Unintended Consequences of Post-Crisis Liquidity Regulation

by

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Motivation

- Liquidity transformation by banks
  - Banks issue deposits and money-like liabilities to fund illiquid assets;
  - Too much of liquidity transformation can cause the banks to seek excessive liquidity from LOLR in “bad states”.
    - 2008 Great Financial Crisis (GFC) – excessive liquidity transformation;
    - LOLR (Fed facilities) supplied liquidity ***ex-post*** against eligible collateral.
    - Difficult to distinguish between illiquidity and insolvency in bad states.

Motivation

- Liquidity transformation by banks
  - Liquidity regulations to force banks to hold internal liquidity
    - Liquidity coverage ratio (LCR)
      - Banks are required to hold liquid assets, ***ex-ante***

$$LCR = \frac{High\ Quality\ Liquid\ Assets\ (HQLA)}{Net\ Cash\ Outflow\ in\ 30\ days\ under\ stress} > 100\%$$

Research Questions

- ***What is the impact of LCR on banks' reliance on public liquidity in "good states"?***
- ***Can this present potential risks in bad states?***
- ***Is the financial system more stable as a consequence of LCR?***
- ***Is there regulatory fragmentation? Lack of coordination between LCR with the pricing of "public liquidity" by FHLBs, which are not subject to liquidity standards.***

Literature

- Allen and Gale (2018) – many open questions on the effects of LCR; understudied topic.
- Berger, et.al (2017), Hoerova, et.al (2018) – banks with greater liquidity draw less from public liquidity facilities – prior to LCR.
- Anadu and Baklanova (2017) and Gissler, et.al (2017) - interactions between banks, FHLB and money market reforms.
- Diamond and Kashyap (2016) - model of liquidity regulations without FHLB.

Summary of Results

- *Liquidity Regulation*
  - Has caused banks to borrow record amounts from FHLB through advances to meet LCR. ***Causality runs from LCR to FHLB-advances;***
  - Banks' reliance on public liquidity (GSEs) has actually gone up to the levels seen only during the onset of GFC.
  - FHLBs now hold banks' illiquid assets as collateral against their advances - **illiquidity therefore remains in the banking network**.
  - This has the potential for financial instability of the banking network: Concentration risk in FHLBs; MMMFs are biggest lenders to FHLBs.

Summary of Results

- *Liquidity Regulation*
  - Tax payer is potentially on the hook
    - FHLBs may experience negative shocks either from deteriorating bank fundamentals or MMMF redemptions;
    - Even if FHLBs recoup (extra collateral, super-lien), unsecured creditors will suffer (FDIC) as they lose access to collateral posted to secure FHLB advances.

Summary of Results

- Model of liquidity regulation based on Diamond and Kashyap (2016)
  - Liquidity regulation discourages banks from issuing short-term money-like claims;
  - FHLBs can issue money-like claims as they are not subject to liquidity regulations.
  - Banks substitute to more FHLB advances:
    - FHLBs have advantage in term funding due to implicit guarantee
    - FHLB advances have preferential runoff rate under liquidity regulation

FHLB System & Banks – Institutional Background

- Government-sponsored enterprises established in Great Depression era.
- Mission: promote housing finance
- Lend to member banks through “advances”
- Finance their lending through issuing agency debt (increasingly held by MMMFs)
- No stigma in borrowing from FHLBs

Special Status of FHLBs

- *FHLB Debt privileges & implicit subsidies*
- The Treasury gives a line of credit for system as a whole;
- Eligibility of their debt for Federal Reserve open market purchases;
- Unlimited investment by insured commercial banks and thrifts;
- Exemption from the bankruptcy code by way of being considered "federal instrumentalities".
- Bank earnings are exempt from federal, state, and local income tax;
- Interest paid to investors is exempt from state income taxes

FHLB System & Banks – Institutional Background

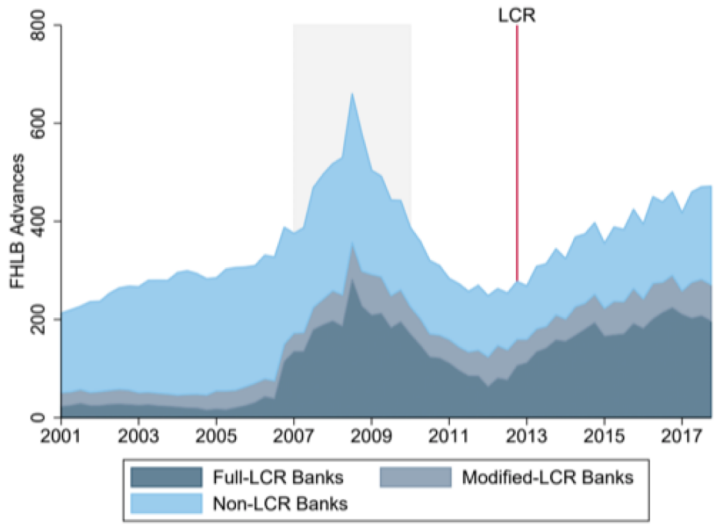
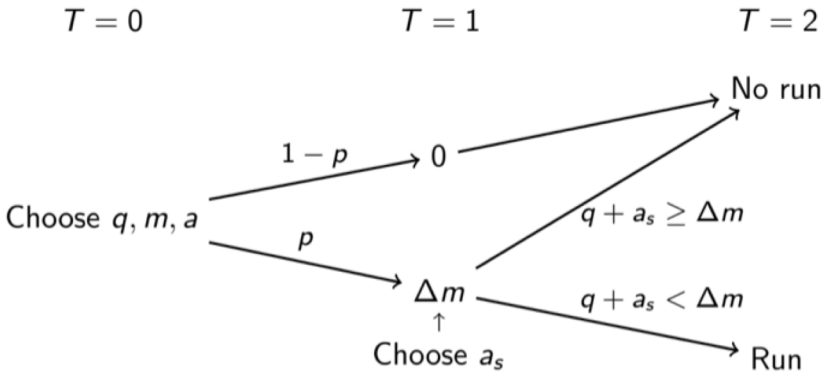


Figure 3: FHLB Advances Borrowed by Banks
This figure plots the FHLB advances borrowed by banks. The sample period is from 2001 to 2017. Data source: Call Report, FRY9C.

Source: Financial Stability Report
Board of Governors (2019)

Model



- q: liquid assets, return 1 at date 1, and R_l at date 2
- $1 - q$: illiquid assets, return 0 at date 1, and $R_i > R_l$ at date 2
- m: short-term money-like debt, borrowing cost: r_m
- b: long-term stable funding, borrowing cost: $r_b > r_m$
- a, a_s: public liquidity, borrowing cost: r_a

Model Ingredients & Results

- Banks do not internalize the losses imposed on the society when there is a run;
  - Hence they under-invest in liquid assets;
  - They rely on public liquidity in “bad states”;
- Regulators care about the social costs of a run and the costs of providing public liquidity;
  - They would like to keep the cost of accessing public liquidity high;
  - Impose liquidity requirements on banks;

Model Ingredients & Results

Proposition 1: Tightening LCR requirements will lead to increased borrowing by Banks from FHLB.

Proposition 2: Tightening LCR reduces the money-like claims issued by Banks but it leads to increased reliance of money-like claims by FHLB. (FHLB is not subject to liquidity regulations).

Proposition 3: Increasing the costs of access to public liquidity will lead to a reduction in banks borrowing from FHLBs

Empirical Results – FHLB Advances "parallel trends assumption"

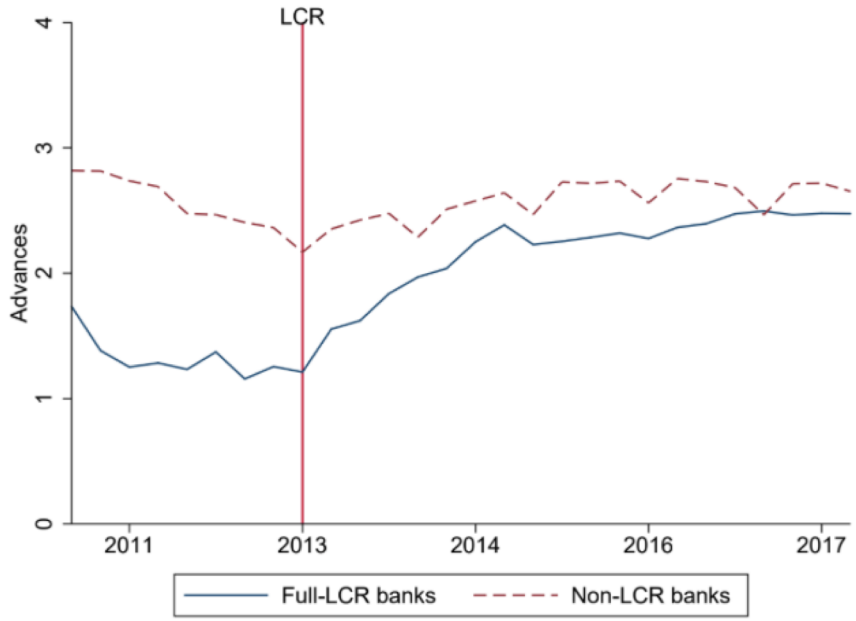


Figure 4: FHLB Advances of Full-LCR Banks vs. Non-LCR Banks
This figure plots the FHLB advances of US banks over assets. The solid line shows the full-LCR banks. The dashed line shows the non-LCR banks. The sample period is from 2011 to 2017. Data source: Call Report, FRY9C.

Empirical Results – FHLB Advances

Table 4: Effect of the LCR on FHLB Advances

	(1) Advances	(2) Advances	(3) Advances
Post*Full-LCR bank	1.880***	1.874***	1.430***
	[0.518]	[0.518]	[0.332]
Post*Modified-LCR bank	1.241***	1.239***	0.811**
	[0.326]	[0.326]	[0.330]
Log assets	-0.112***	-0.116***	0.854***
	[0.029]	[0.028]	[0.093]
Deposit ratio	-0.630***	-0.631***	-0.474***
	[0.009]	[0.009]	[0.016]
Capital ratio	-0.718***	-0.721***	-0.439***
	[0.015]	[0.014]	[0.021]
Bank F.E.	No	No	Yes
Time F.E.	No	Yes	Yes
Observations	149,824	149,824	149,818
Adj. R-squared	0.621	0.622	0.853

1) Full-LCR, a dummy variable which equals to 1 if a bank or a bank holding company is subject to the full LCR requirement;

(2)Modified-LCR, a dummy variable which equals to 1 if a bank or a bank holding company is subject to the modified LCR requirement;

Empirical Results – FHLB Advances/Matched Sample

Table 5: Effect of the LCR on FHLB Advances: Matched Sample

	(1) Advances	(2) Advances	(3) Advances
Post*Full-LCR bank	1.016**	1.013**	1.242***
	[0.371]	[0.381]	[0.421]
Post*Modified-LCR bank	0.479	0.479	0.259
	[0.350]	[0.358]	[0.434]
Log assets	-0.395	-0.406	1.279**
	[0.295]	[0.295]	[0.506]
Deposit ratio	-0.461***	-0.467***	-0.266***
	[0.078]	[0.079]	[0.068]
Capital ratio	-0.473***	-0.476***	-0.216
	[0.135]	[0.135]	[0.142]
Bank F.E.	No	No	Yes
Time F.E.	No	Yes	Yes
Observations	1,476	1,476	1,476
Adj. R-squared	0.403	0.400	0.857

We use a matched bank in the control group which has similar deposit ratios, capital ratios, and liquidity ratios in the pre-regulation period for each LCR bank.

Empirical Results – FHLB Advances/Gap measure prior to LCR

Table 6: Gap to Meet LCR Regulation and FHLB Advances Borrowing

	(1) Advances	(2) Advances	(3) Advances
Post*Gap	2.022**	2.015**	1.443*
	[0.852]	[0.855]	[0.832]
Log assets	-0.135***	-0.139***	0.864***
	[0.031]	[0.030]	[0.094]
Deposit ratio	-0.631***	-0.632***	-0.475***
	[0.009]	[0.009]	[0.016]
Capital ratio	-0.717***	-0.720***	-0.440***
	[0.014]	[0.014]	[0.021]
Bank F.E.	No	No	Yes
Time F.E.	No	Yes	Yes
Observations	147,933	147,933	147,933
Adj. R-squared	0.620	0.622	0.852

LCR Gap, a continuous variable which measures the distance for a bank to meet its LCR requirement.

The LCR Gap is constructed using banks' balance sheets before the liquidity regulation was introduced.

Empirical Results – Usage of FHLB Advances

Table 7: Effect of the LCR Regulation on the Usage of FHLB Advances

	(1) Full-LCR banks	(2) Modified-LCR banks	(3) Non-LCR banks
Δ HQLA	-0.066**	0.024**	-0.015***
	[0.029]	[0.010]	[0.002]
Δ HQLA*Post	0.117**	-0.029	-0.002
	[0.046]	[0.019]	[0.002]
Δ Loans	0.165***	0.098	0.033***
	[0.059]	[0.079]	[0.004]
Δ Loans*Post	-0.249*	-0.159*	-0.004
	[0.133]	[0.089]	[0.005]
Log assets	-0.137*	0.262**	-0.005
	[0.076]	[0.124]	[0.004]
Deposit ratio	-0.020**	-0.035***	-0.006
	[0.009]	[0.010]	[0.007]
Capital ratio	-0.038	-0.021	0.005
	[0.043]	[0.022]	[0.011]
Bank F.E.	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes
Observations	218	604	148,516
Adj. R-squared	0.092	0.017	0.015

FHLB's cost advantage and depth advantage
FHLB Advances versus private markets

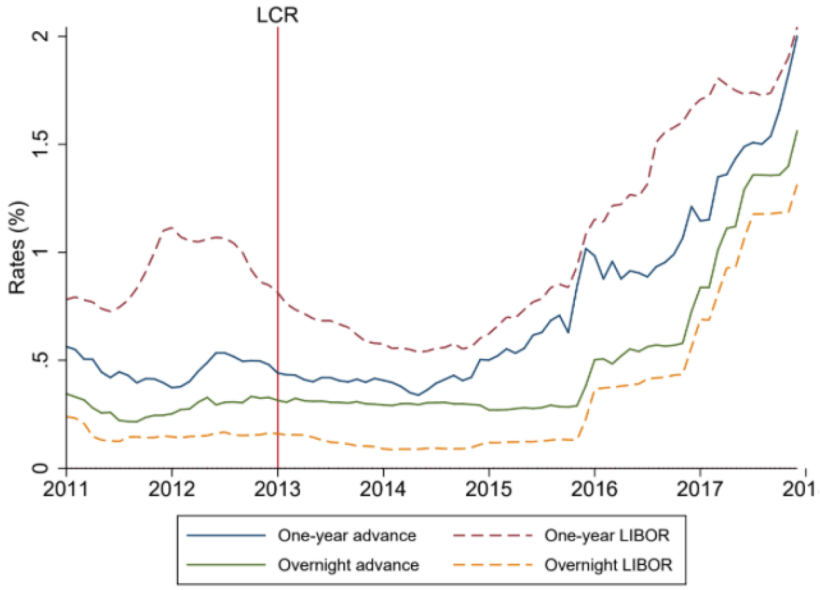


Figure 5: FHLB Advance Rates vs LIBOR
This graph plots FHLB advance rates and LIBOR for different maturities. Data source: FHLB Boston, Dallas, and Des Moines; Federal Reserve Bank of St. Louis.

- Depth in these markets are very different.
- ***Short-term:*** FHLB advances are more expensive than LIBOR.
- ***Long-term:*** FHLB advances are less expensive than LIBOR.
- Results are similar with ABCP

FHLB's preferential run-off rate in LCR

- There is a preferential treatment on the FHLB advances under liquidity regulation.
- According to the current LCR, secured borrowing from a private counterparty receives a run-off rate of 100%, which implies that banks need to hold $1 dollar of HQLA for each dollar of borrowing that matures in 30 days.
- In contrast, secured borrowing from the FHLBs receives a run-off rate of only 25%. The preferential treatment on the FHLB advances allows banks to relax the liquidity constraint so that they can hold more illiquid asset

Empirical Results – FHLB Vulnerabilities –short-term funding

Figure 9: Average Maturity of MMF Lending to FHLBs
This figure plots weighted average maturity of the MMF lending to the FHLBs. Data source: iMoneyNet.

Empirical Results – FHLB Vulnerabilities – concentration risk

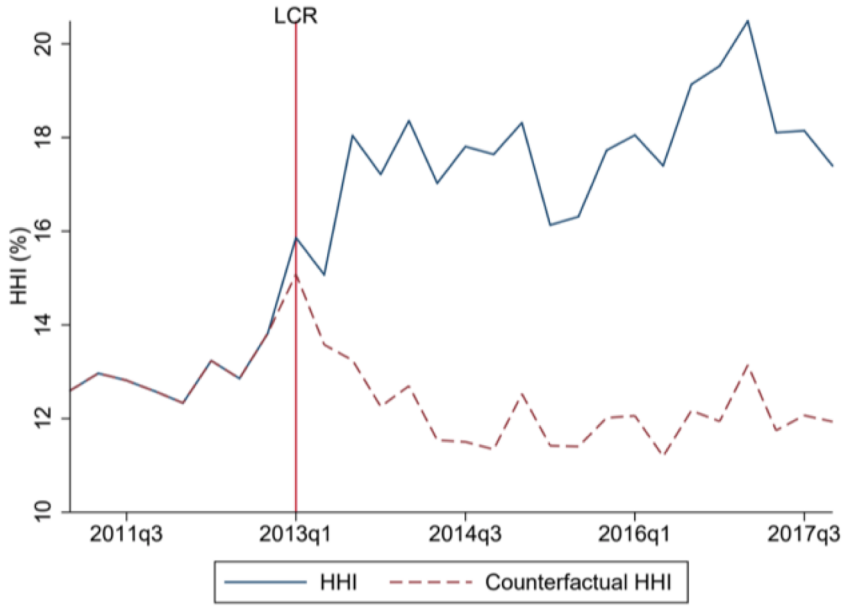


Figure 10: The Herfindahl-Hirschman Index (HHI) of FHLB Lending
This figure plots the HHI of FHLB lending. The counterfactual HHI is computed assuming that the LCR banks' advance-to-asset ratio stays constant after 2013Q1. Data source: Call Report, FRY9C.

Conclusions

- We present a model of liquidity regulation with a GSE and show how the pricing of liquidity facility affects the banks' incentives to draw from public liquidity to satisfy LCR.
- We present empirical evidence suggesting that LCR has been a major driver in explaining large advances drawn by banks.
- We show that the concentration risk and maturity mismatch risk might have increased in the FHLB system.
- We offer some policy responses to the problems above.