On the Interaction of Bank Liquidity and Capital…

Amine TARAZI
Université de Limoges, LAPE, France
Institut Universitaire de France

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Liquidity requirements : Where do we go from…

- Several banks suffered from liquidity crisis during the global financial crisis of 2007-2008 (Nothern Rock, Bear Stearns, Lehman Brothers…)
- The new regulatory framework (Basel III) introduced **two new liquidity ratios** that are added to capital ratios (Solvency) that were implemented earlier (Basel I in 1993).
- **LCR** (Liquidity coverage ratio)
- **NSFR** (Net stable funding ratio)
- Introduced by the Basel committee (Basel III) in 2010 and 2014 and expected to be fully implemented worldwide for all banks with international operations by 2019…

→ ***These liquidity requirements were added to already existing capital requirements which were also tightened***

What are these new liquidity requirements?

- LCR (Liquidity coverage ratio)
  - requires a bank to hold sufficient high-quality liquid assets to cover its total net cash outflows **over 30 days**

⇒ 1 month horizon (sustain a stress during one month)

- NSFR (Net stable funding ratio)
  - requires the "available amount of stable funding to exceed the required amount of stable funding" over a **one-year period** of extended stress

⇒ 1 year horizon

(Available amount of stable funding / Required amount of stable funding) > 100%

⇒ ***Severely impacts the intermediation role of banks (maturity transformation and liquidity creation)***

How are liquidity requirements expected to interact with capital requirements?

- **These constraints are related by structure:**
  - ➢ Risk-based capital ratios compare **equity to asset mix**.
  - ➢ Liquidity ratios (NSFR, LCR) compare **funding mix to asset mix**.
- **When one constraint tightens, will the other constraint naturally tighten or loosen?**
  - Other constraint tightens? (Capital and liquidity are **complements**)
    - For example if reduction in capital reduces franchise value and hence makes banks less risk averse and increase liquidity risk…
  - Other constraint loosens? (Capital and liquidity are **substitutes**)
    - If banks react to capital shock by increasing liquidity because it becomes more expensive or more difficult to access on the market or to prepare for potential creditor runs and make depositors feel more confident…
  - Other constraint unaffected? (Capital and liquidity are **independent**)

Insights from recent pieces of research on the New Liquidity and Capital Requirements

- How do these liquidity requirements interact with capital requirements? What are the implications for lending?
  - **The Joint Regulation of Bank Liquidity and Bank Capital, JFI 2018**
  - Bank Regulatory Capital and Liquidity : Evidence from US and European publicly traded banks, JBF 2013
  - **Market Liquidity Shortage and Banks' Capital Structure and Balance Sheet Adjustments: Evidence from U.S. Commercial Banks**
  - Does banks' systemic importance affect their capital structure and balance sheet adjustment processes? JBF, 2019
  - The impact of liquidity regulation on bank lending: evidence from a natural experiment
- Should these liquidity requirements account for banks' networks characteristics instead of being uniformly implemented in all institutions ? How are network positions perceived by the market?
  - Do banks change their liquidity ratios based on network characteristics?
  - Interbank network characteristics, monetary policy "News" and sensitivity of bank stock returns

This research is part broader Europe/U.S. program that I am coordinating and which deals with the Future of Bank Regulation

The Post-Crisis Banking Industry: How will banks respond to tighter regulatory constraints?

Key takeaways from both papers (1)

How do banks adjust liquidity when facing a capital shock?

- Paper 1 : The Joint Regulation of Bank Liquidity and Bank Capital (JFI 2018)

Robert DeYoung, Kansas University, U.S.A.
Isabelle Distinguin, Université de Limoges, LAPE, France
Amine Tarazi, Université de Limoges, LAPE, France and IUF

Do banks adjust their capital structure and asset mix when they face liquidity shortages on the market ?

- Paper 2 : Market liquidity shortage and banks' capital structure and balance sheet adjustments

Thierno Amadou Barry, Université de Limoges, LAPE, France
Alassane Diabaté, Université de Limoges, LAPE, France
Amine Tarazi, Université de Limoges, LAPE, France and IUF

Key takeaways from both papers (2)

- Both papers use U.S. data on Pre-Basel III regime for paper 1 (1998-2012) and 2000-2014 period for paper 2
- Identification issues : banks have not yet faced the joint constraints… how to identify capital shocks…? How to measure liquidity shortage….?
  - Both papers use of a capital structure adjustment approach but for different reasons (to identify capital shocks or to focus on deviations from capital targets….)
  - Both papers use NSFR and paper 2 TED spread to proxy liquidity crises….
- Main findings :
  - Only small banks seem to behave prudently by either increasing their liquidity when facing capital shocks (paper 1) or by increasing capital ratios when facing liquidity shortages on the market (paper 2)
  - At least large banks do not reduce liquidity when facing capital shocks (neither substitutes nor complements) (paper 1)
  - When facing severe liquidity crises large banks also react but by sharply downsizing instead of issuing equity (paper 2)

→ Adding liquidity regulation to capital regulation is likely to be redundant for small banks (and unnecessarily costly) but possibly necessary for large banks

→ Basel III liquidity rules should be implemented conditional on bank size and/or bank franchise value

How do banks adjust liquidity when facing a capital shock?

The Joint Regulation of Bank Liquidity and Bank Capital

Robert DeYoung, Kansas University, U.S.A.
Isabelle Distinguin, Université de Limoges, LAPE, France
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1. Regulation now constraints bank balance sheets twice:

- Basel I (1988) established **equity capital constraints** on banks.
- Basel III (2010) added **liquidity constraints** on top of equity constraints.

2. These constraints are related by structure:

- Risk-based capital ratios compare **equity to asset mix**.
- Liquidity ratios (NSFR, LCR) compare **funding mix to asset mix**.

3. When one constraint tightens, will the other constraint naturally tighten or loosen?

- Other constraint tightens? (Capital and liquidity are **complements**.)
- Other constraint loosens? (Capital and liquidity are **substitutes**.)
- Other constraint unaffected? (Capital and liquidity are **independent**.)

We observe bank behavior <u>prior to Basel III liquidity regime</u>:

- Annual 1998-2012 data panel on US bank holding companies.
- Only one constraint (capital) on bank balance sheets.
- **<u>Question</u>: When bank capital ratios declined, did banks adjust their balance sheet liquidity?**

Two interesting potential outcomes:

- Banks reduced their balance sheet liquidity. ***The Basel III liquidity constraints are likely to affect bank behavior.***
- Banks increased their balance sheet liquidity. ***The Basel III liquidity constraints are unlikely to affect bank behavior.***

Some recent literature

Theory:

- Walther (2016): Failure risk can be reduced by a Basel III approach that jointly constrains bank equity and bank liquidity.
- Calomiris, Heider and Hoerova (2013): holding more cash reduces the chances that creditor runs will make a bank illiquid
- Acharya, Mehran and Thakor,(2010, 2015): propose regulation where portion of bank capital (a) is pledged to financing low-risk liquid assets and (b) gets claimed by the regulator should the bank approach insolvency.

Empirical estimation:

- Imbierowicz and Rauch (2014): In bank failure models, credit risk and liquidity risk can either **amplify** or **offset** each other.
- Distinguin, Roulet, and Tarazi (2013): Banks respond to reduced liquidity by:
  - **reducing** their capital (data on large banks from multiple countries).
  - **increasing** their capital (data on small U.S. banks).

Simulations:

- Schmaltz, et al (2014): Under Basel III, banks will increase **stable deposit funding**.
- Birn, Dietsch, Durant (2017): Under Basel III, banks will increase their **liquid assets**.

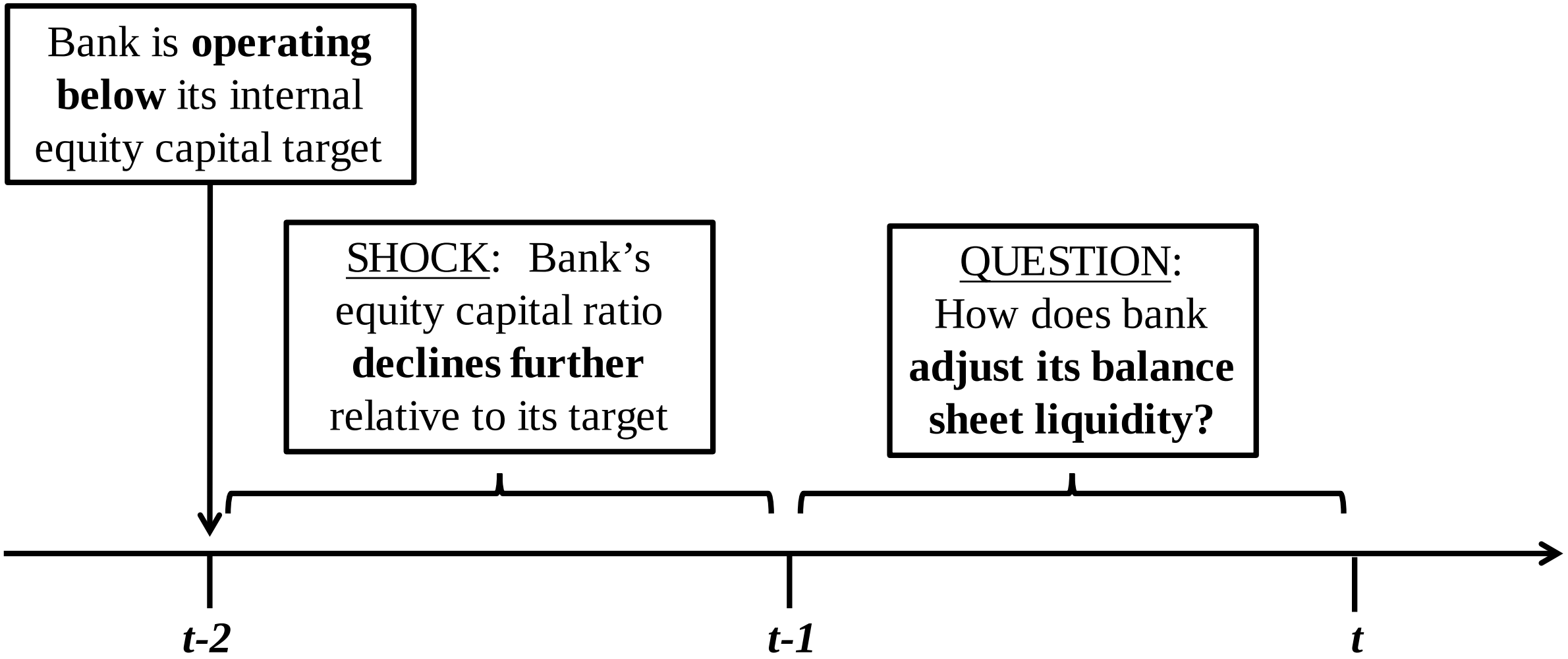
Methodology: First stage

- Estimate a **target capital ratio** for each bank in each year.
  - Variable speed-of-adjustment model (Flannery and Hankins 2013).
  - Three-step model controls for bank size, listed status, earnings volatility, bank proximity to target, bank fixed effects, time fixed effects.

- By definition, if a bank is operating **below its own target capital ratio**, it will not willingly choose to further decrease its capital ratio.
  - ***SHOCK* = 1** if capital ratio falls relative to target at a below-target bank.
  - We claim that ***SHOCK*** is an exogenous shock to bank capital.

- We estimate the model using two different equity capital ratios:
  - (Tier 1 + Tier 2 capital) / Risk-weighted assets
  - Equity / Assets

Methodology: Timing



Methodology: Second stage

- How does balance sheet liquidity respond to a negative capital shock? We estimate following equation:

$$\Delta NSFR_{i,t} = \alpha + \delta \cdot SHOCK_{i,t-1} + \gamma \cdot BELOW_{i,t-2} + \pi \cdot controls_{i,t-1} + \varepsilon_{i,t}$$

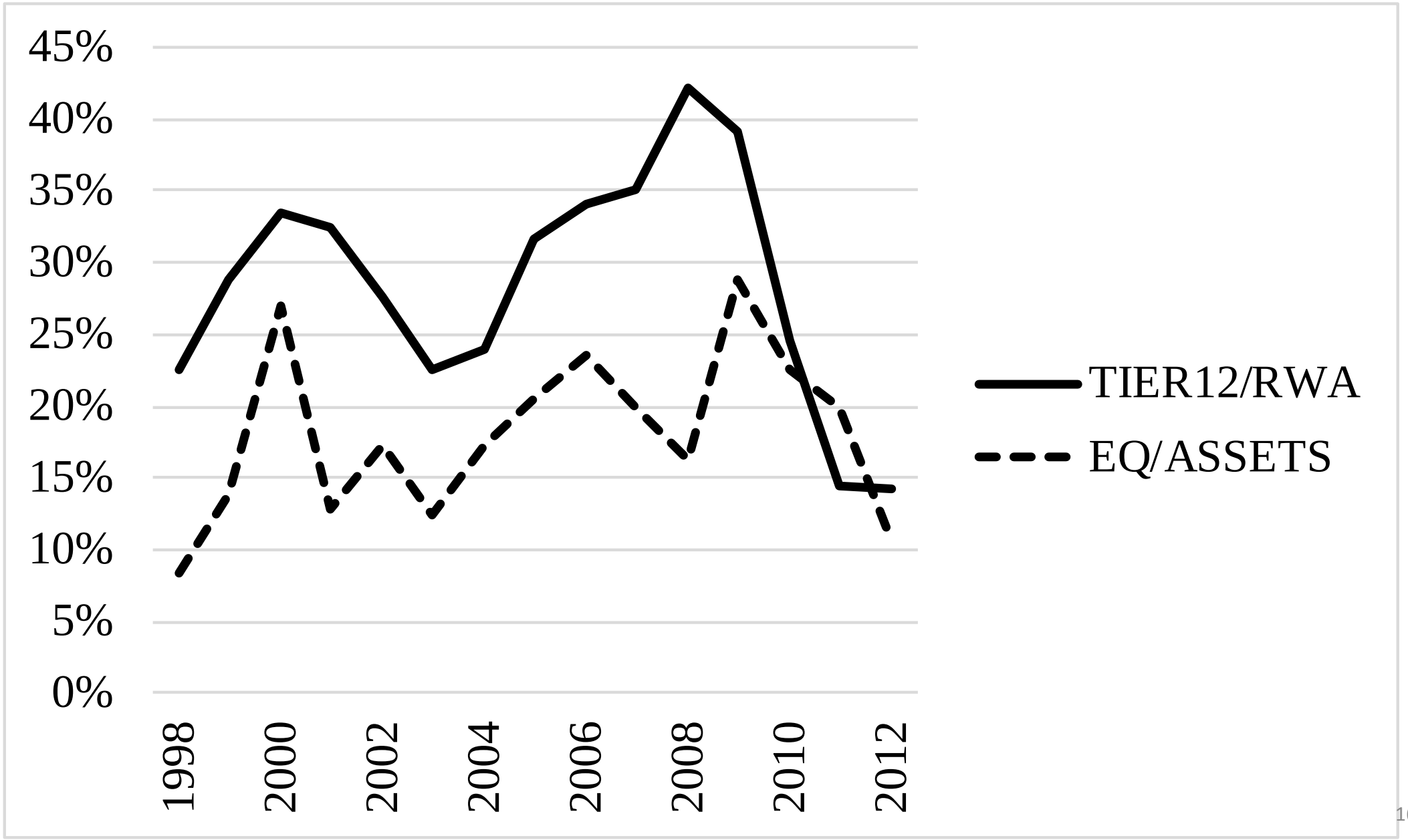
- ***NSFR*** is the net stable funding ratio (DeYoung and Jang 2016). We adjust NSFR by removing equity from the numerator.
- ***BELOW* = 1** if bank is below its capital target before *SHOCK* occurs.
- ***controls*** includes bank size, listed status, bank and time fixed effects.

- $\delta > 0$ ➔ In practice, liquidity and capital are substitutes.
- $\delta < 0$ ➔ In practice, liquidity and capital are complements.

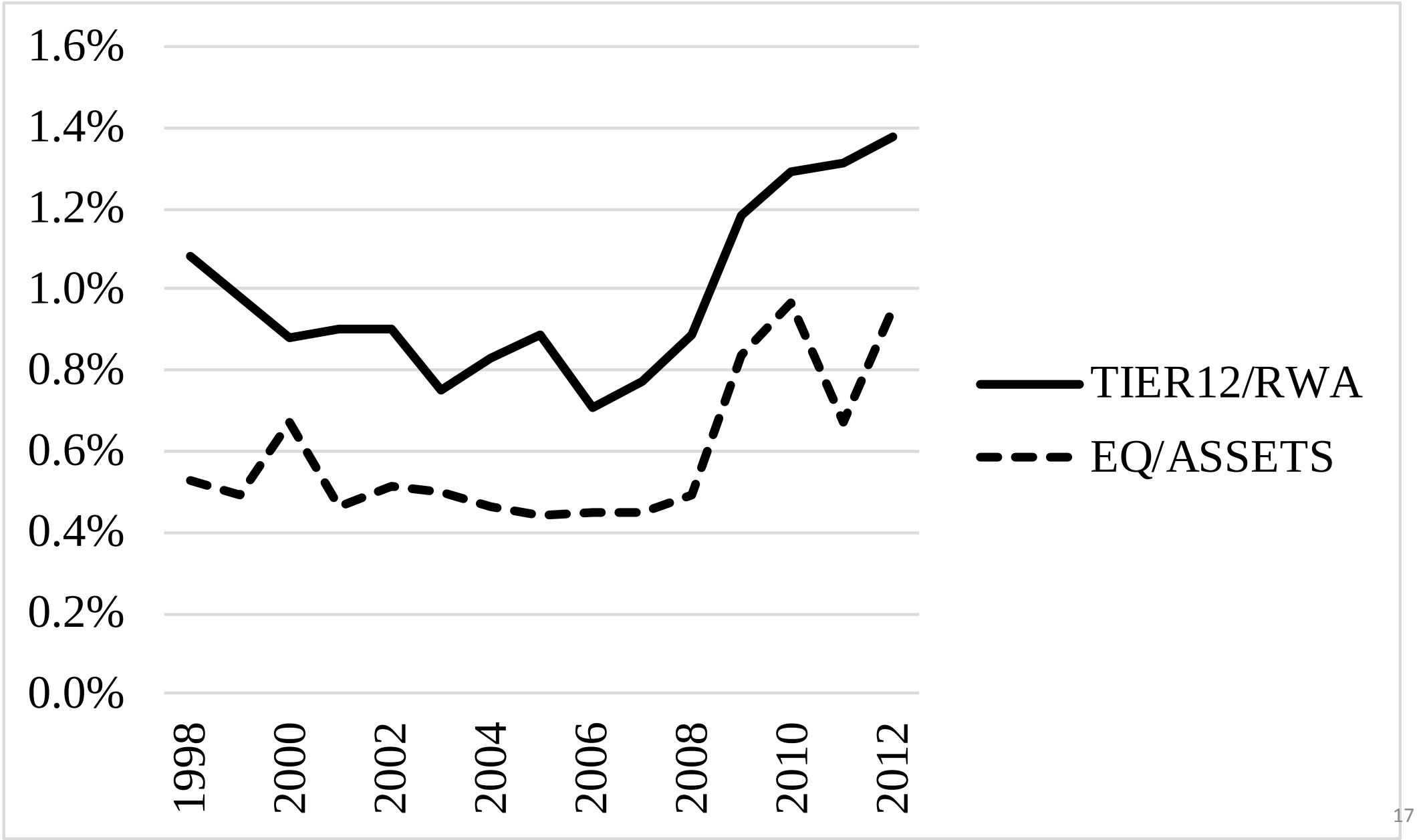
First stage results.
Mean averages from partial adjustment model.

	TIER12/RWA	*EQ/ASSETS*
Capital ratio target	16.85%	7.81%
Adjustment speed	0.151	0.160
SHOCK	-98 bps	-59 bps

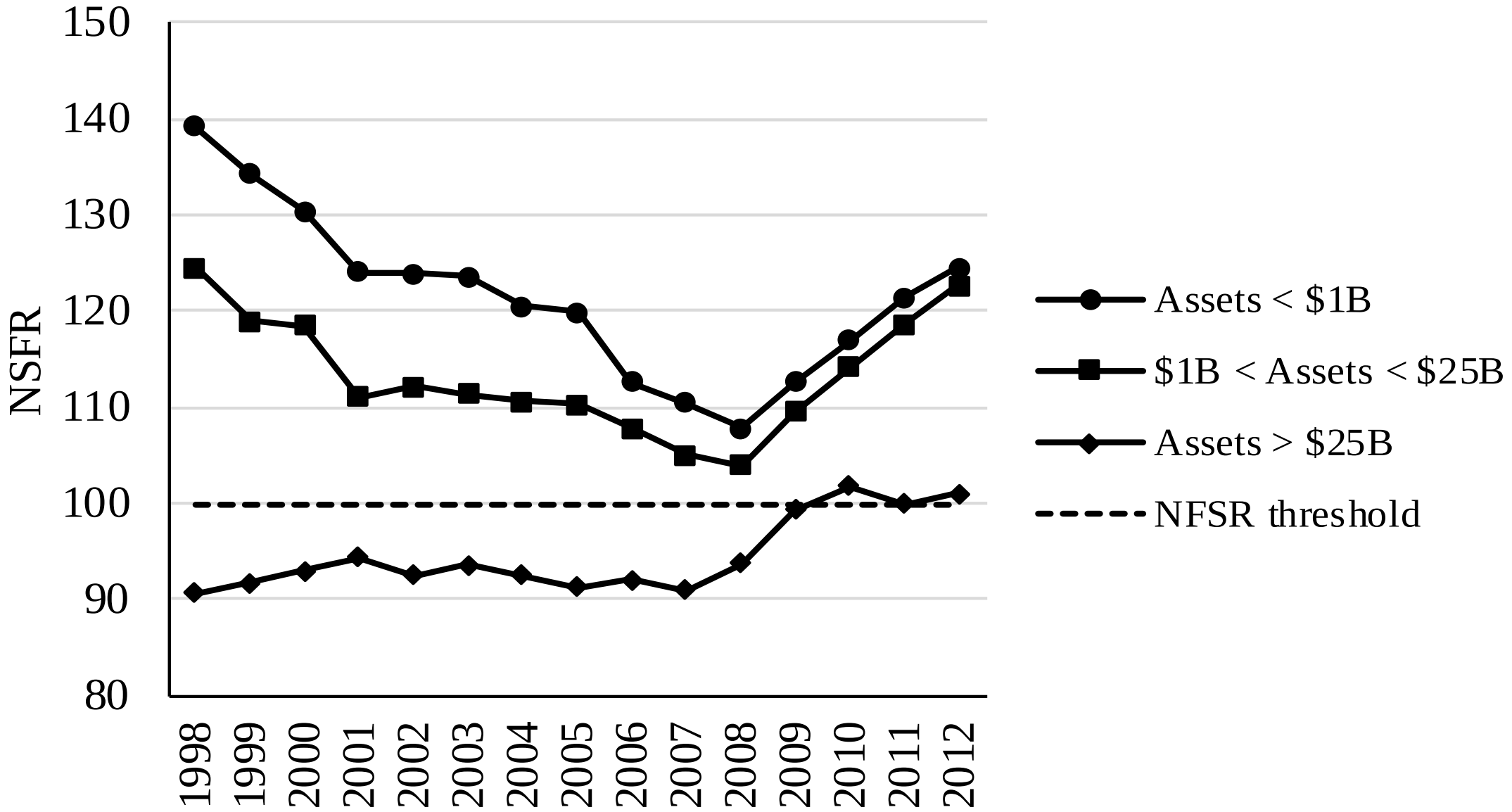
% of banks with *SHOCK* = 1



Mean size of *SHOCK*



Mean NSFRs, 1998-2012



Second stage results: ΔNFSR Regressions

	TIER12/RWA			*EQ/ASSETS*		
	All banks	Assets > $1B	Assets < $1B	All banks	Assets > $1B	Assets < $1B
SHOCK	**0.398*** **	0.155	**0.539*** **	0.203	0.165	0.250
	(2.77)	(0.61)	**(3.01)**	(1.14)	(0.43)	(1.24)
BELOW	**0.694** **	0.333	**0.805** **	-0.245	-0.426	-0.230
	(2.41)	(0.72)	**(2.08)**	(-0.95)	(-0.64)	(-0.77)
lnASSETS	-0.574	-0.111	-0.788	-0.426	-0.052	-0.630
	(-1.27)	(-0.13)	(-1.28)	(-0.95)	(-0.06)	(-1.03)
LISTED	1.748***	0.452	2.214***	1.295***	0.089	1.744***
	(3.89)	(0.51)	(3.94)	(2.85)	(0.10)	(3.25)
constant	10.40*	4.188	13.224	9.121	3.846	11.915
	(1.66)	(0.31)	(1.62)	(1.47)	(0.28)	(1.46)
N	10,807	3,123	7,684	10,807	3,123	7,684
Adj R-sq	0.181	0.209	0.164	0.180	0.209	0.161

Second stage results: ΔNFSR Regressions

Results are robust to:

- Using raw (non-adjusted) ΔNFSR.
- Replacing ΔNFSR with Δ(Liquid Assets/Assets).
- Replacing ΔNFSR with Δ(Core Deposits/Loans).
- Replacing *SHOCK* dummy with continuous *SHOCKSIZE* variable (for shocks less than 2% of capital).

Results are NOT robust to:

- Replacing *SHOCK* dummy with continuous *SHOCKSIZE* variable (for shocks larger than 2% of capital).

Subsamples

1. Our main finding is limited to small banks with assets < $1 billion.
   - Raising new external capital is very difficult for these banks.
   - Do our results intensify for very small banks?

2. A bank may become more risk averse when it has greater franchise value to protect.
   - Do our results intensify for banks with high absolute capital?

ΔNFSR Subsample Regressions

	TIER12/RWA Assets < $1B		*TIER12/RWA* Assets < $1B	
	ASSETS > median	**ASSETS < median**	**TIER12/RWA > median**	**TIER12/RWA < median**
SHOCK	**0.553****	**0.674****	**1.017*****	0.261
	(2.27)	**(2.35)**	**(2.99)**	(1.21)
BELOW	0.512	**1.115***	0.745	0.154
	(0.92)	**(1.96)**	(1.51)	(0.19)
lnASSETS	-1.594*	-2.228	-3.253**	-0.394
	(-1.65)	(-1.60)	(-2.49)	(-0.48)
LISTED	2.029***	3.518***	3.287***	1.960**
	(2.98)	(3.02)	(2.84)	(2.51)
constant	24.204*	31.204*	45.449***	8.105
	(1.83)	(1.73)	(2.64)	(0.74)
N	3.838	3.846	3.833	3.851
Adj R-sq	0.192	0.130	0.159	0.171

Behavioral channels

- What exactly are we capturing in our main results?
  a) **Direct substitution** of balance sheet liquidity for lost capital?
  b) **Ancillary increases** in balance sheet liquidity, as banks work to rebuild their equity ratios?

- We regress the following items on *SHOCK*, *BELOW*, and *controls*:
  - Δ asset growth
  - Δ loans/assets
  - Δ business loans/assets
  - Δ loan commitments/assets

  } Negatively related to capital ratio

  - Δ core deposits/deposits ← Positively related to liquidity
  - Δ dividend payout ratio ← Related to both

Channels Regressions

	TIER12/RWA, Assets < $1B					
	ΔAsset Growth Rate	ΔLoans/ Assets	ΔBusiness Loans/ Assets	ΔLoan Commitments/ Assets	ΔCore Deposits/ Deposits	ΔDividend Payout Ratio
SHOCK	0.267	**-0.352*** **	**-0.214*** **	**-0.223** **	-0.052	**-4.734*** **
	(1.37)	**(-2.79)**	**(-3.77)**	**(-2.53)**	(-0.53)	**(-2.94)**
N	7,684	7,684	7,684	7,684	7,684	7,684
Adj R-sq	0.102	0.129	0.029	0.070	0.084	0.005
SHOCKSIZE	**-0.397*** **	0.000	**-0.078** **	**-0.149*** **	-0.076	-2.058
	(-2.76)	(0.01)	**(-2.14)**	**(-2.66)**	(-1.09)	(-1.55)
N	7,684	7,684	7,684	7,684	7,684	7,684
Adj R-sq	0.104	0.128	0.027	0.070	0.084	0.005

Conclusions from this study (Capital/Liquidity)

1. Banks respond to risk-weighted capital shocks with nontrivial increases to their balance sheet liquidity (NSFR).
   - Result is limited to community banks.
   - Response is stronger at banks with high franchise values.
2. However, **for banks of all sizes and equity levels**, we reject the notion that balance sheet liquidity declines in response to capital shocks.
3. Liquidity not a **direct substitute** for capital. Rather, increases in NSFRs are **ancillary to** the process of rebuilding capital ratios.
4. In state of nature that traditionally worries bank regulators the most (capital distress), banks **do not reduce** their balance sheet liquidity.
5. Regulatory **capital** constraint matters for bank **liquidity behavior**.
6. Evidence suggests that Basel III liquidity rules should be implemented conditional on bank size and/or bank franchise value.

Do banks adjust their capital structure and asset composition when they face liquidity shortages on the market ?

Market liquidity shortage and banks' capital structure and balance sheet adjustments: evidence from U.S. commercial Banks

Thierno Amadou Barry, Université de Limoges, LAPE, France

Alassane Diabaté, Université de Limoges, LAPE, France

Amine Tarazi, Université de Limoges, LAPE, France and IUF

Background and Motivation

- Regulators have introduced stringent changes to the prudential regulation of banks after the Global Financial Crisis of 2007-2008 (Basel III)
  - Because liquidity shortage was a major contributor to bank failure during the crisis, Basel III (2010) added **liquidity constraints** on top of equity constraints (Basel I, 1988)
  - **Capital constraints** have also become more stringent and with newly added requirements (conservation buffer, countercyclical buffer, leverage ratio, TLAC….)
- Do these liquidity constraints work as substitutes or complements to capital constraints (DeYoung et al., 2018)?
- While previous literature has looked at the interaction of capital and liquidity (Distinguin et al., 2013, DeYoung et al., 2018…) how banks adjust their capital during **systemic liquidity crises** is still undocumented

→ Banks might take action during episodes of severe liquidity shortage to improve their financial strength by improving their internal liquidity and their capital ratios

Objective

- Aim is to investigate **how banks react to market liquidity shortages** in terms of **capital structure** and balance sheet **adjustments**:
  - Banks could either downsize their overall activity to achieve lower leverage
  - or substitute liquid assets to loans to improve their internal liquidity….

- Banks might not be affected similarly
  - ✓Banks that hold **less liquid** assets or with higher maturity mismatch between assets and liabilities may be differently affected by a liquidity shortage on the market than other banks
  - ✓Banks operating **below their target capital ratios** might also behave differently than banks operating above their target
  - ✓**Small banks** are financially **more constrained** than large banks

- The cost of capital may be higher during liquidity squeezes
  - Adjustment to target capital ratios can be affected (equity issue/repurchase, Dividend payments, increase/decrease in risk weighted assets…)

What we do in the paper

•We capture episodes of market liquidity shortages by sudden and **sharp increases** in commercial paper rates and specifically the **TED spread** (three-month LIBOR - three-month T-bill interest rates)

• We consider a **capital structure adjustment framework** (Berger et al.,2008; Memmel and Raupach, 2010; Öztekin and Flannery, 2012; Lepetit, et al., 2015; De Jonghe and Öztekin…) to investigate how liquidity shortages affect the capital structure adjustment process

• We focus on the **different channels** through which market liquidity shortages may impact banks' capital structure adjustment :

- ✓the share of risk weighted assets in total assets (substitution effect),
- ✓the share of loans in total assets (impact on lending)
- ✓total assets (downsizing)
- ✓dividend payments (earnings retention)

Sample and Data

- U.S. commercial banks quarterly data over 2000Q1-2014Q4 period
- 10053 banks:
  - ✓We select banks that provide information on their total assets on at least one quarter in our investigation period
  - ✓We exclude banks with a total capital ratio under the minimum required level
- We winsorize our variables at the 2nd and 98th percentiles

- Source: SNL Financial & Federal Reserve Bank of St. Louis

Main variables (1)

- Dependent variables:
  - ✓Total capital ratio, tier 1 capital ratio
  - ✓The change in the share of risk weighted assets in total assets
  - ✓The change in the share of loans in total assets
  - ✓The change in total assets
  - ✓The dividend to total assets ratio

- Proxies of market liquidity shortage:
  - ✓We use the TED spread by following cornett et al. (2011), wu and hong (2012), rodríguez-moreno and peña (2013) and hong et al. (2014)
  - ✓We use the commercial paper spread by following gatev and strahan (2006) and
  - ✓We capture episodes of market liquidity constraint through a dummy variable MLS_t based on either the TED spread or the commercial paper spread.
  - ✓The dummy variable is equal to one if the observation is above its 75^{th} percentile throughout the entire sample period and zero otherwise (other criteria are used…)

Main variables (2)

- Extent of reliance on market liquidity
  - ✓A dummy variable $Z_{i,t}$ that is equal to one if bank *i* has a NSFR lower than 100% at time *t* and zero if otherwise (other criteria are used…)

- Banks operating below their target capital ratio:
  - ✓A dummy variable $dummy\_gap_{i,t-1}$ that is equal to one if bank is operating below their target capital ratio and zero if otherwise

- Control variables:
  - ✓The GDP growth rate
  - ✓Bank size
  - ✓Return on assets
  - ✓Ratio of non-performing loans to total
  - ✓A dummy to control for the effect of mergers and acquisitions

EMPIRICAL SPECIFICATION

- $Y_{i.t} = \alpha_i + \xi_t + \varphi_1 MLS_{t-1} + \varphi_2 Z_{i,t-1} + \varphi_3 dummy\_gap_{i,t-1} + \varphi_4 (Z_{i,t-1} * MLS_{t-1}) + \varphi U_{i.t-1} + \eta_{i.t}$

- $Y_{i.t} = \gamma_i + \theta_t + \omega_1 MLS_{t-1} + \omega_2 Z_{i,t-1} + \omega_3 dummy\_gap_{i,t-1} + \omega_4 (dummy\_gap_{i,t-1} * MLS_{t-1}) + \omega U_{i.t-1} + \mu i.t$

- Fixed effect method
- clustering standard errors at the bank level

RESULTS (1): Impact of market liquidity shortages according to bank liquidity level

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (φ_1)	**-0.578**	**0.263*****	**1.501***	**-0.422*****	**-0.159**	**-0.456*****	**0.187**	**-0.430****	**0.0575**	**0.0513****
	(0.580)	(0.0973)	(0.793)	(0.157)	(0.818)	(0.152)	(0.683)	(0.172)	(0.0570)	(0.0259)
$Z_{i,t-1}$ (φ_2)	0.103	0.0685***	-0.137	-0.142***	-0.530**	-0.270***	0.0816	0.0198	-0.00106	0.00587
	(0.166)	(0.0137)	(0.212)	(0.0238)	(0.259)	(0.0244)	(0.206)	(0.0255)	(0.0210)	(0.00456)
$dummy\_gap_{i,t-1}$ (φ_3)	0.597***	0.414***	-0.860***	-0.931***	-0.380**	-0.475***	0.456***	0.193***	-0.0502***	-0.0144***
	(0.0965)	(0.0154)	(0.128)	(0.0308)	(0.168)	(0.0276)	(0.139)	(0.0290)	(0.0127)	(0.00448)
$Z_{i,t-1} * MLS_{t-1}$ (φ_4)	0.191	0.173***	-0.495	-0.290***	-0.0516	-0.234***	-0.142	0.0345	0.0110	-0.00767
	(0.155)	(0.0244)	(0.364)	(0.0427)	(0.393)	(0.0397)	(0.344)	(0.0394)	(0.0340)	(0.00666)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\varphi_1 + \varphi_4$	-0.387	0.435	1.006	-0.711	-0.211	-0.690	0.0457	-0.396	0.0685	0.0437
Wald test p value	0.493	0.000	0.147	0.000	0.766	0.000	0.939	0.021	0.0918	0.0846
r2	0.0770	0.210	0.116	0.0895	0.0760	0.130	0.625	0.542	0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

RESULTS (1): Impact of market liquidity shortages according to bank liquidity level

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (φ_1)	-0.578	0.263***	1.501*	-0.422***	-0.159	-0.456***	0.187	-0.430**	0.0575	0.0513**
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	(0.0965)	(0.0154)	(0.128)	(0.0308)	(0.168)	(0.0276)	(0.139)	(0.0290)	(0.0127)	(0.00448)
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Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\varphi_1 + \varphi_4$	**-0.387**	**0.435**	**1.006**	**-0.711**	**-0.211**	**-0.690**	**0.0457**	**-0.396**	**0.0685**	**0.0437**
Wald test p value	**0.493**	**0.000**	**0.147**	**0.000**	**0.766**	**0.000**	**0.939**	**0.021**	**0.0918**	**0.0846**
r2	0.0770	0.210	0.116	0.0895	0.0760	0.130	0.625	0.542	0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

RESULTS (2): Impact of market liquidity shortages according to gap between actual and target capital

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (ω_1)	**-0.630**	**0.321*****	**1.206***	**-0.508*****	**-0.160**	**-0.545*****	**0.0189**	**-0.414****	**0.0689**	**0.0486***
	(0.569)	(0.0962)	(0.676)	(0.155)	(0.710)	(0.150)	(0.633)	(0.171)	(0.0466)	(0.0257)
$Z_{i,t-1}$ (ω_2)	0.140	0.111***	-0.237	-0.214***	-0.541**	-0.328***	0.0524	0.0284	0.00108	0.00426
	(0.156)	(0.0129)	(0.204)	(0.0226)	(0.242)	(0.0233)	(0.185)	(0.0237)	(0.0195)	(0.00423)
$dummy\_gap_{i,t-1}$ (ω_3)	0.532***	0.378***	-0.819***	-0.861***	-0.366**	-0.436***	0.443***	0.191***	-0.0497***	-0.0134***
	(0.107)	(0.0162)	(0.145)	(0.0317)	(0.169)	(0.0288)	(0.146)	(0.0303)	(0.0142)	(0.00474)
$dummy\_gap_{i,t-1} * MLS_{t-1}$ (ω_4)	0.289*	0.150***	-0.190	-0.295***	-0.0588	-0.162***	0.0552	0.00937	-0.00208	-0.00455
	(0.159)	(0.0179)	(0.260)	(0.0368)	(0.278)	(0.0339)	(0.245)	(0.0381)	(0.0252)	(0.00571)
Control variable	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\omega_1 + \omega_4$	-0.341	0.471	1.017	-0.803	-0.219	-0.707	0.0740	-0.404	0.0668	0.0440
Wald test p value	0.549	0.000	0.154	0.000	0.763	0.000	0.902	0.019	0.107	0.0802
r2	0.0774	0.210	0.116	0.0895	0.0760	0.130	0.625	0.542	0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

RESULTS (2): Impact of market liquidity shortages according to gap between actual and target capital

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (ω_1)	-0.630	0.321***	1.206*	-0.508***	-0.160	-0.545***	0.0189	-0.414**	0.0689	0.0486*
	(0.569)	(0.0962)	(0.676)	(0.155)	(0.710)	(0.150)	(0.633)	(0.171)	(0.0466)	(0.0257)
$Z_{i,t-1}$ (ω_2)	0.140	0.111***	-0.237	-0.214***	-0.541**	-0.328***	0.0524	0.0284	0.00108	0.00426
	(0.156)	(0.0129)	(0.204)	(0.0226)	(0.242)	(0.0233)	(0.185)	(0.0237)	(0.0195)	(0.00423)
$dummy\_gap_{i,t-1}$ (ω_3)	0.532***	0.378***	-0.819***	-0.861***	-0.366**	-0.436***	0.443***	0.191***	-0.0497***	-0.0134***
	(0.107)	(0.0162)	(0.145)	(0.0317)	(0.169)	(0.0288)	(0.146)	(0.0303)	(0.0142)	(0.00474)
$dummy\_gap_{i,t-1} * MLS_{t-1}$ (ω_4)	0.289*	0.150***	-0.190	-0.295***	-0.0588	-0.162***	0.0552	0.00937	-0.00208	-0.00455
	(0.159)	(0.0179)	(0.260)	(0.0368)	(0.278)	(0.0339)	(0.245)	(0.0381)	(0.0252)	(0.00571)
Control variable	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\omega_1 + \omega_4$	**-0.341**	**0.471**	**1.017**	**-0.803**	**-0.219**	**-0.707**	**0.0740**	**-0.404**	**0.0668**	**0.0440**
Wald test p value	**0.549**	**0.000**	**0.154**	**0.000**	**0.763**	**0.000**	**0.902**	**0.019**	**0.107**	**0.0802**
r2									0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

RESULTS (3)

- Market liquidity shortage **does not impact** the change in the total capital ratio of **large banks** regardless of
  - ✓how much they rely on market liquidity
  - ✓how far they are below their target capital ratio

- **Small banks** respond to market liquidity shortage by **positively adjusting** their total capital ratio. Such banks do so by
  - ✓decreasing the share of risk weighted assets in total assets,
  - ✓reducing the share of loans in total assets and
  - ✓downsizing their balance sheets.

RESULTS (4)

- The **impact** on the total capital ratio is **stronger** for small banks that are **more reliant on market liquidity**
  - ✓They reduce the share of risk weighted assets in total assets by a larger extent
  - ✓They cut loans more extensively than small banks which are less reliant on market liquidity

- Small **banks operating below their target total capital ratio increase their total capital ratio more significantly** than banks operating above their target ratio
  - ✓They more extensively reduce their risk weighted assets
  - ✓They cut loans more extensively than small banks operating above their target total capital ratio

RESULTS (5)

- **Large banks' capital ratios and balance sheets** more generally **do not react** to liquidity shortages possibly because of
  - ✓easier access to fed funds under any circumstances
  - ✓their "too-big-to-fail" status enabling them to benefit from government support which is not the case for small banks.

- **Small banks** may be **adjust**ing their **capital ratio positively** because
  - ✓Their confidence in the market decreases
  - ✓They need to show stronger financial strength or hedge against probable losses (Ramos, 1996)
  - ✓Of precautionary reasons: to avoid falling under the minimum regulatory level of the capital ratio
  - ✓Of the aim to avoid a higher cost of uninsured deposits by limiting the higher premium required by depositors (Fonseca and González, 2009)
  - ✓Of the aim to reduce the likelihood of a bank run (Dermine, 2015)

Severe market liquidity shortage (Liquidity Constraint)

90th percentile and/or the mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (φ_1)	**0.150**	**0.984*****	**0.404**	**-0.636*****	**-1.892****	**-1.109*****	**-3.720*****	**-2.065*****	**-0.0839**	**-0.247*****
	(0.600)	(0.0970)	(0.777)	(0.165)	(0.783)	(0.166)	(0.690)	(0.170)		
$Z_{i,t-1}$ (φ_2)	0.120	0.0973***	-0.237	-0.190***	-0.585**	-0.310***	0.0419	0.0353	-0.00270	0.00485
	(0.157)	(0.0133)	(0.209)	(0.0231)	(0.243)	(0.0234)	(0.192)	(0.0243)	(0.0203)	(0.00435)
$dummy\_gap_{i,t-1}$ (φ_3)	0.598***	0.414***	-0.862***	-0.931***	-0.379**	-0.475***	0.455***	0.193***	-0.0502***	-0.0144***
	(0.0965)	(0.0154)	(0.129)	(0.0308)	(0.168)	(0.0276)	(0.139)	(0.0290)	(0.0127)	(0.00448)
$Z_{i,t-1} * MLS_{t-1}$ (φ_4)	0.313	0.156***	-0.00848	-0.268***	0.620	-0.203***	0.150	-0.0760	0.0512	-0.00620
	(0.281)	(0.0383)	(0.401)	(0.0647)	(0.426)	(0.0691)	(0.406)	(0.0599)	(0.0502)	(0.00911)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\varphi_1 + \varphi_4$	0.463	1.141	0.396	-0.904	-1.272	-1.312	-3.570	-2.141	-0.0327	-0.253
Wald test p value	0.361	0.000	0.552	0.000	0.0484	0.000	0.000	0.000	0.546	0.000
r2	0.0770	0.210	0.115	0.0894	0.0762	0.130	0.625	0.542	0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (Liquidity Constraint)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (φ_1)	**0.150**	**0.984*****	**0.404**	**-0.636*****	**-1.892****	**-1.109*****	**-3.720*****	**-2.065*****	**-0.0839**	**-0.247*****
	(0.600)	(0.0970)	(0.777)	(0.165)	(0.783)	(0.166)	(0.690)	(0.170)	(0.0770)	(0.0270)
$Z_{i,t-1}$ (φ_2)	0.120	0.0973***	-0.237	-0.190***	-0.585**	-0.310***	0.0419	0.0353	-0.00270	0.00485
	(0.157)	(0.0133)	(0.209)	(0.0231)	(0.243)	(0.0234)	(0.192)	(0.0243)	(0.0203)	(0.00435)
$dummy\_gap_{i,t-1}$ (φ_3)	0.598***	0.414***	-0.862***	-0.931***	-0.379**	-0.475***	0.455***	0.193***	-0.0502***	-0.0144***
	(0.0965)	(0.0154)	(0.129)	(0.0308)	(0.168)	(0.0276)	(0.139)	(0.0290)	(0.0127)	(0.00448)
$Z_{i,t-1} * MLS_{t-1}$ (φ_4)	0.313	0.156***	-0.00848	-0.268***	0.620	-0.203***	0.150	-0.0760	0.0512	-0.00620
	(0.281)	(0.0383)	(0.401)	(0.0647)	(0.426)	(0.0691)	(0.406)	(0.0599)	(0.0502)	(0.00911)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\varphi_1 + \varphi_4$	0.463	1.141	0.396	-0.904	-1.272	-1.312	-3.570	-2.141	-0.0327	-0.253
Wald test p value	0.361	0.000	0.552	0.000	0.0484	0.000	0.000	0.000	0.546	0.000
r2	0.0770	0.210	0.115	0.0894	0.0762	0.130	0.625	0.542	0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (Liquidity Constraint)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (φ_1)	0.150	0.984***	0.404	-0.636***	-1.892**	-1.109***	-3.720***	-2.065***	-0.0839	-0.247***
	(0.600)	(0.0970)	(0.777)	(0.165)	(0.783)	(0.166)	(0.690)	(0.170)	(0.0770)	(0.0270)
$Z_{i,t-1}$ (φ_2)	0.120	0.0973***	-0.237	-0.190***	-0.585**	-0.310***	0.0419	0.0353	-0.00270	0.00485
	(0.157)	(0.0133)	(0.209)	(0.0231)	(0.243)	(0.0234)	(0.192)	(0.0243)	(0.0203)	(0.00435)
$dummy\_gap_{i,t-1}$ (φ_3)	0.598***	0.414***	-0.862***	-0.931***	-0.379**	-0.475***	0.455***	0.193***	-0.0502***	-0.0144***
	(0.0965)	(0.0154)	(0.129)	(0.0308)	(0.168)	(0.0276)	(0.139)	(0.0290)	(0.0127)	(0.00448)
$Z_{i,t-1} * MLS_{t-1}$ (φ_4)	0.313	0.156***	-0.00848	-0.268***	0.620	-0.203***	0.150	-0.0760	0.0512	-0.00620
	(0.281)	(0.0383)	(0.401)	(0.0647)	(0.426)	(0.0691)	(0.406)	(0.0599)	(0.0502)	(0.00911)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\varphi_1 + \varphi_4$	**0.463**	**1.141**	**0.396**	**-0.904**	**-1.272**	**-1.312**	**-3.570**	**-2.141**	**-0.0327**	**-0.253**
Wald test p value	**0.361**	**0.000**	**0.552**	**0.000**	**0.0484**	**0.000**	**0.000**	**0.000**	**0.546**	**0.000**
r2										
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (Liquidity Constraint)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (φ_1)	0.150	0.984***	0.404	-0.636***	-1.892**	-1.109***	-3.720***	-2.065***	-0.0839	-0.247***
	(0.600)	(0.0970)	(0.777)	(0.165)	(0.783)	(0.166)	(0.690)	(0.170)	(0.0770)	(0.0270)
$Z_{i,t-1}$ (φ_2)	0.120	0.0973***	-0.237	-0.190***	-0.585**	-0.310***	0.0419	0.0353	-0.00270	0.00485
	(0.157)	(0.0133)	(0.209)	(0.0231)	(0.243)	(0.0234)	(0.192)	(0.0243)	(0.0203)	(0.00435)
$dummy\_gap_{i,t-1}$ (φ_3)	0.598***	0.414***	-0.862***	-0.931***	-0.379**	-0.475***	0.455***	0.193***	-0.0502***	-0.0144***
	(0.0965)	(0.0154)	(0.129)	(0.0308)	(0.168)	(0.0276)	(0.139)	(0.0290)	(0.0127)	(0.00448)
$Z_{i,t-1} * MLS_{t-1}$ (φ_4)	0.313	0.156***	-0.00848	-0.268***	0.620	-0.203***	0.150	-0.0760	0.0512	-0.00620
	(0.281)	(0.0383)	(0.401)	(0.0647)	(0.426)	(0.0691)	(0.406)	(0.0599)	(0.0502)	(0.00911)
Control variables	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\varphi_1 + \varphi_4$	**0.463**	**1.141**	**0.396**	**-0.904**	**-1.272**	**-1.312**	**-3.570**	**-2.141**	**-0.0327**	**-0.253**
Wald test p value	**0.361**	**0.000**	**0.552**	**0.000**	**0.0484**	**0.000**	**0.000**	**0.000**	**0.546**	**0.000**
r2	0.0770	0.210	0.115	0.0894	0.0762	0.130	0.625	0.542	0.415	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (capital gap)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (ω_1)	**0.140**	**1.093*****	**0.463**	**-0.800*****	**-1.210**	**-1.243*****	**-4.022*****	**-2.138*****	**-0.0900**	**-0.248*****
	(0.559)	(0.0917)	(0.700)	(0.159)	(0.741)	(0.158)	(0.644)	(0.166)	(0.0640)	(0.0263)
$Z_{i,t-1}$ (ω_2)	0.140	0.111***	-0.237	-0.214***	-0.540**	-0.328***	0.0498	0.0284	0.000655	0.00427
	(0.156)	(0.0129)	(0.204)	(0.0226)	(0.242)	(0.0233)	(0.185)	(0.0237)	(0.0196)	(0.00423)
$dummy\_gap_{i,t-1}$ (ω_3)	0.563***	0.410***	-0.854***	-0.920***	-0.371**	-0.468***	0.406***	0.190***	-0.0564***	-0.0133***
	(0.0992)	(0.0156)	(0.131)	(0.0313)	(0.171)	(0.0281)	(0.141)	(0.0294)	(0.0138)	(0.00458)
$dummy\_gap_{i,t-1} * MLS_{t-1}$ (ω_4)	0.394*	0.0334	-0.0841	-0.109**	-0.0997	-0.0607	0.561	0.0328	0.0703	-0.0111
	(0.204)	(0.0262)	(0.316)	(0.0504)	(0.418)	(0.0516)	(0.341)	(0.0568)	(0.0441)	(0.00730)
Size $_{i,t-1}$	0.101	1.071***	0.290	-0.968***	-0.411	-1.331***	-2.363***	-2.310***	0.0159	-0.0944***
	(0.275)	(0.0555)	(0.370)	(0.0679)	(0.325)	(0.0763)	(0.248)	(0.0857)	(0.0175)	(0.0121)
ROA $_{i,t-1}$	0.220***	0.378***	-0.0226	-0.203***	-0.137**	-0.325***	0.273***	0.184***	0.0110**	0.00441**
	(0.0358)	(0.0115)	(0.0466)	(0.0166)	(0.0533)	(0.0172)	(0.0491)	(0.0137)	(0.00455)	(0.00185)
NPL $_{i,t-1}$	0.0524**	0.0914***	-0.102***	-0.142***	-0.138***	-0.194***	-0.244***	-0.296***	-0.00271	0.000523
	(0.0213)	(0.00384)	(0.0264)	(0.00609)	(0.0330)	(0.00660)	(0.0395)	(0.00745)	(0.00553)	(0.000959)
GDP growth $_{t-1}$	0.0532	0.322***	0.578**	0.159***	-0.0228	0.204***	-1.145***	-1.023***	-0.00507	-0.0743***
	(0.202)	(0.0329)	(0.270)	(0.0510)	(0.253)	(0.0515)	(0.223)	(0.0541)	(0.0208)	(0.0107)
$M\&A_{i,t-1}$	0.906***	1.408***	3.033***	3.243***	2.174***	3.610***	-15.36***	-13.11***	0.0185	0.0179***
	(0.111)	(0.0392)	(0.210)	(0.0676)	(0.245)	(0.0777)	(0.267)	(0.0805)	(0.0160)	(0.00657)
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\omega_1 + \omega_4$	0.534	1.126	0.379	-0.910	-1.310	-1.303	-3.461	-2.105	-0.0198	-0.259
Wald test p value	0.290	0.000	0.573	0.000	0.0426	0.000	0.000	0.000	0.720	0.000
r2	0.0773	0.209	0.115	0.0893	0.0760	0.130	0.625	0.542	0.416	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (capital gap)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (ω_1)	**0.140**	**1.093*****	**0.463**	**-0.800****	**-1.210**	**-1.243*****	**-4.022*****	**-2.138*****	**-0.0900**	**-0.248*****
	(0.559)	(0.0917)	(0.700)	(0.159)	(0.741)	(0.158)	(0.644)	(0.166)	(0.0640)	(0.0263)
$Z_{i,t-1}$ (ω_2)	0.140	0.111***	-0.237	-0.214***	-0.540**	-0.328***	0.0498	0.0284	0.000655	0.00427
	(0.156)	(0.0129)	(0.204)	(0.0226)	(0.242)	(0.0233)	(0.185)	(0.0237)	(0.0196)	(0.00423)
$dummy\_gap_{i,t-1}$ (ω_3)	0.563***	0.410***	-0.854***	-0.920***	-0.371**	-0.468***	0.406***	0.190***	-0.0564***	-0.0133***
	(0.0992)	(0.0156)	(0.131)	(0.0313)	(0.171)	(0.0281)	(0.141)	(0.0294)	(0.0138)	(0.00458)
$dummy\_gap_{i,t-1} * MLS_{t-1}$ (ω_4)	0.394*	0.0334	-0.0841	-0.109**	-0.0997	-0.0607	0.561	0.0328	0.0703	-0.0111
	(0.204)	(0.0262)	(0.316)	(0.0504)	(0.418)	(0.0516)	(0.341)	(0.0568)	(0.0441)	(0.00730)
Size $_{i,t-1}$	0.101	1.071***	0.290	-0.968***	-0.411	-1.331***	-2.363***	-2.310***	0.0159	-0.0944***
	(0.275)	(0.0555)	(0.370)	(0.0679)	(0.325)	(0.0763)	(0.248)	(0.0857)	(0.0175)	(0.0121)
ROA $_{i,t-1}$	0.220***	0.378***	-0.0226	-0.203***	-0.137**	-0.325***	0.273***	0.184***	0.0110**	0.00441**
	(0.0358)	(0.0115)	(0.0466)	(0.0166)	(0.0533)	(0.0172)	(0.0491)	(0.0137)	(0.00455)	(0.00185)
NPL $_{i,t-1}$	0.0524**	0.0914***	-0.102***	-0.142***	-0.138***	-0.194***	-0.244***	-0.296***	-0.00271	0.000523
	(0.0213)	(0.00384)	(0.0264)	(0.00609)	(0.0330)	(0.00660)	(0.0395)	(0.00745)	(0.00553)	(0.000959)
GDP growth $_{t-1}$	0.0532	0.322***	0.578**	0.159***	-0.0228	0.204***	-1.145***	-1.023***	-0.00507	-0.0743***
	(0.202)	(0.0329)	(0.270)	(0.0510)	(0.253)	(0.0515)	(0.223)	(0.0541)	(0.0208)	(0.0107)
$M\&A_{i,t-1}$	0.906***	1.408***	3.033***	3.243***	2.174***	3.610***	-15.36***	-13.11***	0.0185	0.0179***
	(0.111)	(0.0392)	(0.210)	(0.0676)	(0.245)	(0.0777)	(0.267)	(0.0805)	(0.0160)	(0.00657)
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\omega_1 + \omega_4$	0.534	1.126	0.379	-0.910	-1.310	-1.303	-3.461	-2.105	-0.0198	-0.259
Wald test p value	0.290	0.000	0.573	0.000	0.0426	0.000	0.000	0.000	0.720	0.000
r2	0.0773	0.209	0.115	0.0893	0.0760	0.130	0.625	0.542	0.416	0.525
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (capital gap)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (ω_1)	0.140	1.093***	0.463	-0.800***	-1.210	-1.243***	-4.022***	-2.138***	-0.0900	-0.248***
	(0.559)	(0.0917)	(0.700)	(0.159)	(0.741)	(0.158)	(0.644)	(0.166)	(0.0640)	(0.0263)
$Z_{i,t-1}$ (ω_2)	0.140	0.111***	-0.237	-0.214***	-0.540**	-0.328***	0.0498	0.0284	0.000655	0.00427
	(0.156)	(0.0129)	(0.204)	(0.0226)	(0.242)	(0.0233)	(0.185)	(0.0237)	(0.0196)	(0.00423)
$dummy\_gap_{i,t-1}$ (ω_3)	0.563***	0.410***	-0.854***	-0.920***	-0.371**	-0.468***	0.406***	0.190***	-0.0564***	-0.0133***
	(0.0992)	(0.0156)	(0.131)	(0.0313)	(0.171)	(0.0281)	(0.141)	(0.0294)	(0.0138)	(0.00458)
$dummy\_gap_{i,t-1} * MLS_{t-1}$ (ω_4)	0.394*	0.0334	-0.0841	-0.109**	-0.0997	-0.0607	0.561	0.0328	0.0703	-0.0111
	(0.204)	(0.0262)	(0.316)	(0.0504)	(0.418)	(0.0516)	(0.341)	(0.0568)	(0.0441)	(0.00730)
Size $_{i,t-1}$	0.101	1.071***	0.290	-0.968***	-0.411	-1.331***	-2.363***	-2.310***	0.0159	-0.0944***
	(0.275)	(0.0555)	(0.370)	(0.0679)	(0.325)	(0.0763)	(0.248)	(0.0857)	(0.0175)	(0.0121)
ROA $_{i,t-1}$	0.220***	0.378***	-0.0226	-0.203***	-0.137**	-0.325***	0.273***	0.184***	0.0110**	0.00441**
	(0.0358)	(0.0115)	(0.0466)	(0.0166)	(0.0533)	(0.0172)	(0.0491)	(0.0137)	(0.00455)	(0.00185)
NPL $_{i,t-1}$	0.0524**	0.0914***	-0.102***	-0.142***	-0.138***	-0.194***	-0.244***	-0.296***	-0.00271	0.000523
	(0.0213)	(0.00384)	(0.0264)	(0.00609)	(0.0330)	(0.00660)	(0.0395)	(0.00745)	(0.00553)	(0.000959)
GDP growth $_{t-1}$	0.0532	0.322***	0.578**	0.159***	-0.0228	0.204***	-1.145***	-1.023***	-0.00507	-0.0743***
	(0.202)	(0.0329)	(0.270)	(0.0510)	(0.253)	(0.0515)	(0.223)	(0.0541)	(0.0208)	(0.0107)
$M\&A_{i,t-1}$	0.906***	1.408***	3.033***	3.243***	2.174***	3.610***	-15.36***	-13.11***	0.0185	0.0179***
	(0.111)	(0.0392)	(0.210)	(0.0676)	(0.245)	(0.0777)	(0.267)	(0.0805)	(0.0160)	(0.00657)
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
$\omega_1 + \omega_4$	**0.534**	**1.126**	**0.379**	**-0.910**	**-1.310**	**-1.303**	**-3.461**	**-2.105**	**-0.0198**	**-0.259**
Wald test p value	**0.290**	**0.000**	**0.573**	**0.000**	**0.0426**	**0.000**	**0.000**	**0.000**	**0.720**	**0.000**
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Severe market liquidity shortage (capital gap)

90th percentile and/or mean plus two times the standard deviation

	ΔTCR		ΔRWA		ΔLOAN		ΔASSET		DIVIDEND	
	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL	LARGE	SMALL
MLS_{t-1} (ω_1)	0.140	1.093***	0.463	-0.800***	-1.210	-1.243***	-4.022***	-2.138***	-0.0900	-0.248***
	(0.559)	(0.0917)	(0.700)	(0.159)	(0.741)	(0.158)	(0.644)	(0.166)	(0.0640)	(0.0263)
$Z_{i,t-1}$ (ω_2)	0.140	0.111***	-0.237	-0.214***	-0.540**	-0.328***	0.0498	0.0284	0.000655	0.00427
	(0.156)	(0.0129)	(0.204)	(0.0226)	(0.242)	(0.0233)	(0.185)	(0.0237)	(0.0196)	(0.00423)
$dummy\_gap_{i,t-1}$ (ω_3)	0.563***	0.410***	-0.854***	-0.920***	-0.371**	-0.468***	0.406***	0.190***	-0.0564***	-0.0133***
	(0.0992)	(0.0156)	(0.131)	(0.0313)	(0.171)	(0.0281)	(0.141)	(0.0294)	(0.0138)	(0.00458)
$dummy\_gap_{i,t-1} * MLS_{t-1}$ (ω_4)	0.394*	0.0334	-0.0841	-0.109**	-0.0997	-0.0607	0.561	0.0328	0.0703	-0.0111
	(0.204)	(0.0262)	(0.316)	(0.0504)	(0.418)	(0.0516)	(0.341)	(0.0568)	(0.0441)	(0.00730)
Size $_{i,t-1}$	0.101	1.071***	0.290	-0.968***	-0.411	-1.331***	-2.363***	-2.310***	0.0159	-0.0944***
	(0.275)	(0.0555)	(0.370)	(0.0679)	(0.325)	(0.0763)	(0.248)	(0.0857)	(0.0175)	(0.0121)
ROA $_{i,t-1}$	0.220***	0.378***	-0.0226	-0.203***	-0.137**	-0.325***	0.273***	0.184***	0.0110**	0.00441**
	(0.0358)	(0.0115)	(0.0466)	(0.0166)	(0.0533)	(0.0172)	(0.0491)	(0.0137)	(0.00455)	(0.00185)
NPL $_{i,t-1}$	0.0524**	0.0914***	-0.102***	-0.142***	-0.138***	-0.194***	-0.244***	-0.296***	-0.00271	0.000523
	(0.0213)	(0.00384)	(0.0264)	(0.00609)	(0.0330)	(0.00660)	(0.0395)	(0.00745)	(0.00553)	(0.000959)
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	(0.202)	(0.0329)	(0.270)	(0.0510)	(0.253)	(0.0515)	(0.223)	(0.0541)	(0.0208)	(0.0107)
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	(0.111)	(0.0392)	(0.210)	(0.0676)	(0.245)	(0.0777)	(0.267)	(0.0805)	(0.0160)	(0.00657)
Banks fixed effect	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
time fixed effect	yes	yes	yes							
$\omega_1 + \omega_4$	**0.534**	**1.126**	**0.379**	**-0.910**	**-1.310**	**-1.303**	**-3.461**	**-2.105**	**-0.0198**	**-0.259**
Wald test p value	**0.290**	**0.000**	**0.573**	**0.000**	**0.0426**	**0.000**	**0.000**	**0.000**	**0.720**	**0.000**
r2	0.0773	0.209	0.115							
N	17408	249459	17181	248520	17181	248527	17408	249459	17082	237443

Further issues and robustness checks

- Do banks respond to market liquidity shortage by increasing their liquidity ratio? **No**
- Small banks more reliant on market liquidity and/or operating below their target total capital ratio **adjust faster** than other small banks
- Instead of NSFR below 100% : NSFR lower than its 10^{th} percentile (27.92%)
- Alternative variables to NSFR : i/ reliance on wholesale funding, ii/ total liquid assets to total assets ratio and iii/ loans to core deposits ratio
- Sample limited to banks strongly focused on intermediation activities : banks with total deposits to total assets ratio and total loans over total assets above 30%.
- Proxy of market liquidity shortage : 75^{th} percentile of TED spread throughout **normal times only**. Also use the 90^{th} percentile and the mean plus two times the standard deviation.
- Differences in risk management sophistication (notional value of the interest rate swap and futures contracts committing the reporting institution to purchase or sell equity securities (median).
- Various definitions of the capital ratio. Instead of total capital ratio we use the Tier 1 capital ratio.
- Instead of TED spread, use of commercial paper spread to proxy the market liquidity shortage.

Conclusion from this study (Capital/Liquidity Crisis)

- An extreme liquidity squeeze leads large banks to reduce their lending activities and downsize
- Only small banks react to market liquidity shortage by increasing their total capital ratio
- The improvement in their capital ratio is
  - ✓achieved by downsizing, decreasing the dividend payouts, cutting lending and reducing the share of risk weighted assets in total assets
  - ✓stronger at small banks more reliant on market liquidity and small banks operating below their target capital ratio
- Reducing leverage and holding higher capital ratios by substituting less risky assets for riskier ones is one of the multiple ways to hedge against a liquidity squeeze

  ⇒ Small banks take actions to hedge against liquidity squeeze

  ⇒ **Liquidity requirements might be redundant for small banks but necessary for large banks**

Thank you for your attention