mod-Bank x 2015+	0.04*** (3.56)	-0.00*** (-2.85)
Full (Non-GSIB) x 2015+	0.18*** (3.03)	-0.00 (-1.22)
G-SIB x 2015+	0.10*** (3.90)	-0.00*** (-2.77)
Time F.E.	Yes	Yes
Bank F.E.	Yes	Yes
Bank Controls	Yes	Yes



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