

Internet Appendix: Liquidity Regulations, Bank Lending and Fire-Sale Risk

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Abstract

This is the appendix to the paper *Liquidity Regulations, Bank Lending and Fire-Sale Risk*

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A Section 3 of Paper

Table A.1: The Liquidity Coverage Ratio (LCR): Asset- and Liability-Side Requirements

Panel A of the table shows assets eligible as High Quality Liquid Assets (HQLA) by the LCR rules in three liquidity categories: Level 1, Level 2A and Level 2B. The *LCR Haircut* column shows the haircut required by LCR on assets in a given liquidity level, and the *Constraint* column shows the minimum or maximum share of total HQLA allowed for assets of a given level. Panel B shows the LCR outflow and inflow rates for LCR outflow categories. Abbreviations used in Panel A: RW =Risk Weights; MBS=Mortgage-Backed Securities; GSE=Government-Sponsored Enterprise; L1 = Level 1, L2a = Level 2a and L2b = Level 2b.

Panel A: Eligible Assets and Haircuts for HQLA Portfolio			
Level	Asset	LCR Haircut	Constraint
Level 1 HQLA	Excess Reserves Treasuries Government Agency Debt & MBS Foreign Debt (RW=0%)	0%	$\geq 60\%$ of HQLA
Level 2A HQLA	GSE Debt GSE MBS Foreign Debt (RW=(0,20]%)	15%	L2A + L2B <40% of HQLA
Level 2B HQLA	Investment Grade Non-financial corporates Russell 1000 equities Investment Grade Municipals ¹	50%	<15% of HQLA

1. Investment grade municipal bonds were initially not HQLA-eligible but were made so by Senate Bill S.2515 in 2018.

Table A.1: (Continued) The Liquidity Coverage Ratio (LCR): Asset- and Liability-Side Requirements

Abbreviations for secured funding collateral are for levels of High Quality Liquid Assets: L1 = Level 1, L2a = Level 2a and L2b = Level 2b. Abbreviations for funding counter-parties are: SB = small business; NFin = non-financial; Fin = financial.

Panel B: LCR Outflow Categories, Inflow and Outflow Rates			
LCR Outflow Category	Y-9C item	LCR Outflow Rate	LCR Inflow Rate
Secured Funding	ON Repo Sold	L1 & L2A collateral: 0-15%	L1 & L2A collateral: 0-15%
	Securities Lent	L2B & non-HQLA collateral: 25 – 100% ¹	L2B & non-HQLA collateral: 50 – 100%
Unsecured Funding	ON fed funds purchased	Retail & SB: 3 – 40% ²	
	Deposits	Insured retail deposits: 3%	
	Trading Liabilities	Uninsured retail deposits: 10%	
	Commercial Paper	Wholesale: 5-100%	
	Other Borrowed Money		
	Subordinated Debt		
	Other Liabilities		
Commitments	Equity		
	Unused Commitments	Retail & SB non-mortgage: 5%	
Derivatives	Standby Letters of Credit	NFin Wholesale: 10-30%	
	Net Derivatives	Fin Wholesale: 40-100%	
		100%	

1. Borrowings from exempted central banks have rate=0%.

2. Brokered deposits maturing less than or equal to 30 days have a 100% runoff rate.

B Section 4 of Paper

B.1 Estimating Insured and Core Deposits

We follow Acharya and Mora (2015) in defining insured deposits as non-retirement deposit accounts (RCONF049) plus retirement deposit accounts (RCONF045) of \$250,000 or less. Also following Acharya and Mora (2015), core deposits are defined as the sum of transaction deposits, saving deposits, and time deposits less than \$100,000.¹ Transactions deposits include interest-bearing and non-interest-bearing demand deposits, NOW and ATS accounts.

B.2 Details of Constructing Balanced Panel

We drop: 109 new entrants (as they are not present in our sample for all 36 quarters); BHCs acquired by non-sample banks; and four banks that move between the mid-sized and modified groups during our sample.² Finally, we drop Bank of NY Mellon, State Street and Deutsche Bank, since these banks have unique business models built around asset management and settlement activities that are cash-intensive. Some foreign banks are omitted because they do not file the FR Y-9C until 2016.³

The sample is rebalanced after merging with the Senior Loan Officer Opinion Survey (SLOOS), such that the outcome variable for included entities is non-missing in every quarter.⁴

B.3 Constructing *StanTerm* and *RegTight*

We define the variable *StanTerm* – an indicator for tightening, easing or not changing lending standards or terms – for large firms and small firms. For standards, we code bank responses as -1 (looser), 0 (same) or 1 (tighter). Consistent with the literature, we combine tightening or easing “somewhat” and “considerably.” For terms, questions refer to several specific dimensions of terms (e.g., strictness of loan covenants and cost of credit lines). We code each of these answers as -1 (looser), 0 (no change) or 1 (tighter) and sum these for each bank in each quarter. Terms are considered tighter (looser) if the sum is positive (negative), or no change if the sum is zero. We then set *StanTerm* is equal to 1 (tighter) if both

¹Unlike Acharya and Mora (2015), who use Call Reports, we calculate core deposits from Y-9C filings.

²One bank starts as mid-sized and became modified, and three banks fluctuate between the two groups.

³Since 2016, foreign banking organizations with \$50 billion or more in US assets have been required to place virtually all of their US subsidiaries under a US Intermediate Holding Company (IHC). The IHCs report data to FR Y-9C, but we cannot include them due to their late entry into the sample.

⁴The only cases when we do *not* rebalance after merging with SLOOS are Table 7 and Table E.3. Because the analysis is powered by a relatively rare outcome, rebalancing in those instances would impose a particularly strenuous restriction on the data.

standards and terms are tighter or if one is tighter and the other is “no change.” Similarly, we set *StanTerm* equal to -1 (easier) if both standards and terms are easier or if one is easier while the other is “no change.” *StanTerm* is set to 0 if both standards and terms are unchanged. In the case of a conflict (standards tighter but terms easier, or vice versa), *StanTerm* is missing. In the event that either standards or terms is missing, *StanTerm* is set equal to the non-missing value.

As the SLOOS question regarding the bank’s reasons for tightening or easing does not separate standards and terms, we define *RegTight* based on *Stanterm*. For large and small firms, we set *RegTight* equal to 2 whenever both *StanTerm* equals 1 and banks respond “increased concerns about the effects of legislative changes, supervisory actions, or changes in accounting standards” as a reason for changing their standards or terms. In all other cases, we set *RegTight* equal to *StanTerm*.

B.4 Discussion of Parallel Trends

To examine parallel pre-trends, we estimate the following regression:

$$\frac{\Delta Y_{it}}{A_{i,t-1}} = \alpha_0 + \alpha_i + \alpha_t + \sum_{t \neq k} \delta_j \text{Full-Bank}_i I(t) + \sum_{t \neq k} \gamma_j \text{Mod-Bank}_i I(t) + \sum_{j=1}^4 \beta_{ij} \frac{X_{it}}{A_{i,t-1}} + \epsilon_{it} \quad (1)$$

Y is the outcome variable and A is total assets. *Full-Bank* (*Mod-Bank*) is a dummy variable set equal to 1 for full- (mod-) banks. X_{ij} are bank-level controls. I is an indicator variable set equal to 1 for all quarters except $t = k = 2013Q1$, the last quarter of the pre-LCR period. The coefficients of interest are δ_j and γ_j . In Figures B.1 to B.3, we plot these coefficients for periods $t < k$ and $t > k$ (omitting $t = 2013Q1$, the “event” quarter), and the associated confidence intervals. Consistent with parallel pre-trends, we find that the confidence bands straddle zero in most quarters before 2013Q1 for all outcome variables. However, the quarterly estimates in the post-event period are also generally insignificant, suggesting that the tests have low power. Thus, we provide additional tests recommended in the literature to support parallel pre-trends and rule out alternative hypotheses, as described below.

First, following Bilinski and Hatfield (2020) and others, we explicitly introduce pre-trends

that differ by bank group and we also include differential post-trends, as follows:

$$\begin{aligned} \frac{\Delta Y_{it}}{A_{i,t-1}} = & \alpha_0 + \alpha_i + \alpha_t + \delta_1 \text{pretrend}_t \times \text{LCR-Bank}_i \\ & + \gamma_1 \text{posttrend}_t \times \text{LCR-Bank}_i + \sum_{j=1}^4 \beta_{it} \frac{X_{it}}{A_{i,t-1}} + \epsilon_{it} \end{aligned} \quad (2)$$

The results are reported in Table B.1. Panel A of the table shows results for changes in total loans as shares of lagged assets, Panel B reports results for changes in liquidity creation as shares of lagged assets and Panel C shows results for the illiquidity component of fire-sale risk. The first two columns of each panel report results without period fixed effects while the last two columns show results with fixed effects. Results are similar in all cases. δ_1 is not significantly different from zero, implying that we cannot reject the null that the pre-event trends are similar for LCR and control banks. Moreover, γ_1 is negative and significant at the 5% level or 1% level, indicating lower growth in the outcome variable for LCR banks compared to control banks. In summary, these results are consistent with parallel pre-trends and bigger reductions in the outcome variables post-event for LCR banks relative to the control banks.

Second, we conduct a placebo test using an alternative event date, as in Kearney and Levine (2015) and Kearney and Levine (2016). First, we omit the post-LCR period of 2013-2017. Second, following Chabé-Ferret (2015), we assume that the event date occurs in the mid-point of the pre-event period (i.e., 2011Q1). We expect to see insignificant DiD estimates for 2011Q2-2012. The results are reported in Table B.2. There are insignificant reductions in loan shares (Panel A) and liquidity creation shares (Panel B) for LCR banks since 2011Q2 relative to midsized banks, as hypothesized. However, the first two columns of Panel C report a significant decline in the illiquidity component of fire-sale risk for LCR banks relative to midsized banks since 2011Q2, suggesting that we may underestimate the reduction in their illiquidity risk since 2013Q2.

To understand why illiquidity risk declines earlier in the sample for LCR banks, we plot the average change in illiquidity risk since 2008 by bank groups in Figure B.4. We note that, unlike smaller banks, full-banks experienced a spike in illiquidity risk in 2008Q3, the quarter when Lehman failed. These differential dynamics continued in 2009 and 2010. Motivated by these facts, we first show results separately for mod- and full-banks in the last 2 columns of Panel C. Consistent with Figure B.4, there was a significant decline in the illiquidity risk of full-banks but not of mod-banks since 2011Q2. Second, we redo the placebo DiD after omitting 2009-2010. Specifically, we use 2011-2012 as the sample and assume that the event falls at the mid-point in 2011Q4. We find that the change in the illiquidity risk of LCR

banks in 2012 is insignificant relative to midsized banks (Panel D), consistent with Global Financial Crisis-related dynamics creating differential dynamics for full-banks in 2009-2010.

Table B.1: Differential Pre- and Post-Trends in Outcome Variables

The table shows results from estimating equation (2). Panel A shows results for changes in total loans as a share of lagged assets. Panel B shows results for changes in the on-balance sheet liquidity creation measure *cat nonfat* (Berger and Bouwman (2009)), divided by lagged assets. Panel C shows results for changes in the illiquidity component of fire-sale risk. *Pretrend* is the time trend from 2009 Q1 to 2013Q1 and 0 afterwards. *Posttrend* is the time trend from 2013Q2 to 2017 and 0 before. *LCR-Bank* is set equal to 1 for banks with assets of at least \$50 billion. The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 to 2017 and the regressions use 3,920 observations. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Changes in Loans/Lagged Assets				
	Estimate	T-Statistics	Estimate	T-Statistics
Intercept	-1.72**	-2.18	0.06	0.05
Pretrend*LCRBank	0.01	0.73	0.05	1.34
Pretrend	0.00	0.26		
Posttrend*LCRBank	-0.07***	-4.42	-0.07**	-2.44
Posttrend	0.03***	3.52		
Bank Fixed Effects?	Yes		Yes	
Period Fixed Effects?	No		Yes	
Bank Controls?	Yes		Yes	
Adj. R-Squared	0.08		0.09	
Observations	3920		3920	

Panel B: Changes in Liquidity Creation/Lagged Assets				
	Estimate	T-Statistics	Estimate	T-Statistics
Intercept	0.88	1.00	2.47***	2.78
Pretrend*LCRBank	0.02	1.44	0.03	1.53
Pretrend	-0.01	-0.49		
Posttrend*LCRBank	-0.07***	-3.36	-0.07***	-3.16
Posttrend	0.03*	1.76		
Bank Fixed Effects?	Yes		Yes	
Period Fixed Effects?	No		Yes	
Bank Controls?	Yes		Yes	
Adj. R-Squared	0.07		0.09	
Observations	3920		3920	

Panel C: Changes in Illiquidity Component of Fire-Sale Risk				
	Estimate	T-Statistics	Estimate	T-Statistics
Intercept	-1.29***	-5.06	0.12	0.78
Pretrend*LCRBank	-0.01	-1.26	-0.01	-1.07
Pretrend	0.02***	7.12		
Posttrend*LCRBank	-0.02***	-4.19	-0.01***	-3.66
Posttrend	0.02***	11.32		
Bank Fixed Effects?	Yes		Yes	
Period Fixed Effects?	No		Yes	
Bank Controls?	Yes		Yes	
Adj. R-Squared	0.07		0.22	
Observations	3920		3920	

Table B.2: Placebo Test with Alternative Event Dates

The table shows results from difference-in-differences regressions of outcome variables, when the LCR event is assumed to occur in 2011Q1 and the sample period is 2009 Q1 to 2012 Q4. Panel A shows results for changes in total loans as a share of lagged assets. Panel B shows results for changes in the on-balance sheet liquidity creation measure *cat nonfat* (Berger and Bouwman (2009)), divided by lagged assets. For changes in the illiquidity component of fire-sale risk, Panel C shows results for the 2011Q1 event whereas Panel D shows results for an alternative event date of 2011Q4 and a sample period of 2011-2012. *LCR-Bank* is set equal to 1 for banks with assets of at least \$50 billion. *Mod-Bank* is 1 for LCR banks with assets between \$50 billion and \$250 billion. *Full-Bank* is 1 for LCR banks that are internationally active or have assets exceeding \$250 billion. The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Changes in Loans/Lagged Assets		
	Estimate	T-Statistics
Intercept	-0.59	-0.22
LCRBank*2011q2-2012q4	0.17	0.36
Bank Fixed Effects?	Yes	
Period Fixed Effects?	Yes	
Bank Controls?	Yes	
Adj. R-Squared	0.12	
Observations	1740	

Panel B: Changes in Liquidity Creation/Lagged Assets		
	Estimate	T-Statistics
Intercept	4.73**	2.31
LCRBank*2011q2-2012q4	-0.12	-0.36
Bank Fixed Effects?	Yes	
Period Fixed Effects?	Yes	
Bank Controls?	Yes	
Adj. R-Squared	0.10	
Observations	1740	

Panel C: Changes in Illiquidity Component of Fire-Sale Risk: 2009-2012				
	Estimate	T-Statistics	Estimate	T-Statistics
Intercept	-0.23***	-25.61	-0.23***	-25.37
LCRBank*2011q2-2012q4	-0.19***	-3.01		
Full-Bank*2011q2-2012q4			-0.27***	-5.25
Mod-Bank*2011q2-2012q4			-0.12	-1.20
Bank Fixed Effects?	Yes		Yes	
Period Fixed Effects?	Yes		Yes	
Bank Controls?	Yes		Yes	
Adj. R-Squared	0.23		0.23	
Observations	1736		1736	

Panel D: Changes in Illiquidity Component of Fire-Sale Risk: 2011-2012		
	Estimate	T-Statistics
Intercept	-0.07***	-2.56
Full-Bank*2012q1-2012q4	-0.15	-1.39
Mod-Bank*2012q1-2012q4	-0.06	-0.58
Bank Fixed Effects?	Yes	
Period Fixed Effects?	Yes	
Bank Controls?	Yes	
Adj. R-Squared	0.01	
Observations	872	

Figure B.1: Parallel Trends: All Loans

The figure shows dynamic coefficients from estimating equation (1) for all loans, as shares of assets of full- and mod-banks. LCR banks are further separated into those that participated in the Fed's stress tests before 2014 (early stress test banks) and those who participated since 2014 (late stress test banks).



Figure B.2: Parallel Trends: Liquidity Creation

The figure shows dynamic coefficients from estimating equation (1) for *BBN*, the liquidity creation measure (Berger and Bouwman (2009)) divided by total assets, by full- and mod-banks.

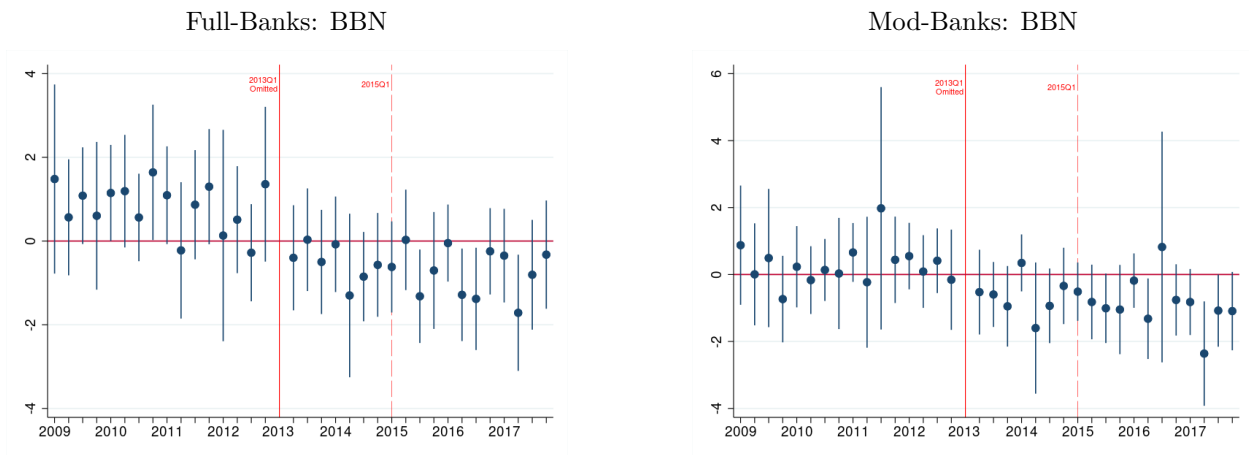


Figure B.3: Parallel Trends: Fire-sale Risk and its Illiquidity Component

The figure shows dynamic coefficients from estimating equation (1) for fire-sale risk and its illiquidity component of full- and mod-banks.

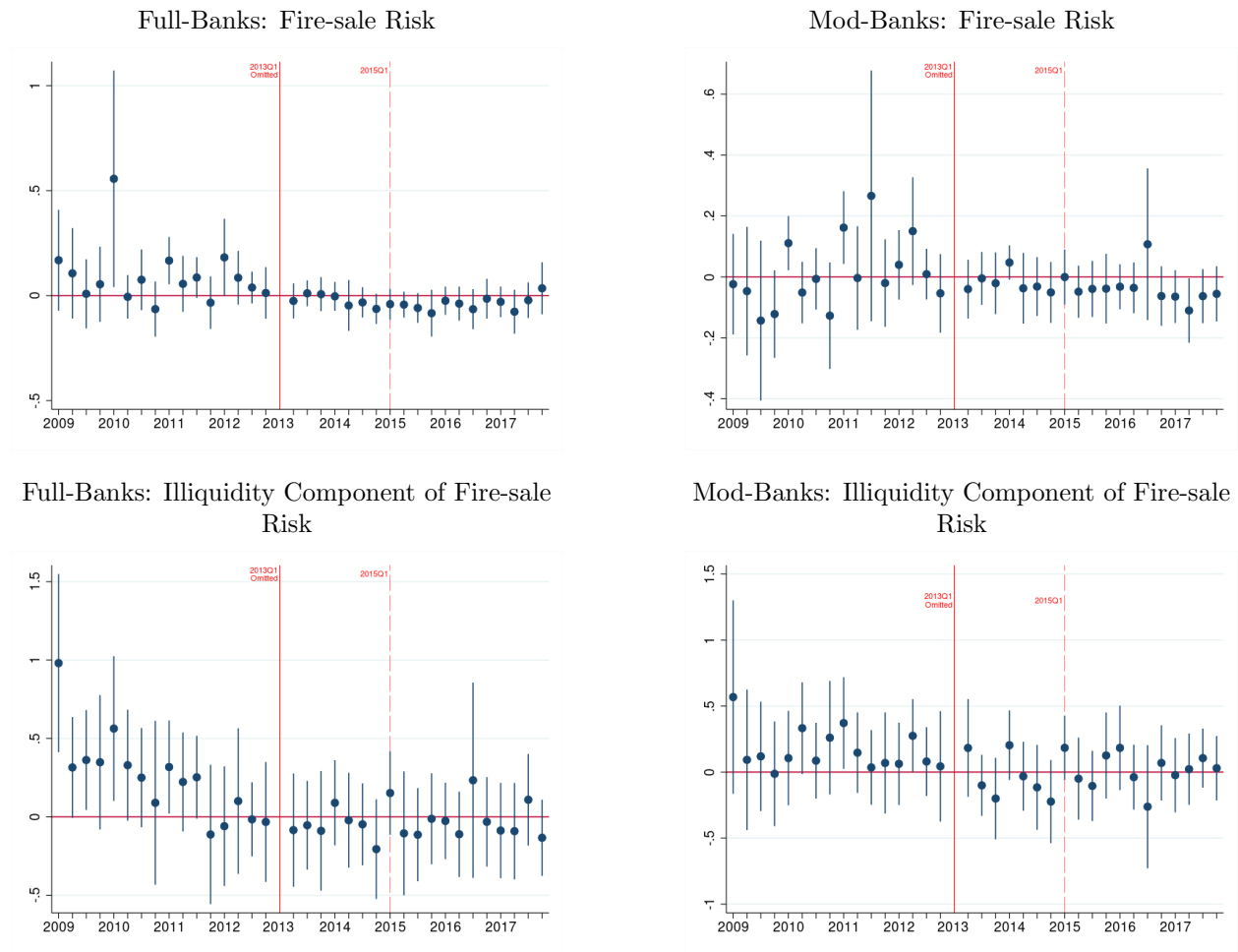
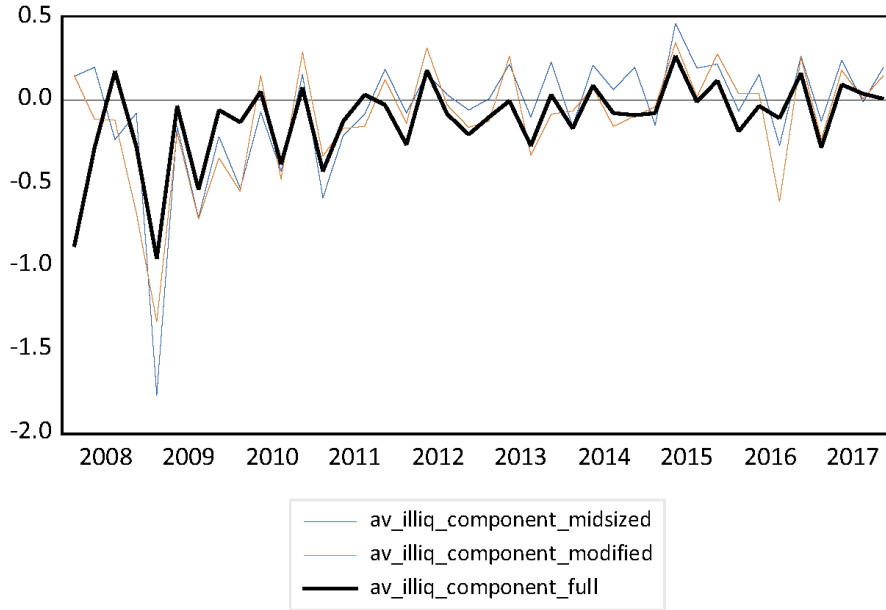


Figure B.4: Illiquidity Component of Fire-Sale Risk: By Bank Groups

The figure shows the changes in the illiquidity component of fire-sale risk by bank groups. Banks with assets greater than \$50 billion are required to implement the LCR; full LCR banks are internationally active or have assets exceeding \$250 billion; and modified LCR banks have assets between \$50 billion and \$250 billion. Midsized banks, with assets between \$3 billion and \$50 billion, are not subject to the LCR rule. The sample period is 2008 Q1 to 2017 Q4.



C. Section 5 of Paper

Table C.1: Liquid Assets and Liabilities Shares: LCR and Non-LCR Banks

Panel A of the table shows results from panel regressions of changes in high quality liquid assets (HQLA) and structured products, as shares of lagged assets. HQLA is an LCR-defined category and calculated based on LCR haircuts and caps. Level 1, 2A and 2B are HQLA liquidity categories, with Level 1 assets the most liquid and Level 2B assets the least. Panel B shows results for changes in liquid liabilities, as shares of lagged assets. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 and *2015 – 2017* is set equal to 1 from 2015 to 2017. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *Full-Bank* is set equal to 1 for LCR banks that are internationally active or have assets exceeding \$250 billion. The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 to 2017. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Liquid Assets					
	Δ Non-HQLA	Δ HQLA			
	(1)	(2)	(3)	(4)	(5)
	Structured Products	HQLA All	HQLA Level 1	HQLA Level 2a	HQLA Level 2b
Mod-Bank x 2013Q2-2014	-0.07 (-1.28)	0.97*** (3.80)	0.64*** (3.65)	0.21 (1.08)	0.06 (1.63)
Full-Bank x 2013Q2-2014	-0.49*** (-3.15)	0.81** (2.57)	0.59** (2.31)	0.28* (1.88)	0.08 (1.58)
Mod-Bank x 2015-2017	-0.03 (-0.67)	0.52*** (4.09)	0.32*** (2.92)	0.29** (2.19)	0.05 (1.24)
Full-Bank x 2015-2017	-0.39*** (-3.60)	0.51*** (2.74)	0.32** (2.00)	0.22 (1.34)	0.07 (1.10)
Bank F.E.	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.05	0.03	0.03	0.02	0.01
Observations	3920	3920	3920	3920	3920

Panel B: Liquid Liabilities				
	Δ Overnight Funding		Δ Deposits	
	(1)	(2)	(3)	(4)
	ON FedFunds	ON Repo	Insured Deposits	Core Deposits
Mod-Bank x 2013Q2-2014	-0.03 (-0.85)	-0.09 (-1.49)	-0.30 (-0.93)	-0.43 (-1.24)
Full-Bank x 2013Q2-2014	-0.04 (-1.58)	-0.39* (-1.96)	-0.34 (-0.97)	-0.65** (-2.01)
Mod-Bank x 2015-2017	-0.04* (-1.88)	0.10 (0.70)	-0.16 (-0.42)	-0.58 (-1.25)
Full-Bank x 2015-2017	-0.05*** (-3.23)	-0.16 (-1.40)	-0.42 (-1.15)	-0.66* (-1.95)
Bank F.E.	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes
Adj R^2	0.00	0.01	0.16	0.07
Observations	3920	3920	3920	3920

Table C.2: Regression Controls and Bank Loan Types: Descriptive Statistics

Panel A of the table shows descriptive statistics of the bank control variables used in the regressions. Panel B shows descriptive statistics of different types of bank loans. *Mod-Bank* are LCR banks with assets between \$50 billion and \$250 billion. *Full-Bank*, also subject to LCR, are internationally active or have assets exceeding \$250 billion. Midsized banks are not subject to LCR and have assets between \$3 billion and \$50 billion. Abbreviations used: C&I=Commercial & Industrial; CRE=Commercial real estate; RRE=Residential real estate.

Panel A: Controls							
Size Group	Period	Number of Banks	Assets (Billions)	Tier 1 Capital Ratio	Nonperforming Loans Share	Net Interest Margin	Core Deposits Share
All Banks	2009-2013Q1	109	117.69	13.58	3.48	0.87	60.95
	2013Q2-2014	109	125.28	13.68	1.70	0.83	66.63
	2015-2017	109	133.78	12.81	1.16	0.81	66.15
Full-Banks	2009-2013Q1	12	894.39	12.51	3.98	0.73	33.10
	2013Q2-2014	12	944.42	13.67	2.54	0.63	37.93
	2015-2017	12	984.05	14.02	1.88	0.62	38.87
Mod-Banks	2009-2013Q1	13	99.49	11.77	3.36	0.82	64.30
	2013Q2-2014	13	107.77	11.85	1.45	0.77	71.09
	2015-2017	13	125.04	11.87	1.17	0.73	69.89
Midsized Banks	2009-2013Q1	84	9.55	14.01	3.42	0.90	64.41
	2013Q2-2014	84	10.97	13.96	1.62	0.87	70.04
	2015-2017	84	13.66	12.78	1.06	0.85	69.46

Panel B: Loans								
Size Group	Period	All Loans	Comm. & Industrial	Small Business C&I	Comm. Real Estate	Res. Real Estate	Consumer Loans	Credit Card Loans
All Banks	2009-2013Q1	60.89	12.00	3.25	22.75	16.43	4.89	1.27
	2013Q2-2014	62.71	13.86	3.03	21.84	16.06	5.13	1.34
	2015-2017	64.60	14.46	2.82	23.22	15.38	5.43	1.31
Full-Banks	2009-2013Q1	42.88	7.17	0.84	4.67	12.51	11.54	7.45
	2013Q2-2014	42.56	8.14	0.75	4.14	10.70	10.73	7.26
	2015-2017	42.38	9.67	0.76	4.33	8.86	11.25	7.27
Mod-Banks	2009-2013Q1	66.83	16.98	2.31	18.30	19.71	6.42	0.48
	2013Q2-2014	67.63	20.54	2.01	14.64	18.82	6.76	0.60
	2015-2017	66.40	20.72	2.03	14.07	17.17	6.91	0.61
Midsized Banks	2009-2013Q1	62.54	11.91	3.74	26.02	16.49	3.70	0.51
	2013Q2-2014	64.83	13.64	3.51	25.49	16.39	4.08	0.61
	2015-2017	67.49	14.18	3.23	27.34	16.03	4.37	0.57

Table C.3: Changes in Bank Lending and LCR: Effect of Securitizations

The table shows results from estimating panel regressions (3) and (4) in the paper, where the outcome variable is the change in loans, divided by the prior quarter's total assets. *Securitization* is a dummy variable equal to 1 if a bank has positive securitization income and 0 otherwise. *LCR-Bank* is 1 for banks that were required to implement the LCR. *Mod-Bank* is 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is 1 for global systemically important banks. *Full-Bank* is 1 for LCR banks that are internationally active or have assets exceeding \$250 billion (excluding G-SIBs when the G-SIB dummy is included). The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. C&I=Commercial & Industrial.

	All Loans			C&I Loans			
	(1)	(2)	(3)	(4) All	(5) All	(6) Small Business	(7) Small Business
LCR Bank x 2013Q2-2014	-1.30*** (-3.73)						
Mod-Bank x 2013Q2-2014		-0.90** (-2.21)	-0.90** (-2.21)	-0.18 (-1.48)	-0.18 (-1.47)	-0.04* (-1.83)	-0.04* (-1.83)
Full-Bank x 2013Q2-2014		-1.74*** (-4.79)		-0.27** (-2.40)		-0.06*** (-2.90)	
Full (Non-GSIB) x 2013Q2-2014			-1.87*** (-3.54)		-0.23 (-1.64)		-0.06** (-2.37)
GSIB x 2013Q2-2014			-1.61*** (-5.15)		-0.31*** (-2.91)		-0.06*** (-2.94)
LCR Bank x 2015-2017	-1.48*** (-4.14)						
Mod-Bank x 2015-2017		-0.97** (-2.05)	-0.97** (-2.04)	-0.29** (-2.12)	-0.29** (-2.12)	-0.03 (-1.17)	-0.03 (-1.17)
Full-Bank x 2015-2017		-2.06*** (-6.03)		-0.19 (-1.48)		-0.07** (-2.31)	
Full (Non-GSIB) x 2015-2017			-2.34*** (-6.00)		-0.09 (-0.40)		-0.06 (-1.23)
GSIB x 2015-2017			-1.79*** (-4.27)		-0.29*** (-3.21)		-0.09*** (-3.34)
Lag Securitization Dummy	0.11 (0.24)	0.08 (0.18)	0.04 (0.10)	-0.14** (-2.42)	-0.13** (-2.16)	0.03 (0.95)	0.03 (1.01)
Lag Tier 1 Capital Ratio	0.23*** (3.64)	0.24*** (3.72)	0.24*** (3.71)	0.07*** (3.94)	0.07*** (3.93)	0.01* (1.98)	0.01* (1.98)
Lag Share Nonperforming Loans	-0.25*** (-3.49)	-0.25*** (-3.46)	-0.25*** (-3.48)	-0.05* (-1.97)	-0.05* (-1.96)	-0.00 (-0.71)	-0.00 (-0.70)
Lag Net Interest Margin	-0.89 (-1.35)	-0.90 (-1.37)	-0.92 (-1.39)	-0.01 (-0.06)	-0.01 (-0.04)	-0.15** (-2.30)	-0.15** (-2.27)
Lag Share Core Deposits	-0.01 (-0.79)	-0.01 (-0.83)	-0.01 (-0.85)	-0.00 (-0.53)	-0.00 (-0.50)	-0.00* (-1.85)	-0.00* (-1.83)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.06	0.06	0.05	0.05	0.02	0.02
Observations	3920	3920	3920	3920	3920	3379	3379

Table C.4: Changes in Mod- and Full-Bank Lending in 2013 and 2014

The table shows results from estimating panel regressions (3) and (4) but with the 2013Q2-2013Q4 dummy variable split into separate dummy variables 2013Q2-2013Q4 and 2014. The outcome variable is the change in loans, divided by the prior quarter's total assets. *Mod-Bank* is 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is 1 for global systemically important banks. *Full-Bank* is 1 for LCR banks that are internationally active or have assets exceeding \$250 billion (excluding G-SIBs when the G-SIB dummy is included). The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. C&I=Commercial & Industrial.

	(1) All Loans	(2) All C&I Loans	(3) Small Business C&I Loans	(4) All Loans	(5) All C&I Loans	(6) Small Business C&I Loans
	Without G-SIB			With G-SIB		
Mod-Bank x 2013Q2-2013Q4	-0.65 (-1.65)	-0.12 (-1.39)	-0.01 (-0.34)	-0.64 (-1.64)	-0.12 (-1.39)	-0.01 (-0.34)
Full-Bank x 2013Q2-2013Q4	-1.30*** (-3.78)	-0.16** (-2.25)	-0.02 (-0.63)			
Full (Non-GSIB) x 2013Q2-2013Q4				-1.56*** (-2.91)	-0.15 (-1.48)	-0.02 (-0.63)
GSIB x 2013Q2-2013Q4				1.01** (2.15)	0.27 (1.59)	0.07** (2.07)
Mod-Bank x 2014	-1.09** (-2.16)	-0.22 (-1.20)	-0.07** (-2.47)	-1.09** (-2.16)	-0.22 (-1.19)	-0.07** (-2.47)
Full-Bank x 2014	-2.08*** (-4.25)	-0.34* (-1.93)	-0.09*** (-3.37)			
Full (Non-GSIB) x 2014				-2.12*** (-3.34)	-0.25 (-1.25)	-0.09*** (-3.02)
GSIB x 2014				-2.05*** (-4.39)	-0.43** (-2.57)	-0.09*** (-3.42)
Mod-Bank x 2015-2017	-0.97** (-2.05)	-0.29** (-2.10)	-0.03 (-1.18)	-0.97** (-2.05)	-0.29** (-2.11)	-0.03 (-1.18)
Full-Bank x 2015-2017	-2.07*** (-5.89)	-0.18 (-1.39)	-0.07** (-2.25)			
Full (Non-GSIB) x 2015-2017				-2.35*** (-5.73)	-0.07 (-0.29)	-0.06 (-1.26)
GSIB x 2015-2017				-1.79*** (-4.34)	-0.30*** (-3.26)	-0.08*** (-3.11)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.05	0.02	0.06	0.05	0.02
Observations	3920	3920	3379	3920	3920	3379

Table C.5: Bank Lending Growth and LCR

The table shows results from estimating panel regressions (3) and (4) where the outcome variable is the loan growth, defined as $\ln(\frac{Loans_{i,t}}{Loans_{i,t-1}})$ for bank i in quarter t . *LCR-Bank* is 1 for banks that were required to implement the LCR. *Mod-Bank* is 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is 1 for global systemically important banks. *Full-Bank* is 1 for LCR banks that are internationally active or have assets exceeding \$250 billion (excluding G-SIBs when the G-SIB dummy is included). The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. t statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. C&I=Commercial & Industrial; Bus.=Business

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\Delta \text{Log}(\text{All Loans})$	$\Delta \text{Log}(\text{All Loans})$	$\Delta \text{Log}(\text{All C\&I Loans})$	$\Delta \text{Log}(\text{Small Bus. C\&I Loans})$	$\Delta \text{Log}(\text{All Loans})$	$\Delta \text{Log}(\text{All C\&I Loans})$	$\Delta \text{Log}(\text{Small Bus. C\&I Loans})$
	Without G-SIB Dummy Variable				With G-SIB Dummy Variable		
LCR Bank x 2013Q2-2014	-0.02*** (-3.15)						
Mod-Bank x 2013Q2-2014		-0.01** (-2.27)	-0.01* (-1.84)	-0.01 (-0.75)	-0.01** (-2.27)	-0.01* (-1.85)	-0.01 (-0.75)
Full-Bank x 2013Q2-2014		-0.02*** (-2.84)	-0.05 (-1.12)	-0.03 (-0.65)			
Full (Non-GSIB) x 2013Q2-2014					-0.02 (-1.57)	-0.07 (-0.90)	-0.07 (-0.79)
GSIB x 2013Q2-2014					-0.03*** (-3.01)	-0.02 (-1.07)	0.01 (0.75)
LCR Bank x 2015-2017	-0.02*** (-2.91)						
Mod-Bank x 2015-2017		-0.01 (-1.58)	-0.01 (-1.32)	0.01 (1.30)	-0.01 (-1.58)	-0.01 (-1.32)	0.01 (1.30)
Full-Bank x 2015-2017		-0.02*** (-3.03)	-0.05 (-1.32)	-0.05 (-0.87)			
Full (Non-GSIB) x 2015-2017					-0.02*** (-2.98)	-0.06 (-1.08)	-0.07 (-0.67)
GSIB x 2015-2017					-0.03* (-1.84)	-0.03 (-0.91)	-0.03 (-1.37)
Lag $\Delta \text{Log}(\text{Tier 1 Capital Ratio})$	0.04*** (3.40)	0.04*** (3.38)	0.06** (2.58)	0.04 (0.93)	0.04*** (3.37)	0.06** (2.61)	0.04 (0.95)
Lag $\Delta \text{Log}(\text{Nonperforming Loans})$	-0.00 (-0.88)	-0.01 (-0.94)	-0.02** (-2.10)	-0.01 (-0.66)	-0.01 (-0.93)	-0.02** (-2.11)	-0.01 (-0.67)
Lag $\Delta \text{Log}(\text{Net Interest Margin})$	0.01 (0.83)	0.01 (0.84)	0.03 (0.70)	-0.02 (-1.04)	0.01 (0.82)	0.03 (0.67)	-0.02 (-1.24)
Lag $\Delta \text{Log}(\text{Core Deposits})$	-0.01** (-2.02)	-0.01** (-2.07)	-0.01 (-0.63)	0.02 (0.31)	-0.01** (-2.02)	-0.01 (-0.64)	0.02 (0.28)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.06	0.01	0.00	0.06	0.01	0.00
Observations	3877	3877	3877	3349	3877	3877	3349

Table C.6: List of Early and Late Stress Test LCR Banks

The table lists, among LCR banks in our sample, those who participated in the Fed's stress tests before 2014 (denoted *early stress test*) and those who only participated since 2014 (denoted *late stress test*). LCR banks have assets of at least \$50 billion. The list is from Flannery, Hirtle and Kovner (2017).

Name	LCR Bank Type
American Express Company	Early Stress Test
Bank of America Corporation	Early Stress Test
BB&T Corporation	Early Stress Test
BBVA USA Bancshares, Inc.	Late Stress Test
BMO Financial Corporation	Late Stress Test
Capital One Financial Corporation	Early Stress Test
Citigroup Inc.	Early Stress Test
Citizens Financial Group, Inc.	Late Stress Test
Comerica Incorporated	Late Stress Test
Fifth Third Bancorp	Early Stress Test
The Goldman Sachs Group, Inc.	Early Stress Test
HSBC North America Holdings Inc.	Late Stress Test
Huntington Bancshares Incorporated	Late Stress Test
JPMorgan Chase & Co.	Early Stress Test
KeyCorp	Early Stress Test
M&T Bank Corporation	Late Stress Test
Morgan Stanley	Early Stress Test
MUFG Americas Holdings Corporation	Late Stress Test
Northern Trust Corporation	Late Stress Test
The PNC Financial Services Group, Inc.	Early Stress Test
Regions Financial Corporation	Early Stress Test
SunTrust Banks, Inc.	Early Stress Test
U.S. Bancorp	Early Stress Test
Wells Fargo & Company	Early Stress Test
Zions Bancorporation	Late Stress Test

Table C.7: Changes in Loan Amounts, Excluding Banks that Failed Stress Tests

The table shows results from panel regressions of changes in the book values of loans, as shares of lagged assets, after excluding domestic US banks that failed stress tests in various years (Zions, BB&T, Citibank, and Citizens Bank (see (Schneider, Strahan and Yang 2020))). *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *Full-Bank* is set equal to 1 for LCR banks that are internationally active or have assets exceeding \$250 billion. The omitted group is midsized non-LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. Abbreviations used: C&I=Commercial & Industrial

	All Loans		C&I Loans	
	(1)	(2)	(3) All	(4) Small Business
LCR Bank x 2013Q2-2014	-1.32*** (-3.63)			
Mod-Bank x 2013Q2-2014		-0.87* (-1.98)	-0.16 (-1.27)	-0.05* (-1.75)
Full-Bank x 2013Q2-2014		-1.74*** (-4.48)	-0.25** (-2.15)	-0.06*** (-2.72)
LCR Bank x 2015-2017	-1.58*** (-4.08)			
Mod-Bank x 2015-2017		-1.06* (-1.91)	-0.32* (-1.93)	-0.04 (-1.20)
Full-Bank x 2015-2017		-2.06*** (-5.60)	-0.16 (-1.16)	-0.07** (-2.10)
Bank F.E.	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.06	0.05	0.02
Observations	3776	3776	3776	3255

Table C.8: Changes in Loan Amounts: G-SIBs versus Other Large LCR Banks

The table shows results from panel regressions of changes in the book values of loans, as shares of lagged assets. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is set equal to 1 for global systemically important banks. *Full-Bank* is set equal to 1 for LCR banks that are internationally active or have assets exceeding \$250 billion, excluding G-SIBs. The omitted group is midsized non-LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *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)
	Δ All Loans	Δ RRE	Δ CRE	Δ Credit Card Loans	Δ Consumer Loans
Mod-Bank x 2013Q2-2014	-0.90** (-2.21)	-0.34*** (-2.71)	-0.41** (-2.27)	-0.00 (-0.19)	-0.01 (-0.17)
Full (Non-GSIB) x 2013Q2-2014 (α)	-1.88*** (-3.43)	-0.56** (-2.37)	-0.73*** (-4.52)	-0.20 (-0.64)	-0.23 (-0.92)
GSIB x 2013Q2-2014 (β)	-1.61*** (-5.21)	-0.26** (-2.41)	-0.68*** (-4.29)	-0.03 (-0.99)	-0.12*** (-2.85)
Mod-Bank x 2015-2017	-0.97** (-2.05)	-0.18 (-1.37)	-0.50*** (-2.63)	-0.01 (-0.45)	-0.01 (-0.07)
Full (Non-GSIB) x 2015-2017 (γ)	-2.34*** (-5.73)	-0.59*** (-3.16)	-1.09*** (-5.06)	-0.20 (-0.82)	-0.01 (-0.05)
GSIB x 2015-2017 (δ)	-1.79*** (-4.34)	-0.18 (-1.63)	-0.99*** (-3.58)	-0.04 (-1.22)	-0.16*** (-3.28)
Wald Test P-Value: $\alpha = \beta$	0.59	0.22	0.67	0.58	0.66
Wald Test P-Value: $\gamma = \delta$	0.22	0.03	0.73	0.49	0.47
Bank F.E.	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.02	0.06	0.02	0.04
Observations	3920	3920	3920	3920	3920

Table C.9: Changes in Loan Amounts, Excluding LISCC Banks

The table shows results from panel regressions of changes in the book values of loans, as shares of lagged assets, after excluding banks subject to the Large Institution Supervision Coordinating Committee (LISCC) supervisory program. The excluded banks are: Bank of America, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley and Wells Fargo (LISCC banks. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *Full-Bank* is set equal to 1 for LCR banks that are internationally active or have assets exceeding \$250 billion. The omitted group is midsized non-LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. Abbreviations used: C&I=Commercial & Industrial.

	All Loans		C&I Loans	
	(1)	(2)	(3) All	(4) Small Business
LCR Bank x 2013Q2-2014	-1.21*** (-3.11)			
Mod-Bank x 2013Q2-2014		-0.90** (-2.22)	-0.18 (-1.47)	-0.04* (-1.82)
Full-Bank x 2013Q2-2014		-1.88*** (-3.44)	-0.21 (-1.45)	-0.06** (-2.42)
LCR Bank x 2015-2017	-1.40*** (-3.40)			
Mod-Bank x 2015-2017		-0.97** (-2.04)	-0.29** (-2.11)	-0.03 (-1.19)
Full-Bank x 2015-2017		-2.36*** (-5.70)	-0.07 (-0.30)	-0.06 (-1.26)
Bank F.E.	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.06	0.05	0.02
Observations	3706	3706	3706	3193

Table C.10: Changes in Loan Amounts, Excluding the Event Quarter

The table shows results from panel regressions of changes in the book values of loans, as shares of lagged assets, after excluding the event quarter of 2013Q1. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is 1 for global systemically important banks. *Full-Bank* is 1 for LCR banks that are internationally active or have assets exceeding \$250 billion (excluding G-SIBs when the G-SIB dummy is included). The omitted group is midsized non-LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. Abbreviations used: C&I=Commercial & Industrial.

	All Loans			C&I Loans			
	(1)	(2)	(3)	(4) All	(5) All	(6) Small Business	(7) Small Business
LCR Bank x 2013Q2-2014	-1.33*** (-3.69)						
Mod-Bank x 2013Q2-2014		-0.91** (-2.17)	-0.91** (-2.17)	-0.18 (-1.44)	-0.18 (-1.44)	-0.05* (-1.95)	-0.05* (-1.95)
Full-Bank x 2013Q2-2014		-1.79*** (-4.57)		-0.27** (-2.35)		-0.06*** (-2.92)	
Full (Non-GSIB) x 2013Q2-2014			-1.96*** (-3.29)		-0.21 (-1.44)		-0.06** (-2.38)
GSIB x 2013Q2-2014			-1.62*** (-5.23)		-0.33*** (-3.21)		-0.06*** (-2.96)
LCR Bank x 2015-2017	-1.51*** (-4.08)						
Mod-Bank x 2015-2017		-0.98** (-2.02)	-0.98** (-2.02)	-0.29** (-2.09)	-0.29** (-2.09)	-0.03 (-1.40)	-0.03 (-1.40)
Full-Bank x 2015-2017		-2.12*** (-5.75)		-0.19 (-1.45)		-0.07** (-2.32)	
Full (Non-GSIB) x 2015-2017			-2.43*** (-5.44)		-0.07 (-0.31)		-0.06 (-1.23)
GSIB x 2015-2017			-1.80*** (-4.32)		-0.31*** (-3.35)		-0.08*** (-3.43)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.06	0.06	0.06	0.05	0.05	0.02	0.02
Observations	3811	3811	3811	3811	3811	3270	3270

D Section 5.7 of Paper

D.1 Berger-Bouwman Liquidity Creation Measure

A generic liquidity creation measure LC is the sum of liquidity-weighted assets and liquidity-weighted liabilities. For bank i and quarter t , assets A_j and liabilities L_k , we define:

$$LC_{i,t} = \sum_{j=1}^m \lambda_{a,jt}^{LC} A_{ijt} + \sum_{k=1}^n \lambda_{l,kt}^{LC} L_{ikt} \quad (1)$$

Our liquidity creation measure BB is taken from Berger and Bouwman (2009) and is equal to liquidity-weighted liabilities plus liquidity-weighted assets. Assets and liabilities are categorized as illiquid, semi-liquid or liquid and assigned fixed weights. Initially, we only use on-balance-sheet items (called “catnonfat” in Berger and Bouwman (2009)). To compare across bank size groups, we divide the change in BB by lagged assets and denote it BBN .

We use the measure developed in Berger and Bouwman (2009), denoted BB . For bank i and quarter t , it is defined as:

$$BB_{i,t} = \sum_{j=1}^m \lambda_{a,j}^{BB} A_{ijt} + \sum_{k=1}^n \lambda_{l,k}^{BB} L_{ikt} = BBA_{i,t} + BBL_{i,t} \quad (2)$$

where $\lambda_{a,j}^{BB}$ and $\lambda_{l,k}^{BB}$ are the weights for asset item A_j and liability item L_k , respectively. The weights are fixed over time at pre-assigned values with illiquid assets and liquid liabilities receiving $+\frac{1}{2}$, liquid assets and illiquid liabilities receiving $-\frac{1}{2}$, and semi-liquid items receiving zero weight.⁵ Thus, more liquid liabilities and more illiquid assets imply greater liquidity creation. We calculate the on-balance sheet version of BB (denoted *catnonfat* in Berger and Bouwman (2009)) using the liquidity categories and weights from Table 1 of Berger and Bouwman (2009), as shown in Table D.1.

To compare BB across banks in different size groups, we divide the change in BB by lagged assets:

$$BBN_{i,t} = \frac{BB_{i,t} - BB_{i,t-1}}{A_{i,t-1}} \quad (3)$$

For a bank group k , we first calculate $BBN_{k,i}$ for bank i and then obtain the group mean:

$$BBN_{k,t} = \frac{\sum_{i=1}^n BBN_{k,i,t}}{n} \quad (4)$$

⁵The liquidity categories are determined by the ease, cost and time to liquidate assets or obtain funds (Berger and Bouwman (2009)). For example, shorter-maturity liabilities and easier-to-securitize assets are considered liquid.

Table D.1: Liquidity Categories

For each liquidity category in Berger and Bouwman (2009) (*BB* category), the table shows the included assets and liabilities from the Y9-C data. Also shown are off-balance sheet liability items. Abbreviation used: ON=overnight.

Assets	Y9-C Asset Item
Illiquid Assets	Other Real Estate owned, Customers' liab. on acceptances, Inv. in subsidiaries, Premises Direct and indirect investments in real estate ventures Intangible & Other Loans: Commercial & Industrial, Commercial Real Estate, Agricultural, Other, Lease Financing
Semi-liquid Assets	Loans: Residential Real Estate, Consumer, To Depository Institutions, To Foreign Govts.
Liquid Assets	Cash/Balances due from Dep. Institutions Fed Funds Sold Treasury Securities Government Agency Debt and MBS GSE Debt and MBS Municipal Securities Equity Securities Other Domestic Debt Structured Products (incl. non-agency MBS)
Liabilities	Y-9C Liability Item
Liquid Liabilities	ON Fed. Funds. Purchased ON Repo sold Trading Liabilities Transaction Deposits Savings Deposits
Semi-Liquid Liabilities	Time Deposits Other Borrowed Money
Illiquid Liabilities	Subordinated Debt and Trust Preferred Securities Other Liabilities Equity
Off-balance Sheet Liabilities	Unused Commitments Standby Letters of Credit Securities Lent Net Derivatives

Table D.2: Descriptive Statistics of Liquidity Creation

The table shows the means of on-balance sheet assets of banks. BB is the on-balance sheet liquidity creation measure *cat nonfat* (Berger and Bouwman (2009)). BBN is BB divided by total assets. $BBNA$ and $BBNL$ are the asset- and liability-side components of BBN . High Quality Liquid Assets (HQLA) is an LCR-defined asset category. *Mod-Bank* are LCR banks with assets between \$50 billion and \$250 billion. *Full-Bank*, also subject to LCR, are internationally active or have assets exceeding \$250 billion. Midsized banks are not subject to LCR and have assets between \$3 billion and \$50 billion.

Liquidity Creation Summary							
Size Group	Period	Number of Banks	Assets (Billions)	BB (Billions)	BBN Share	BBNA Share	BBNL Share
All Banks	2009-2013Q1	109	117.69	6.43	29.12	8.35	20.76
	2013Q2-2014	109	125.28	10.33	34.20	9.57	24.63
	2015-2017	109	133.78	14.52	36.89	11.32	25.57
Full-Banks	2009-2013Q1	12	894.39	0.16	2.31	-8.56	10.87
	2013Q2-2014	12	944.42	19.49	4.35	-8.90	13.25
	2015-2017	12	984.05	38.68	4.11	-9.03	13.14
Mod-Banks	2009-2013Q1	13	99.49	34.21	36.15	15.29	20.85
	2013Q2-2014	13	107.77	42.17	40.71	14.68	26.03
	2015-2017	13	125.04	49.57	40.68	13.66	27.01
Midsized Banks	2009-2013Q1	84	9.55	3.03	31.86	9.69	22.16
	2013Q2-2014	84	10.97	4.10	37.46	11.42	26.04
	2015-2017	84	13.66	5.64	40.99	13.87	27.12

Figure D.1: Liquid and Illiquid Assets and Liabilities, as Shares of Bank Assets: LCR and non-LCR Banks

The figures show the changes in 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 D.1. Semi-liquid assets and liabilities are not shown. Banks with assets greater than \$50 billion are required to implement the LCR; full LCR banks are internationally active or have assets exceeding \$250 billion; and modified LCR banks have assets between \$50 billion and \$250 billion. Midsized banks, with assets between \$3 billion and \$50 billion, are not subject to the LCR rule. The sample period is 2009 Q1 to 2017 Q4.

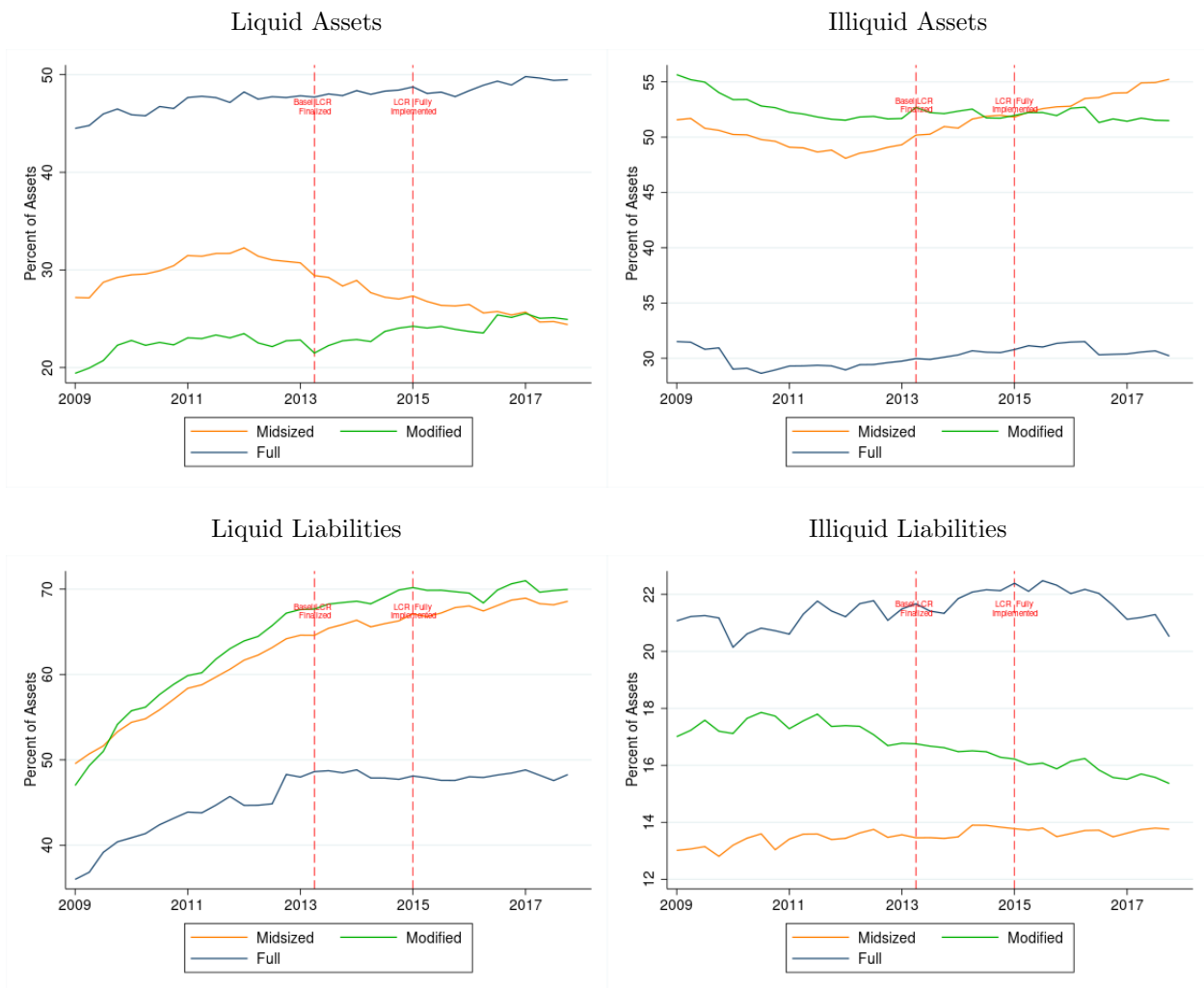
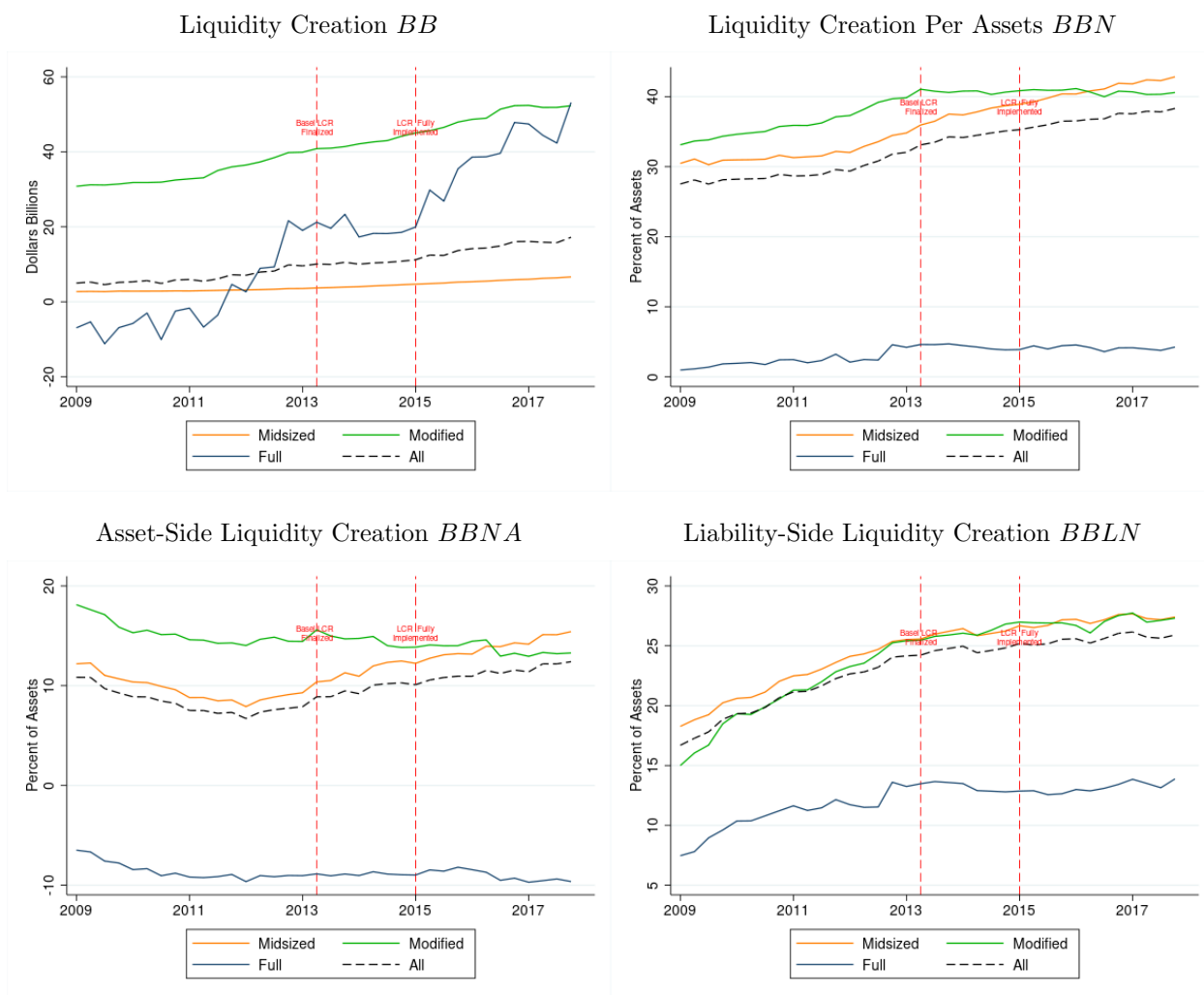


Figure D.2: Liquidity Creation by LCR and Non-LCR Banks

The figure plots BB , the liquidity creation measure of Berger and Bouwman (2009), and $BBN = BB/Totalassets$, averaged over all banks (dashed line) or over banks in different size groups (solid lines). The bottom panel plots BBN 's asset- and liability-side components $BBNA$ and $BBNL$, respectively. Banks with assets exceeding \$50 billion are required to implement the LCR rule. Full-banks are internationally active or have assets exceeding \$250 billion. Mod-banks have assets between \$50 billion and \$250 billion, which we have divided further into those with assets \$50-100 billion and \$100-250 billion. BB is calculated using on-balance-sheet items only. Midsized banks have assets between \$3 billion and \$50 billion and are not subject to the LCR rule. The sample period is 2009 Q1 to 2017 Q4.



D.2 Off-Balance Sheet Liabilities

We consider off-balance sheet (OBS) liabilities (unused commitments, letters of credit, securities lent and liquid derivatives). As LCR outflow rates are close to 100% for most OBS liabilities (Panel B of Table A.1 in this appendix), including them might result in a larger decline in *BBNL*. We find that, while shares of some OBS items are higher and others are lower for LCR banks relative to non-LCR banks, the relative OBS share of LCR banks is mostly unchanged (see Table D.4). After including OBS liabilities, *BBN* is significantly lower for LCR banks (see Table D.5). Thus, consistent with a weaker effect of LCR on liability-side liquidity creation, when we include OBS liabilities, our results remain unaffected.

Table D.4: Off-Balance Sheet Liabilities: LCR and non-LCR Banks

The table shows results from panel regressions of changes in off-balance sheet liabilities, as shares of total assets. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is set equal to 1 for global systemically important banks. *Full-Bank* is set equal to 1 for LCR banks that are internationally active or have assets exceeding \$250 billion (excluding G-SIBs). The omitted group is mid-sized non-LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

D.8

	(1)	(2)	(3)	(4)	(5)
	All	Unused Commitments	Standby Letters of Credit	Securities Lent	Liquid Derivatives
Mod-Bank x 2013Q2-2014	0.39 (1.59)	0.20 (1.34)	0.08 (0.58)	0.05 (0.75)	0.05 (0.86)
Full (Non-GSIB) x 2013Q2-2014	0.29 (0.30)	-0.22 (-0.29)	-0.07** (-2.53)	0.51 (1.19)	0.07 (0.37)
GSIB x 2013Q2-2014	2.28 (1.04)	0.14 (0.39)	-0.03 (-0.24)	-0.07 (-0.53)	2.25 (0.95)
Mod-Bank x 2015-2017	-0.21 (-0.76)	-0.08 (-0.35)	-0.17 (-1.37)	0.01 (0.22)	0.04 (0.59)
Full (Non-GSIB) x 2015-2017	-0.20 (-0.35)	-0.81** (-2.09)	-0.08*** (-4.05)	0.61 (1.21)	0.08 (0.81)
GSIB x 2015-2017	-2.56*** (-3.51)	0.21 (0.75)	-0.12 (-0.96)	-0.06 (-0.72)	-2.58*** (-2.75)
Bank F.E.	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.05	0.05	0.01	0.01	0.04
Observations	3920	3920	3918	3918	3920

Table D.5: Liquidity Creation, Including Off-Balance Sheet Liabilities: by LCR and Non-LCR Banks

The table shows results from panel regressions of changes in BBN , equal to BB divided by total assets. BB is the liquidity creation measure developed in Berger and Bouwman (2009), calculated using both on- and off-balance sheet items. $Post-LCR$ is set equal to 1 from 2013 Q2 to 2017 Q4. $2013Q2-2014$ is set equal to 1 from 2013 Q2 to 2014 Q4 and $2015-2017$ is set equal to 1 from 2015 Q1 to 2017 Q4; $LCR-Bank$ is set equal to 1 for banks that had to implement the LCR rule. The omitted group is mid-sized non- LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. t statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Post- LCR	0.93*** (5.01)			
2013Q2-2014			0.98*** (4.46)	
2015-2017			0.89*** (4.46)	
LCR Bank	0.36 (1.46)			
LCR Bank x Post- LCR	-1.03*** (-3.91)	-1.23*** (-4.47)		
LCR Bank x 2013Q2-2014			-1.25*** (-3.05)	-1.34*** (-3.22)
LCR Bank x 2015-2017			-0.90*** (-2.65)	-1.17*** (-3.24)
Lag Tier 1 Capital Ratio	0.10*** (2.94)	0.22*** (4.90)	0.10*** (2.90)	0.22*** (4.86)
Lag Share Nonperforming Loans	-0.14*** (-4.01)	-0.17*** (-2.64)	-0.14*** (-3.95)	-0.17*** (-2.64)
Lag Net Interest Margin	0.13 (0.29)	-1.19* (-1.76)	0.13 (0.29)	-1.19* (-1.75)
Lag Core Deposits	-0.01 (-0.93)	-0.04*** (-3.24)	-0.01 (-0.78)	-0.04*** (-3.27)
Bank F.E.	No	Yes	No	Yes
Time F.E.	No	Yes	No	Yes
Bank Controls	Yes	Yes	Yes	Yes
Adj R^2	0.02	0.05	0.02	0.05
Observations	3920	3920	3920	3920

E. Section 6 of Paper

Table E.1: Changes in Loans, Using Shorter Sample of Lending Standards and Terms

The table shows results from panel regressions of changes in loans, as shares of total assets, using the sample available for loan standards and terms. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *LCR-Bank* is set equal to 1 for banks that had to implement the LCR. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. *G-SIB* is set equal to one for global systemically important banks. *Full-Bank* is set equal to 1 for LCR banks that are internationally active or have assets exceeding \$250 billion, excluding G-SIBs. The omitted group is midsized non-LCR banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively. Abbreviations used: C&I=Commercial and Industrial.

	All Loans			C&I Loans			
	(1)	(2)	(3)	(4) All	(5) All	(6) Small Business	(7) Small Business
LCR Bank x 2013Q2-2014	-1.19** (-2.50)						
Mod-Bank x 2013Q2-2014		-0.98* (-1.96)	-0.98* (-1.96)	-0.22** (-2.06)	-0.22** (-2.05)	-0.07** (-2.43)	-0.07** (-2.42)
Full-Bank x 2013Q2-2014		-1.39** (-2.59)		-0.23* (-2.02)		-0.08*** (-3.14)	
Full (Non-GSIB) x 2013Q2-2014			-1.40* (-1.73)		-0.11 (-0.78)		-0.08** (-2.59)
GSIB x 2013Q2-2014			-1.37*** (-3.23)		-0.32*** (-3.08)		-0.08*** (-3.47)
LCR Bank x 2015-2017	-1.15** (-2.34)						
Mod-Bank x 2015-2017		-0.87 (-1.55)	-0.86 (-1.54)	-0.27 (-1.55)	-0.27 (-1.54)	-0.04 (-1.61)	-0.04 (-1.62)
Full-Bank x 2015-2017		-1.48*** (-2.95)		-0.18 (-1.42)		-0.07 (-1.47)	
Full (Non-GSIB) x 2015-2017			-1.84*** (-3.32)		-0.24* (-1.77)		-0.05 (-0.70)
GSIB x 2015-2017			-1.18** (-2.55)		-0.12 (-0.84)		-0.09** (-2.52)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.10	0.10	0.10	0.20	0.20	0.03	0.03
Observations	1079	1079	1079	1079	1079	930	930

Table E.2: C&I Lending Standards and Terms, Loan Demand, Risk Aversion and Macro Conditions

The table shows regressions of changes in standards or terms of loans to large and small firms on loan demand, macro and financial conditions, and financial risk measures. The sample period is 2009 Q1 to 2017 Q4. t statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	Standards	
	(1) Small	(2) Large
Lagged Dependent Variable	0.28*** (6.10)	0.32*** (6.92)
Lag Δ Loan Demand	-0.03 (-0.70)	-0.04 (-1.23)
lag_core_loans_perca	-0.00 (-0.18)	-0.00 (-0.36)
lag_loan_loss_prov_perca	0.21** (2.58)	0.26* (1.87)
Lag GDP Expectation	-0.06 (-1.30)	-0.14* (-1.79)
Lag Unemployment Expectation	0.13 (1.28)	0.16 (1.37)
Lag TBill Expectation	0.15** (2.18)	0.21** (2.57)
Lag TBond Expectation	0.13 (0.76)	0.26 (1.67)
lag_gdp	-0.00 (-1.54)	-0.00 (-0.37)
lag_unemployment	-0.12** (-2.28)	-0.07 (-1.41)
Lag Δ FedFunds Rate	-0.16 (-0.95)	-0.34 (-1.62)
Lag Δ VIX	-0.00 (-0.60)	-0.01* (-1.76)
Constant	3.46 (1.49)	0.97 (0.42)
Bank F.E.	Yes	Yes
Time F.E.	No	No
Bank Controls	Yes	Yes
Adj R^2	0.35	0.33
Observations	1006	1079

Table E.3: Changes in Lending Standards or Terms Related to Regulation: Placebo Test

The table shows, for large and small firms, results from a multinomial logistic regression of *RegTight* on *CapReg*, *LCR-Bank* and *CapReg * LCR-Bank* with *RegTight* = 1 as the reference category, along with bank controls. *RegTight* is coded as -1 when standards or terms are looser, 0 when there is no change, 1 when tighter for non-regulatory reasons and 2 when tighter due to regulatory or supervisory concerns. *CapReg* is set equal to 1 from 2011 to 2012. *LCR-Bank* is set equal to 1 for banks that had to implement the LCR. The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. Panel A shows coefficient estimates when banks choose category “2” versus “1.” Estimates for “0” versus “1” and “-1” versus “1” are not shown. The likelihood ratio is a test of whether all regression coefficients are simultaneously zero. Panel B shows estimated odds ratios of citing regulations as a reason for tightening standards or terms for LCR versus non-LCR banks and pre-CapReg versus CapReg periods. The sample period is 2009 Q1 to 2017 Q4.

Panel A: Multinomial Logistics Estimates						
	Large Firms			Small Firms		
	Estimate	Chi-Square	Prob>Chi-Square	Estimate	Chi-Square	Prob>Chi-Square
	(1)	(2)	(3)	(4)	(5)	(6)
LCR bank*Post-Capreg	-1.18	1.17	0.28	-2.86**	4.11	0.04
Post-Capreg	1.52	2.60	0.11	0.81	0.87	0.35
LCR bank	0.05	0.01	0.92	0.24	0.19	0.66
Likelihood Ratio		143.56***	0.00		127.60***	0.00
Bank Controls?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,442	1,442	1,442	1,395	1,395	1,395

Panel B: Odds-Ratio Estimates and Wald Confidence Intervals							
	Large Firms			Small Firms			
Odds Ratio of Citing regulation	Estimate	95% Confidence Intervals		Estimate	95% Confidence Intervals		
	(1)	(2)	(3)	(4)	(5)	(6)	
Capreg=1: LCR vs non-LCR bank	0.32	0.04	2.52	0.07	0.01	1.10	
Capreg=0: LCR vs non-LCR bank	1.05	0.41	2.65	1.27	0.43	3.81	
<i>LCR-Bank</i> = 0 Post-Capreg vs Pre-Capreg	4.59	0.72	29.24	2.25	0.41	12.36	
<i>LCR-Bank</i> = 1 Post-Capreg vs Pre-Capreg	1.41	0.46	4.33	0.13	0.01	1.24	

F Section 8 of Paper

F.1 Estimating Net Benefits from LCR

The net benefits from LCR equal the reduction in banks' contributions to fire-sale losses minus the costs from reduced bank lending:

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

where $g=LCR, Full, Mod$ is the LCR bank group and $p=2013Q2-2017$ or sub-periods thereof. The estimated $\Delta(IlliquidityComponent)$ is from columns 3-4 of Table 7. Since the illiquidity component is unitless, we scale this estimate by the post-LCR mean ratio of firesale losses to the illiquidity component for banks in group g and period p to convert to dollars.

The costs from reduced lending are denoted as *LoanLoss*. We approximate these costs using banks' private losses (equal to the foregone income from lower lending) 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. The foregone loan income of LCR banks is then obtained by multiplying this pre-LCR ratio by the estimated reduction in lending 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."⁶ The estimated $\Delta(Loans/Assets)$ is obtained from specifications similar to those in columns 1 and 2 of Table 2 in the text, except that we do not split up the mod-banks (see Table F.2 in this appendix). We multiply by the average post-LCR assets to obtain the total reduction in lending in dollars.

⁶These 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 are some outliers, we winsorize the distribution of *Tax* to the interval [22%, 38%].

To obtain net benefits as a share of total assets, we divide the estimated net benefits in dollars from (1) by the post-LCR mean of total assets of the relevant banking group.

$$\left(\frac{NetBenefit}{Assets}\right)_{g,p} = \frac{NetBenefit_{g,p}}{Mean(Assets)_{g,p}} \quad (3)$$

Table F.1 reports the inputs used to estimate (2). For full-banks in the pre-LCR period, the average (NII-LLP)/Loan is 94 bp before tax and 68 bp after tax.

Table F.1: Inputs into Calculating Net Benefits

Panel A of the table shows the inputs to 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. Panel B reports the ratio of fire-sale risk to its illiquidity component, which we use to scale the benefits.

Panel A: Mean, Pre-LCR Period					
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)
All Banks	0.44	0.31	49.61	88	63
LCR Banks	1.90	1.36	216.30	88	63
Full-Banks	3.98	2.86	433.18	92	66
Mod-Banks	0.45	0.33	66.15	68	49

Panel B: Mean, Post-LCR Period				
Group	Period	Assets (\$Billions)	$\frac{Firesale\ Risk\ (\$Billions)}{Illiquidity\ Component}$	
All Banks	Post-LCR	116.68	0.15	
LCR Banks	Post-LCR	513.82	0.66	
All Banks	2013Q2-2014	111.19	0.15	
LCR Banks	2013Q2-2014	493.83	0.67	
Full-Banks	2013Q2-2014	1051.48	1.45	
Mod-Banks	2013Q2-2014	107.77	0.13	
All Banks	2015-2017	119.89	0.15	
LCR Banks	2015-2017	525.47	0.66	
Full-Banks	2015-2017	1103.87	1.39	
Mod-Banks	2015-2017	125.04	0.16	

Table F.2: Changes in Bank Lending and LCR: Inputs Into Net Benefit Calculations

The table shows results from panel regressions of changes in total loans, as shares of total assets. *Post-LCR* is set equal to 1 from 2013 Q2 to 2017 Q4. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. *LCR-Bank* is set equal to 1 for banks that had to implement the LCR rule. *Mod-Bank* is set equal to 1 for LCR banks with assets between \$50 billion and \$250 billion. The omitted group is midsized banks, which have assets between \$3 billion and \$50 billion. The sample period is 2009 Q1 to 2017 Q4. Standard errors are clustered at the bank-level. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)
Mod-Bank x 2013Q2-2014	-0.90** (-2.21)	
Full-Bank x 2013Q2-2014	-1.74*** (-4.69)	
Mod-Bank x 2015-2017	-0.97** (-2.05)	
Full-Bank x 2015-2017	-2.07*** (-5.89)	
LCR Bank x Post-LCR		-1.41*** (-4.52)
Bank F.E.	Yes	Yes
Time F.E.	Yes	Yes
Bank Controls	Yes	Yes
Adj R^2	0.06	0.06
Observations	3920	3920

G Section 7.3 of Paper

G.1 Aggregate Lending and Fire-Sale Risk in the Banking Sector Following LCR

In this section, we examine the degree to which shifts in lending and liquidity creation from covered banks to non-LCR banks mitigate the effects of LCR on aggregate lending, liquidity creation, and fire-sale risk. We then quantify the net benefits from LCR for the banking sector as a whole in section G.2. We account for broad financial conditions by including lagged values of the Chicago Fed’s National Financial Conditions Index (NFCI) with a higher value of NFCI indicating tighter financial conditions.⁷ To further isolate LCR effects in the time-series, we include a dummy variable for the pre-LCR capital regulation period of 2011-2012 in the regressions.

The descriptive statistics show that the loan share, averaged over all sample banks, increases after LCR (Panel A of Table 1). To consider this result more formally, we report results from regressing changes in a bank’s total loans, as a share of its assets, on our time dummies, bank controls and bank fixed effects (columns 1-4 of Table G.1). The coefficient on *Post-LCR* is positive and significant, implying an increase in the lending share of about 81 basis points per bank-quarter since 2013Q2 (column 1). When the lagged NFCI is included, its coefficient is negative and significant, indicating that looser financial conditions are associated with greater lending. However, the coefficient on *Post-LCR* remains positive and significant (column 2). The change in lending is positive and significant in both 2013Q2-2014 and 2015-2017 (column 4). As a robustness check, we report in columns 5-8 results from time-series regressions of changes in loan shares, averaged over all sample banks. The reported standard errors are Newey-West with four lags. With only 36 observations, we find similar qualitative results but the estimates are mostly not significant. For example, the average loan share increases by 31 basis points per quarter but the estimate is insignificant when NFCI is included (column 6). These results show that lending migrated from regulated to midsized banks as the aggregate lending share does not fall after LCR while lending shares of LCR banks decline significantly.

Could capital regulations be driving these changes in lending? Empirical evidence on the effects of capital regulations on lending in the US is mixed (Bouwman (2018)). To examine this issue, we add the capital regulation dummy 2011 – 2012 to the regressions and find that its estimate is positive and significant (see Table G.2) but the coefficient on *Post-LCR* remains significant and positive. Thus, the bank lending share seems to have recovered after

⁷NFCI is a financial indicator for risk, credit and leverage (see <https://www.chicagofed.org/research/data/nfci/background>).

the GFC and then increased further post-LCR as non-LCR banks gained market share.

Since post-LCR changes in liquidity creation mainly occur on the asset side and total bank lending increases, aggregate asset-side liquidity creation $BBNA$ in the banking sector may also increase after LCR. Indeed, the average $BBNA$ of all banks increases post-LCR (bottom panel of Figure D.2), and regression results indicate that this increase is significant (see column 5 of Table G.3). Overall liquidity creation also increases significantly (column 2) while liability-side liquidity creation is unchanged (column 8). The results are robust to including NFCI. $BBNA$ also increases significantly in time-series regressions (column 5 of Table G.4). Hence, as with lending, asset-side liquidity creation migrates from regulated banks to smaller banks – a reversal of their historic roles (Berger and Bouwman (2009)). When included in the regressions, the 2011 – 2012 dummy has an insignificant effect on both $BBNA$ and $BBNL$ (see Table G.5), indicating that asset-side liquidity creation only increases after LCR.

Does the shift in lending and asset-side liquidity creation to smaller banks enhance financial stability in the banking sector, as conjectured by Cortes, Demyanyk, Li, Loutskina and Strahan (2020) in the context of small business lending? We focus on the illiquidity component of aggregate fire-sale risk as there is greater concentration of illiquid assets in smaller banks after LCR. Panel A of Table G.6 shows results from panel regressions of changes in fire-sale risk (as a share of assets) and its illiquidity component across the entire banking sector. Aggregate fire-sale risk increases both in the entire post-LCR period and its sub-periods even after including NFCI (columns 2 and 4). The illiquidity component is also significantly higher in the post-LCR period without including NFCI (column 5) but the estimate becomes insignificant after including NFCI in the entire post-LCR period (column 6) as well as in each of the sub-periods (column 8). Since changes in NFCI are negative and significant, the increase in the illiquidity component (absent NFCI) likely reflects looser financial conditions associated with greater aggregate lending. Panel B shows results from time-series regressions. As in the panel regressions, changes in the illiquidity component are insignificant after including NFCI (column 8). Hence, the reallocation of lending to smaller banks does not improve financial stability, contrary to the conjecture by Cortes et al. (2020).

G.2 Net Benefits for the Banking Sector Following LCR

The net benefits are calculated based on the panel regression results for lending and fire-sale risk. Following the procedure outlined in section F.1 of the appendix, the costs are obtained as foregone lending opportunities (using results in columns 2 and 4 of Table G.2) and the benefits are obtained using the illiquidity coefficients from columns 6 and 8 of Panel A of

Table G.6, scaled to convert to dollars of fire-sale risk. As shown in columns 2 and 3 of Panel A of Table G.7, benefits are positive due to lower illiquidity concentrations (except during 2015-2017) while costs are negative due to more lending post-LCR. The net benefit is thus positive but insignificant (column 4 and last column). The results are robust to adjustments for corporate taxes (Panel B).

Table G.1: Changes in Aggregate Lending in the Banking Sector

The table shows results from regressions of changes in total loans as a share of total assets. Columns 1-4 report bank-quarter regressions and columns 5-8 report time series regressions. *Post-LCR* is set equal to 1 from 2013 Q2 to 2017 Q4. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. The sample period is 2009 Q1 to 2017 Q4 and the regressions use 3,916 observations. The Chicago Fed’s National Financial Conditions Index (NFCI) accounts for changes in financial conditions. Standard errors in columns 1-4 are two-way clustered by bank and quarter; standard errors in columns 5-8 are Newey-West with four lags. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	Panel Regressions				Time Series Regressions			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-LCR	0.81*** (3.11)	0.65** (2.18)			0.56* (2.03)	0.31 (0.95)		
2013Q2-2014			0.86** (2.43)	0.67* (1.75)			0.58** (2.20)	0.40 (0.78)
2015-2017			0.78*** (2.80)	0.63** (2.04)			0.82 (1.63)	0.54 (0.56)
Lag NFCI		-0.27** (-2.59)		-0.27** (-2.54)		-0.24 (-1.55)		-0.17 (-0.52)
Bank F.E.	Yes	Yes	Yes	Yes	N/A	N/A	N/A	N/A
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3920	3920	3920	3920	36	36	36	36

Table G.2: Changes in Aggregate Lending in the Banking Sector: Accounting for Capital Regulations

The table shows results from panel regressions of changes in total loans, as shares of lagged assets. The capital regulation period dummy variable *2011-2012* is set equal to 1 from 2011 Q1 to 2012 Q4. *Post-LCR* is set equal to 1 from 2013 Q2 to 2017 Q4. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4; The Chicago Fed’s National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values imply tighter financial conditions. The sample period is 2009 Q1 to 2017 Q4. Standard errors are two-way clustered by bank and quarter. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively

	(1)	(2)	(3)	(4)
2011-2012	0.75*** (3.01)	0.68** (2.72)	0.75*** (3.05)	0.68*** (2.83)
Post-LCR	1.25*** (5.22)	1.14*** (4.21)		
2013Q2-2014			1.31*** (4.16)	1.19*** (3.52)
2015-2017			1.21*** (4.32)	1.11*** (3.62)
Lag NFCI		-0.11 (-1.40)		-0.11 (-1.38)
Bank F.E.	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes
Adj R^2	0.08	0.08	0.08	0.08
Observations	3920	3920	3920	3920

Table G.3: Changes in Liquidity Creation in the Banking Sector: Bank-Quarter Regressions

The table shows results from panel regressions for changes in *BBN*, its asset-side component *BBNA* and its liability-side component *BBNL*. *BBN* is equal to the on-balance sheet liquidity creation measure *cat nonfat* (Berger and Bouwman (2009)) divided by total assets. *Post-LCR* is set equal to 1 from 2013 Q2 to 2017 Q4. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. The Chicago Fed’s National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values imply tighter financial conditions. The sample period is 2009 Q1 to 2017 Q4. Standard errors are two-way clustered by bank and quarter. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	BBN	BBN	BBN	BBNA	BBNA	BBNA	BBNL	BBNL	BBNL
Post-LCR	0.49** (2.71)	0.37* (1.79)		0.46*** (2.80)	0.35* (1.85)		0.04 (0.24)	0.03 (0.15)	
2013Q2-2014			0.40 (1.64)			0.42 (1.54)			-0.02 (-0.10)
2015-2017			0.35 (1.65)			0.29 (1.66)			0.06 (0.30)
Lag NFCI		-0.20** (-2.16)	-0.20** (-2.13)		-0.18* (-1.70)	-0.18 (-1.66)		-0.02 (-0.30)	-0.02 (-0.36)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.07	0.07	0.07	0.05	0.05	0.06	0.04	0.04	0.04
Observations	3920	3920	3920	3920	3920	3920	3920	3920	3920

Table G.4: Changes in Liquidity Creation in the Banking Sector: Time-Series Regressions

The table shows results from time-series regressions for changes in *BBN*, its asset-side component *BBNA* and liability-side component *BBNL*. *BBN* is equal to the on-balance-sheet liquidity creation measure *cat nonfat* (Berger and Bouwman (2009)) divided by total assets. *Post-LCR* is set equal to 1 from 2013 Q2 to 2017 Q4. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. The Chicago Fed’s National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values imply tighter financial conditions. The sample period is 2009 Q1 to 2017 Q4 and the regressions use 36 observations. Standard errors are Newey-West with four lags. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	BBN	BBN	BBN	BBNA	BBNA	BBNA	BBNL	BBNL	BBNL
Post-LCR	0.29 (1.51)	0.20 (0.83)		0.47*** (3.14)	0.36* (1.85)		-0.18 (-0.95)	-0.16 (-0.67)	
2013Q2-2014			0.32 (0.99)			0.43 (1.69)			-0.11 (-0.38)
2015-2017			0.51 (0.93)			0.53 (1.21)			-0.03 (-0.07)
Lag NFCI		-0.08 (-0.70)	0.01 (0.06)		-0.11 (-0.67)	-0.05 (-0.26)		0.02 (0.15)	0.06 (0.32)
Bank F.E.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36	36	36	36	36	36	36	36	36

Table G.5: Changes in Liquidity Creation in the Banking Sector: Accounting for Capital Regulations

The table shows results from panel regressions for changes in the asset-side component *BBNA* and liability-side component *BBNL* of *BBN*. *BBN* is equal to the on-balance sheet liquidity creation measure *cat nonfat* (Berger and Bouwman (2009)) divided by total assets. *2011-2012* is set equal to 1 from 2011 Q1 to 2012 Q4. *Post-LCR* is set equal to 1 from 2013 Q2 to 2017 Q4. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4; The Chicago Fed’s National Financial Conditions Index (NFCI) is an indicator for risk, credit and leverage conditions; higher values imply tighter financial conditions. The sample period is 2009 Q1 to 2017 Q4. Standard errors are two-way clustered by bank and quarter. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively

	(1)	(2)	(3)	(4)	(5)	(6)
	BBNA	BBNA	BBNA	BBNL	BBNL	BBNL
2011-2012	0.24 (1.25)	0.24 (1.28)	0.15 (0.84)	0.22 (1.32)	0.21 (1.31)	0.24 (1.30)
Post-LCR	0.59*** (3.85)			0.16 (1.09)		
2013Q2-2014		0.68*** (2.84)	0.53** (2.07)		0.13 (0.85)	0.16 (0.91)
2015-2017		0.53*** (3.38)	0.39** (2.33)		0.20 (1.08)	0.23 (1.14)
Lag NFCI			-0.14 (-1.40)			0.03 (0.45)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.05	0.05	0.06	0.04	0.04	0.04
Observations	3920	3920	3920	3920	3920	3920

Table G.6: Changes in Fire-Sale Risk of Banking Sector

Panel A (Panel B) of the table shows results from panel (time-series) regressions of changes in the overall fire-sale risk (i.e., the contribution of a bank to fire-sale losses in the banking sector, as a share of its assets) and its illiquidity component. The Chicago Fed's National Financial Conditions Index (NFCI) accounts for changes in financial conditions. *2013Q2-2014* is set equal to 1 from 2013 Q2 to 2014 Q4 and *2015 – 2017* is set equal to 1 from 2015 Q1 to 2017 Q4. The sample period is 2009 Q1 to 2017 Q4. The bank-quarter regressions use 3,916 observations and the standard errors are two-way clustered by bank and quarter. The time-series regressions use 36 observations and the standard errors are derived from the Newey-West procedure with four lags. *t* statistics are shown in parenthesis. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall	Overall	Overall	Overall	Illiquidity Component	Illiquidity Component	Illiquidity Component	Illiquidity Component
Post-LCR	0.05** (2.05)	0.08** (2.69)			0.19* (2.00)	-0.01 (-0.10)		
2013Q2-2014			0.03 (1.26)	0.06* (1.86)			0.17* (1.78)	-0.05 (-0.47)
2015-2017			0.07** (2.51)	0.09*** (3.18)			0.21* (1.91)	0.02 (0.30)
Lag NFCI		0.04 (1.21)		0.04 (1.13)		-0.33** (-2.13)		-0.33** (-2.14)
Bank F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.05	0.05	0.05	0.06	0.06	0.11	0.06	0.12
Observations	3920	3920	3920	3920	3920	3920	3920	3920

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall	Overall	Overall	Overall	Illiquidity Component	Illiquidity Component	Illiquidity Component	Illiquidity Component
Post-LCR	0.01 (0.16)	0.06 (1.10)			0.29 (1.21)	-0.10 (-0.69)		
2013Q2-2014			0.01 (0.16)	0.09* (1.94)			0.34* (1.96)	0.08 (0.48)
2015-2017			0.02 (0.17)	0.14* (1.95)			0.76** (2.38)	0.36 (1.17)
Lag NFCI		0.05 (1.32)		0.07* (1.88)		-0.38*** (-2.93)		-0.24 (-1.67)
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	36	36	36	36	36	36	36	36

Table G.7: Net Benefits For the Banking Sector Following LCR, Using Panel Regression Results

The table shows the net benefits following LCR based on pane regression results. Net benefits equal the benefits of reduced fire-sale contributions minus the costs due to income foregone from reduced lending, for all banks. Both benefits and costs account for changes in broad financial conditions. The estimated benefits are from Panel A of Table 11 in the text, scaled by the average ratio of fire-sale losses to illiquidity (to convert to dollars). The loan income is the net interest income (NII) minus provisions for loan and lease losses (LLP), adjusted for taxes. To obtain the foregone income, the average pre-LCR ratio of loan income to loans of all banks is multiplied by the estimated reduction in lending in the banking sector during the post-LCR period. Panel A shows the the pre-tax net benefits from LCR. Panel B shows the after-tax net benefits from LCR. *, **, *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Pre-Tax Net Benefits								
Group	Period	(1) Mean Assets (\$Billions)	Share of Assets (Basis Points)			Total (Millions of Dollars)		
			(2) Benefit	(3) Cost	(4) Benefit - Cost	(1)*(2) Benefit	(1)*(3) Cost	(1)*(4) Benefit - Cost
All Banks	Post-LCR	116.68	0.12	-0.60	0.72	1.39	-7.02	8.41
All Banks	2013Q2-2014	111.19	0.68	-0.63	1.31	7.56	-6.95	14.52
All Banks	2015-2017	119.89	-0.31	-0.58	0.27	-3.74	-6.97	3.23

Panel B: After-Tax Net Benefits								
Group	Period	(1) Mean Assets (\$Billions)	Share of Assets (Basis Points)			Total (\$Millions)		
			(2) Benefit	(3) Cost	(4) Benefit - Cost	(1)*(2) Benefit	(1)*(3) Cost	(1)*(4) Benefit - Cost
All Banks	Post-LCR	116.68	0.12	-0.43	0.55	1.39	-5.04	6.43
All Banks	2013Q2-2014	111.19	0.68	-0.45	1.13	7.56	-4.99	12.55
All Banks	2015-2017	119.89	-0.31	-0.42	0.11	-3.74	-5.00	1.26

References

- Acharya, Viral V. and Nada Mora**, “A Crisis of Banks as Liquidity Providers,” *Journal of Finance*, 2015, 70 (1), 1–44.
- Berger, Berger N. and Christa H. S. Bouwman**, “Bank Liquidity Creation,” *Review of Financial Studies*, 2009, 22 (9), 3779–3837.
- Bilinski, Alyssa and Laura A. Hatfield**, “Nothing to see here? Non-inferiority approaches to parallel trends and other model assumptions,” *Working Paper*, 2020.
- Bouwman, Christa H. S.**, “Creation and Regulation of Bank Liquidity,” 2018, *Forthcoming*. in: Allen Berger, Phil Molyneux, and John Wilson (eds.), *The Oxford Handbook of Banking (3rd edition)*, Oxford University Press.
- Chabé-Ferret, Sylvain**, “Analysis of the bias of matching and difference-in-difference under alternative earnings and selection processes,” *Journal of Econometrics*, 2015, 185 (1), 110–123.
- Cortes, Kristle Romero, Yuliya Demyanyk, Lei Li, Elena Loutskina, and Philip E. Strahan**, “Stress Tests and Small Business Lending,” *Journal of Financial Economics*, 2020, 136 (1), 260–279.
- Flannery, Mark, Beverly Hirtle, and Anna Kovner**, “Evaluating the information in the federal reserve stress tests,” *Journal of Financial Intermediation*, 2017, 29 (1), 1–18.
- Kearney, Melissa S. and Phillip B. Levine**, “Media Influences on Social Outcomes: The Impact of MTV’s 16 and Pregnant on Teen Childbearing,” *The American Economic Review*, 2015, 105 (12), 3597–3632.
- **and** –, “Does Reality TV Induce Real Effects? A Response to Jaeger, Joyce, and Kaestner (2016),” *IZA Discussion Paper No. 10318*, 2016.
- Schneider, Thomas, Philip E. Strahan, and Jun Yang**, “Bank Stress Testing: Public Interest or Regulatory Capture?,” *Working Paper*, 2020. Available at SSRN: Paper.