Bank Liquidity Provision and Basel Liquidity Regulations

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Need for Liquidity Regulations

- Banks provide liquidity and maturity transformation: they fund illiquid, long-maturity assets with liquid, short-term liabilities (Diamond and Dybvig (1983) and Holmstrom and Tirole (1998))

- Thereby, banks take on risk (Diamond (1984), Ramakrishnan and Thakor (1984) and Boyd and Prescott (1986))

- Banks may under-provide liquidity reserves due to moral hazard (Tirole (2006)) or because they don't account for the systemic effects of their own actions (Freixas et al. (2000), Allen and Gale (2000) and Brunnermeier (2009)).

- Ex-ante liquidity regulations may be needed to provide the optimal amount of liquidity insurance (Farhi et al. (2009), Perotti and Suarez (2011))

Liquidity Coverage Ratio LCR

- Increases resilience of largest bank holding companies BHCs to liquidity risk

- Provides consistent view of liquidity buffer across BHCs

- Requires large BHCs to hold enough High Quality Liquid Assets (HQLA) to meet their peak net cash outflow during 30 days of stressed financial conditions

	BHC with consolidated assets	Subject to
Large LCR	$\geq$ \$250 bln	Full LCR
Smaller LCR	$\leq 50 <$ \$250 bln	Modified LCR
Smaller non-LCR	$<$ \$50 bln	

Our Paper: Tradeoff Between Liquidity Creation and Liquidity Resilience?

- Reducing liquidity mismatch reduces run risk but also liquidity creation

- LCR applies to largest banks who also create the most liquidity (Berger and Bouwman (2009))

- What is the impact on liquidity creation of largest banks?

    - Do they take on liquidity risk in unconstrained parts of their portfolios to offset LCR requirements?

- What is the impact on liquidity creation of the banking industry?

Analysis

- Measure liquidity creation using LMIN measure=Liquidity Mismatch Index (LMI) (Bai et al. (Forthcoming)) divided by assets

- Identifying LCR effects

    - LCR applies to banks of different sizes

    - LCR implemented at particular times

    - LCR created the HQLA-asset category

- Our sample period also saw initiation of liquidity stress tests which added to LCR effects

LCR Implementation Timeline

- Basel III LCR initially proposed Dec 2010, revised Jan 2013

- US rule proposed Oct 2013, finalized Sept 2014

- Full LCR banks (assets $>=$ \$250 bln): accelerated transition period wrt Basel III LCR rules (LCR of 80% by 2015, 90% by 2016, 100% by 2017)

- Modified LCR banks (assets between \$50 and \$250 bln): LCR of 90% by 2016, 100% by 2017

- BHC with $\geq$ \$700 bln in total consolidated assets: began public disclosure on April 1, 2017

Eligible HQLA Assets

	Assets	Haircut	Constraint
Level 1	Excess Reserves Treasuries Govt Agency Debt / MBS Foreign Debt (0% RW)	0%	>60% of HQLA
Level 2A	GSE Debt GSE MBS Foreign Debt ((0,20]% RW)	15%	2A + 2B <40%
Level 2B	IG Non-financial corporates Russell 1000 equities IG Municipals	50%	<15% HQLA

Measuring Liquidity Creation

- LMI for bank *i* and quarter *t* is (Bai et al. (Forthcoming)) :

$$LMI_{i,t} = \sum_{j=1}^{m} \lambda_{a,jt} A_{ijt} - \sum_{k=1}^{n} \lambda_{l,jt} L_{ijt}$$

$$= LMIA_{i,t} - LMIL_{i,t}$$

λ_a and λ_l are asset and liability sides liquidity weights, and *A* and *L* are balance sheet assets and liabilities

- λ_a is obtained from repo haircuts and λ_l from the OIS-Tbill spread
- *Higher* LMIN indicates *lower* liquidity mismatch

$$LMIN_{i,t} = \frac{LMI_{i,t}}{A_{i.t}}$$

- If there are *n* banks in size group *k*, then LMIN for group *k* is:

$$LMIN_{k,t} = \frac{\sum_{j=1}^{n} LMIN_{k,j,t}}{n}$$

Data

- Quarterly US BHCs' FR Y-9C, 1998-2016

- Measuring HQLA

    - Level 1, Level 2A, Level 2B HQLA are measured directly using asset side balance sheet variables

    - Gross Outflows measured through liability-side proxies for weighted regulated outflow categories

    - Inflows offset up to 75% of Gross outflows, difficult to measure through financial statements

- Triparty repo haircut data from SEC Edgar website.
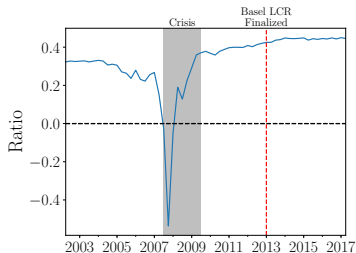
- OIS and Tbill data from Bloomberg.

Liquidity Creation by Banking Sector

- 2002 Q2 to 2017 Q2: increased liquidity creation pre-crisis, liquidity destruction during crisis and decreased liquidity creation since crisis (i.e. increasing LMI)

Overall LMI
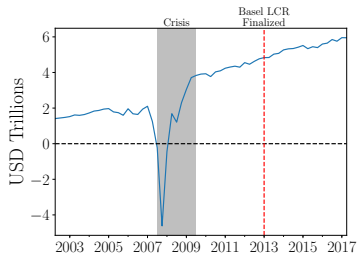
Overall LMIN

Is there an LCR Effect on Liquidity Creation?

	(1) LMI	(2) LMIN	(3) LMI	(4) LMIN
LMI (Lag)	0.663***		0.579**	
	(2.89)		(2.32)	
LMIN (Lag)		0.533**		0.516**
		(2.21)		(2.11)
Crisis	-101821.3	-0.000209	-369707.3	-0.000220
	(-0.05)	(-0.92)	(-0.19)	(-0.95)
Post-Crisis (All)	2855196.6	0.000177**	2858835.2*	0.000152**
	(1.59)	(2.31)	(1.85)	(2.48)
Post-LCR			1241598.0	0.0000556*
			(1.63)	(1.69)
Constant	557273836.3	0.127*	701422972.4	0.132*
	(1.39)	(1.77)	(1.61)	(1.81)
Observations	60	60	60	60
R^2	0.836	0.658	0.842	0.661

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Liquidity Creation by LCR and non-LCR Banks

- LCR banks: assets exceeding $50 billion), large non-LCR banks (assets between $3 billion and $50 billion) and smaller banks (assets less than $3 billion)
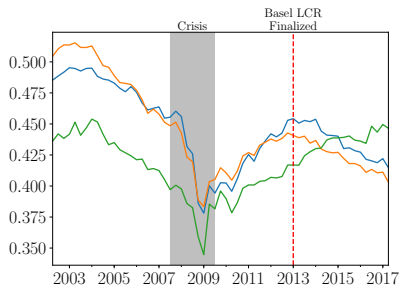- Lower liquidity creation by LCR banks and higher liquidity creation by non-LCR banks
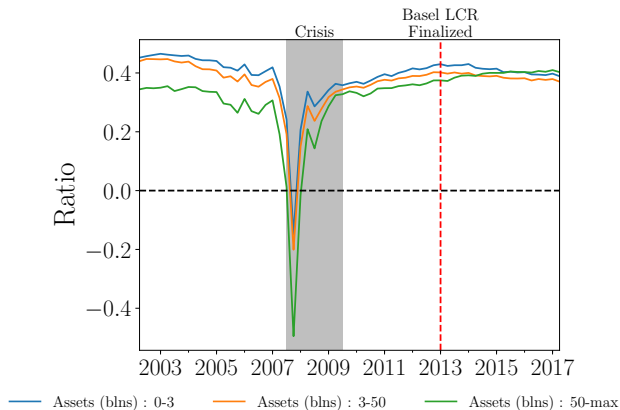
See Table

Liquidity-Weighted Assets and Liabilities

- LMIN trends driven by asset side for all size categories.
- Higher liquidity weighted assets for LCR banks and the reverse for non-LCR banks.

LMIN Assets

LMIN Liabilities

Assets (blns) : 0-3   Assets (blns) : 3-50   Assets (blns) : 50-max
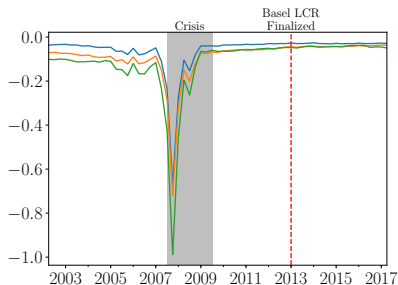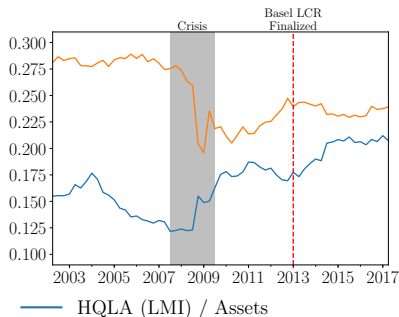
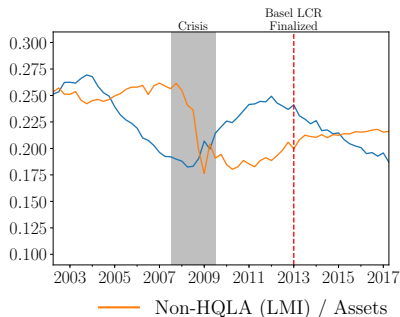See Tables for Assets and Liabilities

Liquidity-Weighted Assets: HQLA and non-HQLA

- HQLA component: apply LMINA liquidity weights to assets that are eligible as HQLA.
- Non-HQLA component: apply LMINA liquidity weights to assets ineligible as HQLA.

Large LCR Banks

Large Non-LCR Banks

HQLA (LMI) / Assets

Non-HQLA (LMI) / Assets

Panel Regression Results

- Liquidity-weighted HQLA increasing and liquidity-weighted non-HQLA decreasing for LCR banks. The opposite is true for non-LCR banks
- Increasing for LCR banks and decreasing for non-LCR banks

	(1) Δ LMIN	(2) Δ LMIN Assets	(3) Δ LMIN Liabilities	(4) Δ LMIN HQLA	(5) Δ LMIN Non-HQLA
Post-LCR	-0.00825***	-0.00734***	-0.000990***	-0.00832***	0.00105***
	(-20.59)	(-21.89)	(-5.27)	(-18.20)	(4.82)
Large (Non-LCR)	-0.000171	-0.000695	0.000696*	-0.00211***	0.00107***
	(-0.27)	(-1.08)	(1.88)	(-2.64)	(2.59)
LCR Bank	0.000197	0.000607	-0.000419	-0.00205***	0.00248***
	(0.23)	(0.66)	(-0.87)	(-2.59)	(4.21)
Post-LCR X Large (Non-LCR)	0.00162**	0.00185***	-0.000306	0.00346***	-0.00168***
	(2.24)	(2.63)	(-0.81)	(3.64)	(-3.09)
Post-LCR X LCR Bank	0.00399***	0.00347***	0.000599	0.00750***	-0.00410***
	(4.01)	(3.21)	(0.74)	(7.88)	(-4.12)
Constant	0.00543***	0.00458***	0.000888***	0.00421***	0.000439***
	(17.17)	(18.02)	(4.71)	(13.01)	(3.07)
Observations	14589	14589	14589	14589	14589

t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
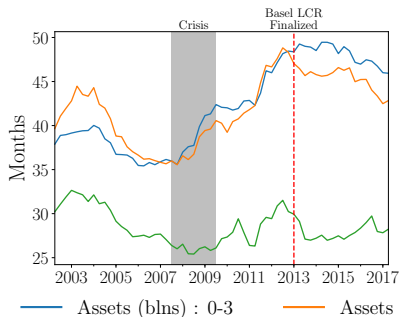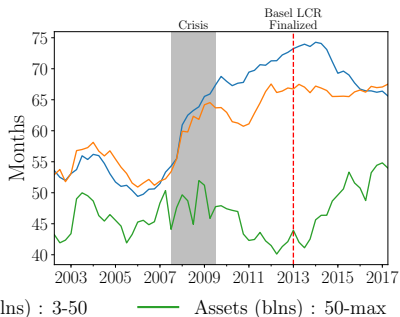
Maturity Profile of Bank Assets

- "Overall Duration" is the duration of total assets

Overall Duration

Debt Securities Duration

See Tables for Overall and Debt Securities

Conclusion

- We find lower liquidity mismatch of LCR banks (implying lower liquidity creation) that is not offset by increased liquidity creation of non-LCR banks. Thus, overall liquidity creation of the banking sector decreases

- These trends appear not to be continuations of post-crisis trends, given structural breaks in the LCR implementation period and differential effects on HQLA category of LCR and non-LCR banks

- Lower liquidity mismatch of largest banks is intent of LCR, and imply lower run risk. Quantifying costs and benefits of these tradeoffs subject of future research

- Absent regulation, there might be excess mis-match in the banking industry, so the reduction in mis-match may not be socially harmful

- Narrow banking proponents may argue that liquidity creation is not the natural provenance of banks

Appendix

Post-Crisis Sample: Assets vs Liabilities

LMIN Assets Post-Crisis
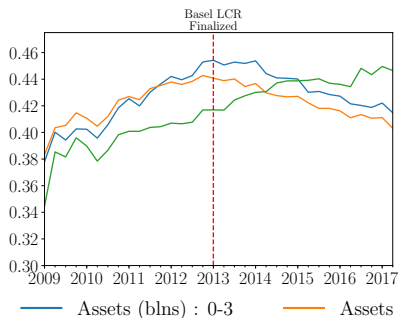
LMIN Liabilities Post-Crisis

Table: Post-Crisis Panel Regression: LMIN

	Δ LMIN				
Post-LCR	-0.00752***	-0.00752***	-0.00758***	-0.00825***	-0.00868***
	(-23.15)	(-23.16)	(-23.32)	(-20.59)	(-20.73)
LCR Bank		0.00203***	0.00224***	0.000197	
		(4.07)	(4.37)	(0.23)	
Large (Non-LCR)			0.000724**	-0.000171	
			(1.97)	(-0.27)	
Post-LCR X Large (Non-LCR)				0.00162**	0.00271***
				(2.24)	(4.09)
Post-LCR X LCR Bank				0.00399***	0.00473***
				(4.01)	(4.71)
Constant	0.00541***	0.00529***	0.00511***	0.00543***	0.00541***
	(21.66)	(20.78)	(18.44)	(17.17)	(33.02)
Observations	14589	14589	14589	14589	14589
bankfe	No	No	No	No	Yes

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Return to

Table: Post-Crisis Panel Regression: LMIN Assets

	Δ LMIN Assets				
Post-LCR	-0.00661***	-0.00661***	-0.00664***	-0.00734***	-0.00771***
	(-22.83)	(-22.84)	(-22.54)	(-21.89)	(-22.17)
LCR Bank		0.00228***	0.00238***	0.000607	
		(4.07)	(4.18)	(0.66)	
Large (Non-LCR)			0.000340	-0.000695	
			(0.88)	(-1.08)	
Post-LCR X Large (Non-LCR)				0.00185***	0.00266***
				(2.63)	(4.27)
Post-LCR X LCR Bank				0.00347***	0.00414***
				(3.21)	(3.79)
Constant	0.00445***	0.00432***	0.00423***	0.00458***	0.00445***
	(20.59)	(19.72)	(18.27)	(18.02)	(30.68)
Observations	14589	14589	14589	14589	14589
bankfe	No	No	No	No	Yes

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table: Post-Crisis Panel Regression: LMIN Liabilities

	Δ LMIN Liabiltiies				
Post-LCR	-0.000994***	-0.000994***	-0.00104***	-0.000990***	-0.00106***
	(-6.24)	(-6.24)	(-6.54)	(-5.27)	(-5.17)
LCR Bank		-0.000261	-0.000108	-0.000419	
		(-0.61)	(-0.25)	(-0.87)	
Large (Non-LCR)			0.000521***	0.000696*	
			(2.61)	(1.88)	
Post-LCR X Large (Non-LCR)				-0.000306	0.0000416
				(-0.81)	(0.13)
Post-LCR X LCR Bank				0.000599	0.000677
				(0.74)	(0.81)
Constant	0.00103***	0.00104***	0.000911***	0.000888***	0.00103***
	(6.58)	(6.51)	(5.42)	(4.71)	(12.54)
Observations	14589	14589	14589	14589	14589
bankfe	No	No	No	No	Yes

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Return to

Table: Post-Crisis Panel Regression: Overall Duration

	Δ Overall Duration				
Post-LCR	-0.613***	-0.613***	-0.600***	-0.576***	-0.554***
	(-10.42)	(-10.42)	(-10.15)	(-8.34)	(-7.92)
LCR Bank		-0.0884	-0.134*	-0.299**	
		(-1.25)	(-1.86)	(-2.47)	
Large (Non-LCR)			-0.155***	-0.0699	
			(-2.74)	(-0.67)	
Post-LCR X Large (Non-LCR)				-0.149	-0.236*
				(-1.04)	(-1.81)
Post-LCR X LCR Bank				0.312*	0.269
				(1.75)	(1.52)
Constant	0.437***	0.441***	0.479***	0.468***	0.437***
	(11.80)	(11.80)	(12.22)	(10.86)	(14.45)
Observations	12654	12654	12654	12654	12654
bankfe	No	No	No	No	Yes

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table: Post-Crisis Panel Regression: Debt Securities Duration

	Δ Debt Securities Duration				
Post-LCR	-0.657***	-0.657***	-0.650***	-0.958***	-0.820***
	(-4.71)	(-4.71)	(-4.68)	(-5.77)	(-4.94)
LCR Bank		0.149	0.124	-0.937***	
		(0.87)	(0.70)	(-2.83)	
Large (Non-LCR)			-0.0846	-0.486**	
			(-0.70)	(-2.17)	
Post-LCR X Large (Non-LCR)				0.736**	0.234
				(2.36)	(0.84)
Post-LCR X LCR Bank				2.043***	1.858***
				(4.19)	(3.87)
Constant	0.362***	0.355***	0.376***	0.524***	0.354***
	(3.89)	(3.75)	(3.66)	(4.56)	(5.02)
Observations	12654	12654	12654	12654	12654
bankfe	No	No	No	No	Yes

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

LCR Foreign Exposure

- Any BHC with $10 bln in foreign exposure, and subsidiary depository institutions of covered BHC with $> \$10$ bln in consolidated assets are s.t. full LCR