The Influence of Liquidity Information on Liquidity Holdings in the Banking System

Yao Lu

Cornell University

Motivation

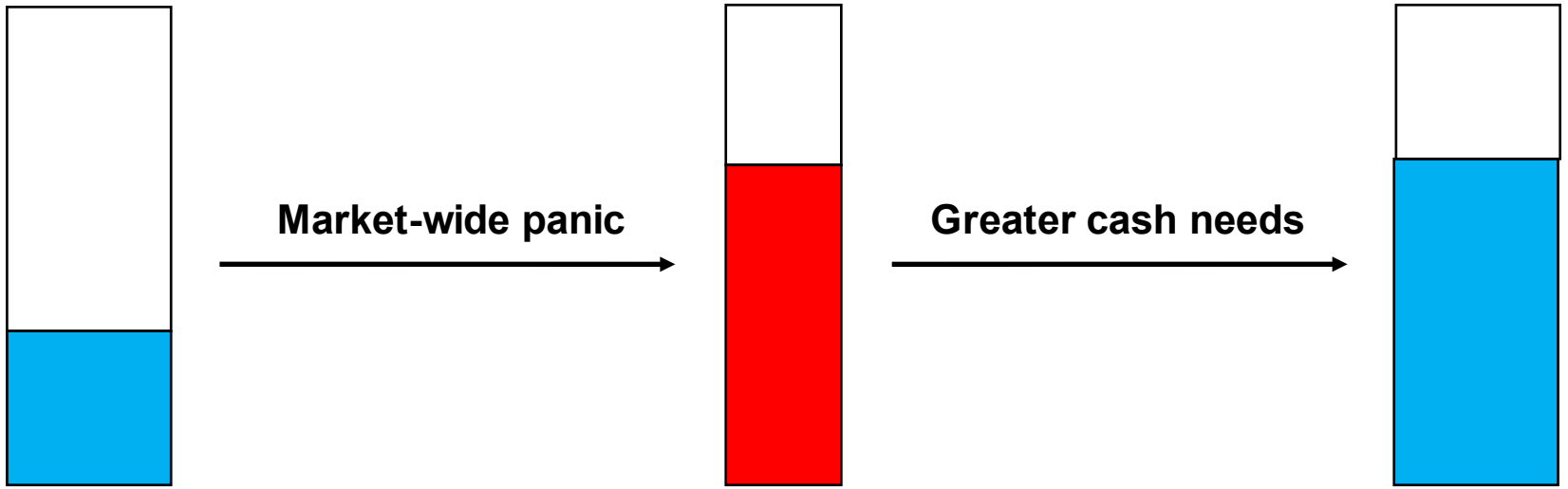
- **Liquidity holdings among banks are crucial for financial stability.**
  - Illiquidity amplified the severity of the 2008 financial crisis (Brunnermeier, 2009).
  - Liquidity risk contributed to bank stocks' crash during the pandemic (Acharya, Engle, and Steffen, 2021).
- **Liquidity information is one important determinant of liquidity holdings.**
  - Liquidity information reveals the risk of bank runs, which in turn influences banks' demand for liquid assets (Diamond and Dybvig, 1983; Diamond and Kashyap, 2016).
- **Liquidity information's influence can be significant and has financial stability implications.**
  - Given the potential domino effect of widespread illiquidity and bankruptcies following an initial bank run (Allen and Babus, 2009).
- **We have limited empirical evidence on the impact of liquidity disclosures.**

Preview of the paper

- **Research question**
  - How does liquidity information influence banks' liquidity holdings?
  - Does liquidity disclosure from a group of banks negatively affect other banks' liquidity?
- **Setting**
  - Liquidity coverage ratio (LCR) disclosure mandated for a group of large US banks.
- **Results**
  - Non-disclosing banks **reduced** cash holdings in response to LCR disclosures.
  - Diff-in-diff: non-disclosing banks that learned more from the disclosures cut more liquidity.
  - In the aggregate: lower aggregate liquidity and higher systemic risk in the banking system.
- **Implication**
  - The spillover effect of LCR disclosures undercut the regulation's goal of **increasing** the liquidity and stability of the banking system (81 FR 94922).

Mechanism – Strategic interactions

- **When peer banks hold less cash, which increases liquidity risk, I want more cash**



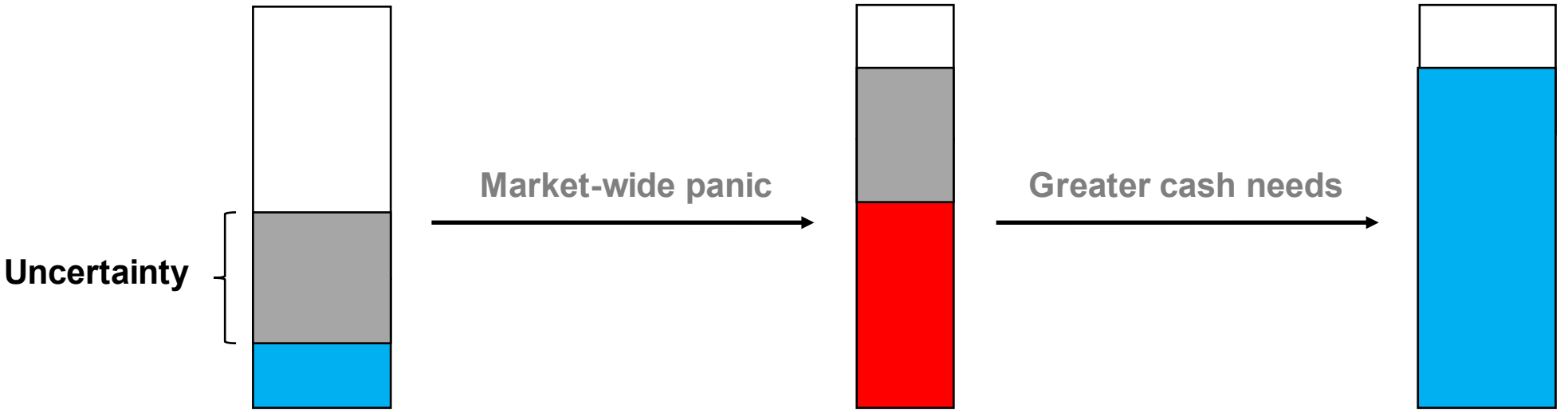
Low-liquidity peer bank
- Experiences a run due to low liquidity

High liquidity risk in the market
- Short-term funding declines and Credit line drawdowns increase

More cash holdings
- Higher cash outflows
- Costlier to borrow cash

Mechanism – Disclosure

- **LCR disclosures reduce precautionary liquidity needs by mitigating uncertainty about liquidity risk**



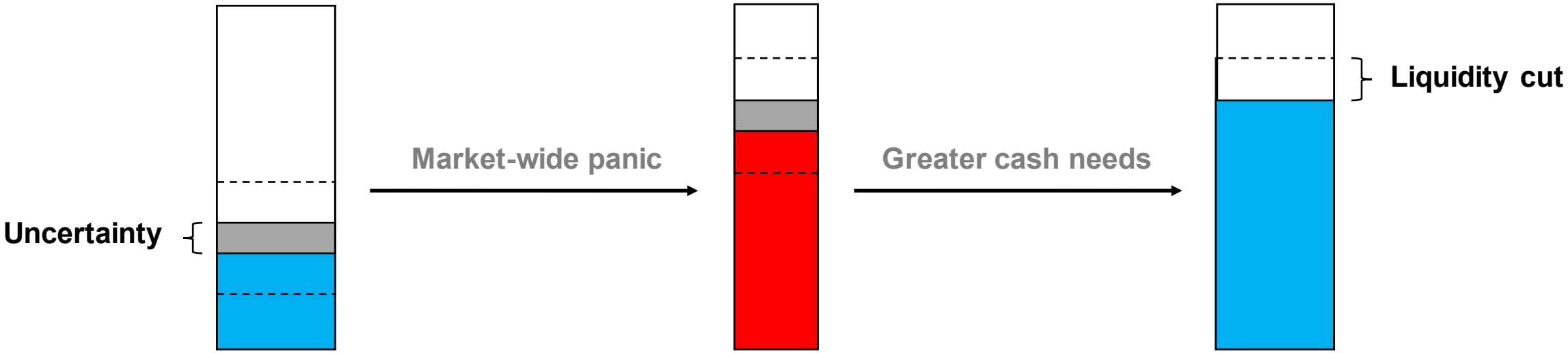
Uncertain about peer banks' liquidity

Uncertain about liquidity risk in the market

My bank: holds more cash as a precaution
(Caballero and Krishnamurthy, 2008)

Mechanism – Disclosure

- **LCR disclosures reduce precautionary liquidity needs by mitigating uncertainty about liquidity risk**



With LCR disclosures:

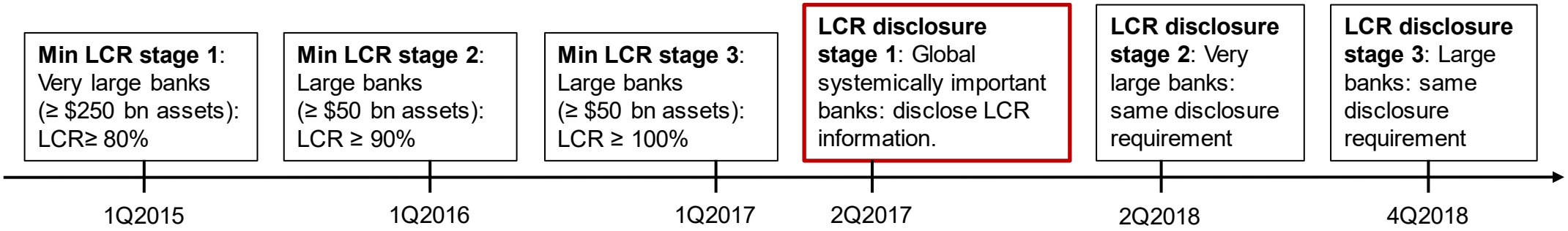
Less uncertain about peer banks' liquidity

Less uncertain about liquidity risk in the market

My bank: lower demand for precautionary liquid asset holdings

Liquidity coverage ratio (LCR) regulation

- **Background**
  - $\text{LCR} = \dfrac{\text{High quality liquid assets (i.e., cash available)}}{\text{Expected 30-day net cash outflows (i.e., potential cash needs)}}$
  - First global bank liquidity regulation from Basel III
  - Implementation in the US:



- **Features**
  - The disclosure rule was implemented after the minimum LCR rule.
  - Only a small number of banks disclose.

LCR disclosures are useful and new

Three months ended December 31, 2017 (in millions)		Average Unweighted Amount[a]	Average Weighted Amount[b]
HIGH-QUALITY LIQUID ASSETS			
1	**Total eligible high-quality liquid assets (HQLA), of which:[c]**	$ 568,014	$ 560,081
2	Eligible level 1 liquid assets	515,472	515,472
3	Eligible level 2A liquid assets	52,392	44,534
4	Eligible level 2B liquid assets	150	75
CASH OUTFLOW AMOUNTS			
5	**Deposit outflow from retail customers and counterparties, of which:**	$ 704,413	$ 43,227
6	Stable retail deposit outflow	430,531	12,916
7	Other retail funding outflow	249,628	26,224
8	Brokered deposit outflow	24,254	4,087
9	**Unsecured wholesale funding outflow, of which:**	702,495	261,508
10	Operational deposit outflow	480,652	119,893
11	Non-operational funding outflow	213,074	132,846
12	Unsecured debt outflow	8,769	8,769
13	**Secured wholesale funding and asset exchange outflow[d]**	601,963	163,017
14	**Additional outflow requirements, of which:**	531,792	126,687
15	Outflow related to derivative exposures and other collateral requirements	135,580	31,019
16	Outflow related to credit and liquidity facilities including unconsolidated structured transactions and mortgage commitments	396,212	95,668
17	**Other contractual funding obligation outflow**	6,346	6,346
18	**Other contingent funding obligations outflow[e]**	281,300	9,956
19	**TOTAL CASH OUTFLOW**	$ 2,828,309	$ 610,741
CASH INFLOW AMOUNTS			
20	**Secured lending and asset exchange cash inflow[d]**	$ 594,830	$ 147,975
21	**Retail cash inflow**	21,011	10,506
22	**Unsecured wholesale cash inflow[f]**	16,539	12,213
23	**Other cash inflows, of which:**	12,322	12,322
24	Net derivative cash inflow	4,359	4,359
25	Securities cash inflow	4,321	4,321
26	Broker-dealer segregated account inflow	3,642	3,642
27	Other cash inflow	–	–
28	**TOTAL CASH INFLOW**	$ 644,702	$ 183,016

		Average Weighted Amount[b]
29	**HQLA AMOUNT[c]**	$ 560,081
30	**TOTAL NET CASH OUTFLOW AMOUNT EXCLUDING THE MATURITY MISMATCH ADD-ON**	$ 427,725
31	**MATURITY MISMATCH ADD-ON**	44,353
32	**TOTAL NET CASH OUTFLOW AMOUNT**	$ 472,078
33	**LIQUIDITY COVERAGE RATIO (%)**	119%

- **The disclosure is useful**
  - Breaks down LCR based on the assets and liabilities contributing to

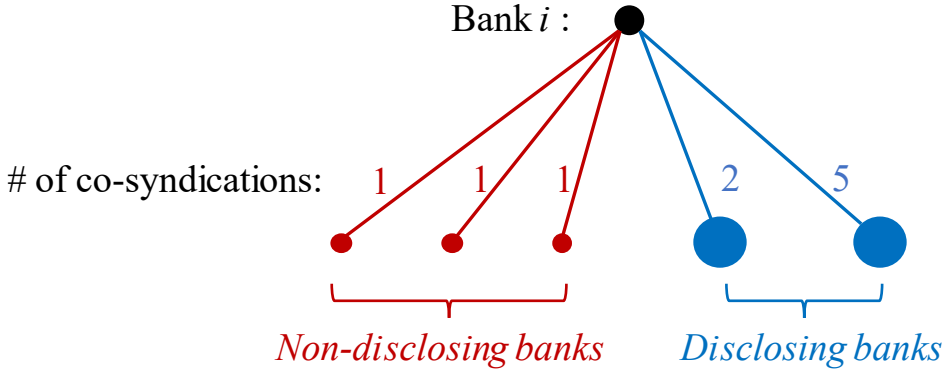
$$\text{LCR} = \frac{\text{High quality liquid assets}}{\text{Expected net cash outflows}}$$

  - Reveals cash available relative to cash needs.
  - Information on cash needs is critical in interpreting cash available (Diamond and Kashyap, 2016)
- **The disclosure is new**
  - Replicate the table using other bank disclosures.
  - While cash available can be reasonably estimated, cash needs are hard to estimate.
  - Estimated/reported LCR: 103%/119%.

Source: J.P. Morgan's LCR calculation, 4Q2017

Empirical strategy

- **Difference-in-differences design**
  - $LiquidAssets_{i,t+1} = \alpha_i + \alpha_t + \beta InfoGain_i \times Post_t + \gamma X_{i,t} + \epsilon_{i,t}$
  - $InfoGain$:
    - Liquidity information gained from LCR disclosures, measured based on a bank business network.



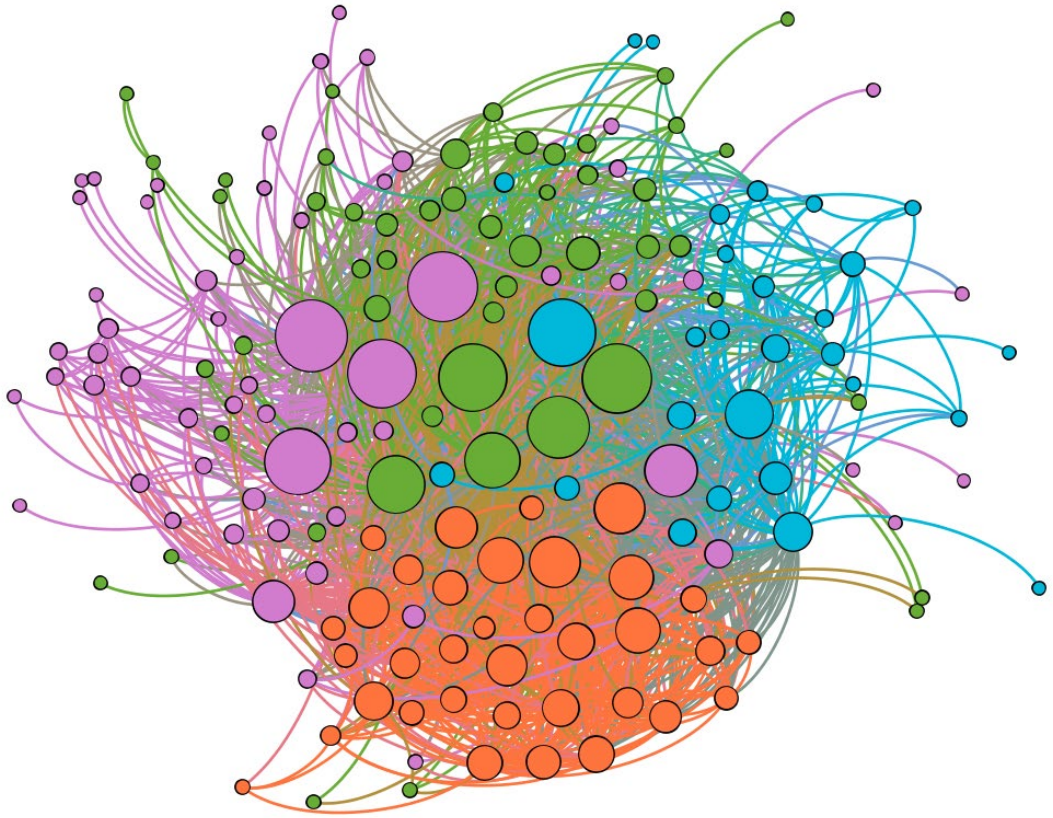
$$InfoGain_i = 1 - \frac{\#\text{ of syndicated loans issued with } disclosing\ banks}{\#\text{ of syndicated loans issued with } all\ banks}$$

$$= 1 - \frac{2+5}{1+1+1+2+5}$$

$$= 0.3$$

    - Intuition: more business linkages (co-syndication as a proxy) with disclosing banks → know more about them → learn less from their LCR disclosures.

Network analysis – Does the disclosure matter to all?



- **Bank business network structure**
  - Node: bank
  - Edge: co-syndication
  - Size: # of co-syndicated banks
  - Color: same if relatively more connected
  - Layout: clusters (separates) closely (less) connected nodes

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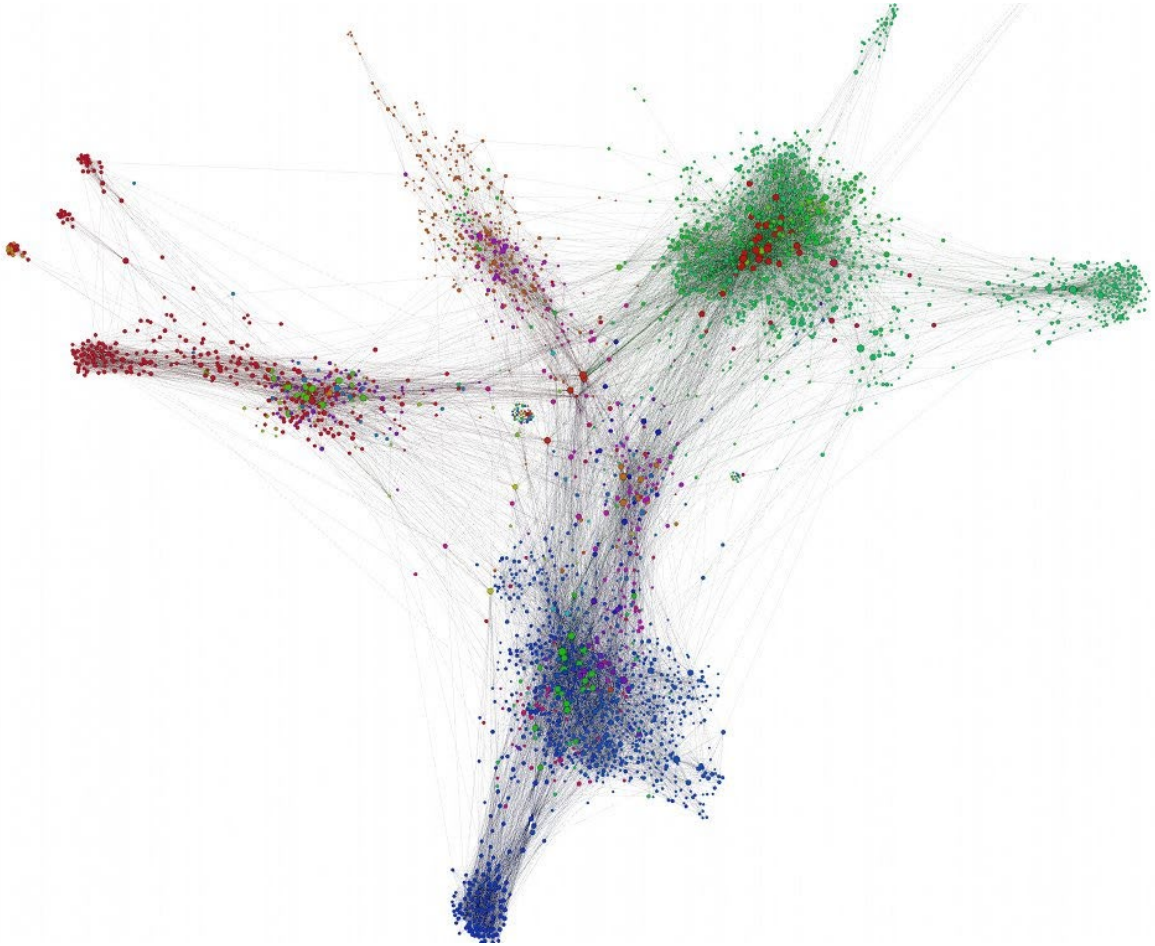

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Source: https://gephi.org/features/

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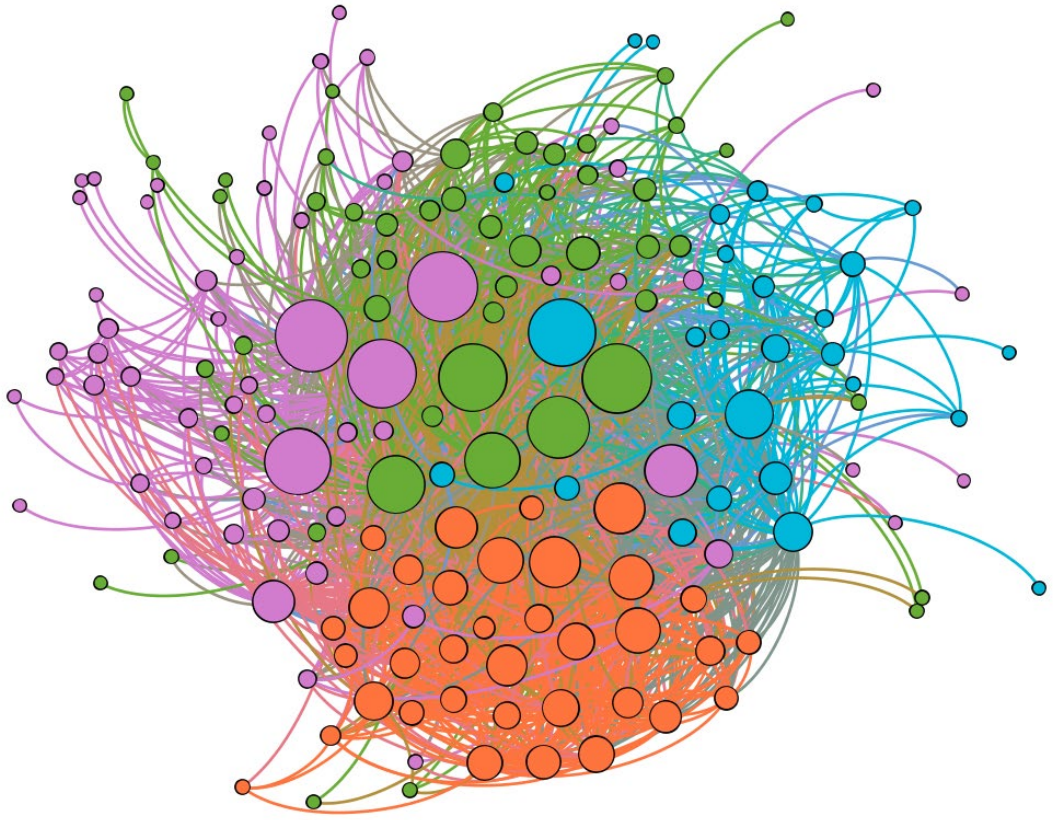

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  - Color: same if relatively more connected
  - Layout: clusters (separates) closely (less) connected nodes
- **Banks are all closely connected in a single network**
- **Disclosures from a few banks matter to all other banks**

Main results – Change in liquid asset holdings

- $LiquidAssets_{i,t+1} = \alpha_i + \beta Post_t + \gamma X_{i,t} + \epsilon_{i,t}$

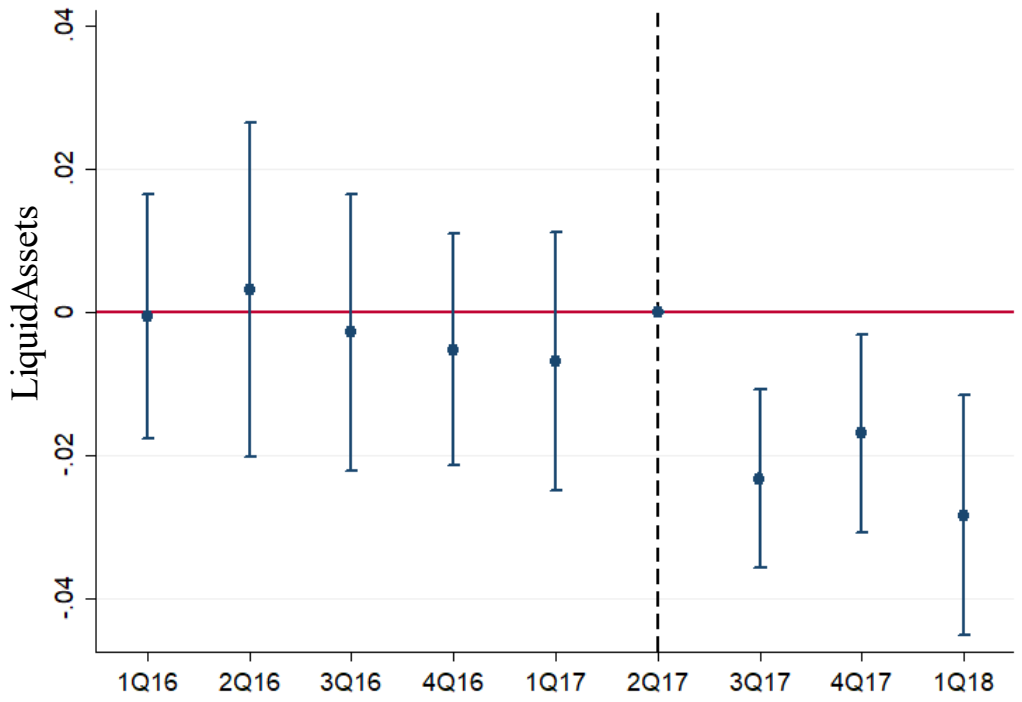
VARIABLES	(1) $LiquidAssets_{t+1}$ (Disclosing)	(2) $LiquidAssets_{t+1}$ (Non-disclosing)	(3) $LiquidAssets_{t+1}$ (All)
$Post_t$	0.0038	-0.0037***	
	(1.09)	(-3.12)	
$NonDisclosing*Post_t$			-0.0066**
			(-2.05)
$LiquidAssets_t$	0.4809***	0.4845***	0.4907***
	(5.67)	(8.14)	(8.47)
$CoreDeposit_t$	0.0116	-0.0644	-0.0458
	(0.14)	(-1.60)	(-1.13)
$Capital_t$	-0.4244	0.0770	0.0912
	(-0.91)	(0.69)	(0.83)
$Commitment_t$	-0.1004	0.0436	0.0443
	(-0.48)	(0.82)	(0.86)
$Size_t$	-0.1306**	-0.0222**	-0.0183*
	(-2.60)	(-2.43)	(-1.92)
Observations	72	1,478	1,550
Adjusted R-squared	0.986	0.975	0.981
Bank Fixed Effects	Yes	Yes	Yes
Year-quarter Fixed Effects	No	No	Yes

- **Non-disclosing** banks significantly **reduced** liquid asset holdings
- **Disclosing** banks insignificantly **increased** liquid asset holdings

Effect of LCR disclosures on liquidity

- **Non-disclosing banks that learned more from LCR disclosures cut liquid asset holdings more**

VARIABLES	(1) $LiquidAssets_{t+1}$
$InfoGain * Post_t$	-0.0236***
	(-2.64)
$LiquidAssets_t$	0.5008***
	(6.48)
$CoreDeposit_t$	-0.0059
	(-0.11)
$Capital_t$	0.1754
	(1.17)
$Commitment_t$	0.0688
	(1.08)
$Size_t$	-0.0113
	(-1.06)
Observations	1,047
Adjusted R-squared	0.976
Bank Fixed Effects	Yes
Year-quarter Fixed Effects	Yes



- **On average, liquid-assets-to-total-assets ratio dropped by 11% (15% of the standard deviation).**

Main results – Aggregate effect

Year-quarter	(1) ΔLiqAsset, bn$ (Disclosing)	(2) ΔLiqAsset, bn$ (Non-disclosing)	(3) (1)+(2), bn$	(4) |(2)/(1)|	(5) (3)/LiqAsset	(6) (1)/LiqAsset (Disclosing)	(7) (2)/LiqAsset (Non-disclosing)
2017Q4	41.75	-52.36	-10.60	125%	-0.27%	1.21%	-12.42%
2018Q1	42.68	-52.52	-9.84	123%	-0.24%	1.18%	-13.00%
2018Q2	42.26	-52.94	-10.69	125%	-0.27%	1.21%	-13.15%
Average	42.23	-52.61	-10.38	125%	-0.26%	1.20%	-12.86%

- **Aggregate effects: total liquid assets -$10bn, or -0.3% (disclosing +1%, non-disclosing: -13%).**

Main results – Impact on financial stability

VARIABLES	(1) $SRISK_{t+1}$
$Post_t$	0.0197***
	(5.11)
$Post\_1Q17_t$	-0.0465***
	(-12.05)
$Post\_1Q16_t$	-0.0272***
	(-6.39)
$Post\_1Q15_t$	-0.0039
	(-1.14)
$LiquidAssets_t$	0.1247
	(1.65)
$CoreDeposit_t$	-0.1843***
	(-3.47)
$Capital_t$	-0.5679**
	(-2.29)
$Commitment_t$	0.0663
	(0.60)
$Size_t$	0.0080
	(0.46)
Observations	1,933
Adjusted R-squared	0.621
Bank Fixed Effects	Yes
Year-quarter Fixed Effects	No

- **The impact on financial stability is unclear ex ante**
  - Can have little or even positive impact if disclosing banks' liquidity matters much more.
- **Measure of a bank's contribution to systemic risk**
  - SRISK: the extent a bank contributes to the undercapitalization of the financial system in stress periods (Acharya, Engle, and Richardson, 2012).
- **LCR disclosures increased systemic risk**
  - Minimum LCR requirements reduced systemic risk.

Alternative explanations and robustness tests

- **The decline in non-disclosing banks' liquidity is unlikely driven by:**
  - increases in the level of disclosing banks' liquid asset holdings
  - omitted variables correlated with *InfoGain* and changes in liquid asset holdings

- **Results are robust to:**
  - changes in sample selection criteria
  - changes in sample period
  - additional control variables
  - alternative measures of *InfoGain*

Conclusion

- **Takeaways**
  - LCR disclosure rule discouraged non-disclosing banks from holding liquid assets.
  - This spillover effect led to lower liquidity and higher systemic risk in the banking system.

- **Contribution**
  - The effect of the LCR disclosure regulation.
  - Potential cost of bank transparency.
  - Externalities of corporate disclosure and disclosure regulation.

Thank you!