The views expressed are solely those of the authors, although they should be everyone’s.
History of Bank Liquidity Regulation

- **National Banking Era**: Macro-Prudential approach, uses cash reserves (interbank deposits) where ratio depends on position in the network.

- **Founding of Fed** continues this approach.

- **Reserve rations remain important in many countries** (Vegh), but were cut in U.S. after disintermediation of 70s in U.S., and capital ratios were instituted in 1981 (reserve interest would have avoided disintermediation.)
Liquidity regulation prominent part of post-crisis regulation overhaul

Basel Committee proposed two new standards (LCR and NSFR)

"The objective of the LCR is to promote the short-term resilience of the liquidity risk profile of banks. It does this by ensuring that banks have an adequate stock of unencumbered high-quality liquid assets that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30 calendar day liquidity stress scenario"
What is the economic rationale?

- LCR limits roll-over risk, penalizing short-term liabilities
- But:
  - isn’t the creation of short-term liabilities what banks do?
  - don’t we have interbank markets to deal with idiosyncratic liquidity shocks?
  - don’t we have the lender-of-last resort to deal with dysfunctional interbank markets and aggregate shocks?
- Markets malfunctioned and central bank intervention has limits...why?
- Credit and counterparty risk
Liquidity crises in banking almost always caused by increases in credit risk (Calomiris and Gorton, 1991)

This crisis was no exception

Gorton and Metrick (2012), Covitz, Liang and Suarez (2013), Afonso, Kovner and Schoar (2011)

Risk-management of banks important

importance of strong CROs (Ellul and Yerramilli, 2013)

banks with losses in 2008 = banks with losses in 1998 (Fahlenbrach, Prilmeier and Stulz, 2012)
Cash as a prudential tool

- Focus on the asset side of banks
- Constrain risk-taking by requiring them to hold reserves
  - like a margin call by counter-parties in derivative trading (Biais, Heider and Hoerova, 2010)
- Properties of cash held at central bank
  - observable
  - not subject to moral hazard by bankers
  - opportunity cost of not investing in high-return (risky) assets
- Incentive role of cash requires liquidity risk
  - how to ensure that banks hold sufficient cash at the right time?
  - make senior outside claim withdrawable (expose banks to liquidity risk)
  - insurance against liquidity risk → cash must be regulated
Capital as a prudential tool is problematic

- Usually equity (capital) is taken to controls credit risk
- But equity is assets minus liabilities
- Since assets are opaque and risky, so is equity
  - costly to issue (Myers and Majluf, 1984)
  - debt/deposits save on verification costs (Gale and Hellwig, 1985; Calomiris and Kahn, 1991)
  - deposits avoid hold-up problem by banker (Diamond and Rajan, 2001)
  - debt can be traded (Gorton and Pennacchi, 1990)
- Citibank had regulatory capital ratio of 11% when bailed out, Dexia had 12% on July 15, 2011, bail-out on 10th October
Banking

- Risk-neutrality, no discounting, storage available
- Banker endowed with loan making ability Banker
- endowed with own (inside) equity \( E_0 \) Takes in
- deposits \( D \) and pays \( R \) to depositors
- Deposits are in elastic supply up to \( D \)
- Banker invests in risky loans \( L_0 \) (return \( Y \) or 0) and safe cash \( C_0 \)
- Bank’s balance sheet at \( t = 0 \)

\[
C_0 + L_0 = D + E_0
\]
Moral-hazard in bank’s risk-management

- Banker can exert unobservable risk-management effort

\[
\begin{align*}
\text{effort} & \quad \rightarrow YL \\
\text{shirk} & \quad \rightarrow (p \times YL, (1-p) \times 0)
\end{align*}
\]

- Shirking carries private benefit $BL$
- Protected by limited liability $\rightarrow$ moral hazard With
- risk-management, loans are profitable $Y > 1$
Risk-management more difficult in some states

- Two aggregate states $s$, good or bad: $s = g, b$
  - observable but not contractible

\[
\begin{align*}
q & \quad B_g \\
1 - q & \quad B_b
\end{align*}
\]

- Risk-management more difficult in bad state: $B_b > B_g$
- Without risk-management in bad state, loan making is socially wasteful

\[1 > qY + (1 - q) (pY + B_b)\]
Loans are illiquid

- After observing the aggregate state, banker can liquidate loans at a cost to increase cash holdings

\[
\Delta C(s) = (1 - l) \Delta L(s)
\]

- Increasing cash ex-post reduces the value of (inside) equity

\[
E_2 = E_0 - \lambda \Delta C(s) \quad \text{where} \quad \lambda = \frac{l}{1 - l}
\]
Sequence of events

$t=0$
- $E_0$ and $D$ invested in $L_0$ and $C_0$
- Contract promises $(R, R_f)$

$t=1$
- Exogenous liquidity withdrawals $\mu D$ with probability $k$
  
  ($k=0$ for most of present-on)

$t=2$
- State $s$ revealed

$t=3$
- Cash can be increased to $C_3(s)$ by liquidating loans at cost $l$
- Depositors choose whether to withdraw

$t=4$
- Banker chooses whether to exert effort

$t=5$
- Loans return $Y$ or $0$
- Depositor is paid $R$ or $R_f$
Deposit insurance

- Deposit insurance scheme motivated by information externality
  - when bad state occurs a fraction $\alpha$ of banker shirks on risk-management effort
  - deposit insurance optimal when depositors are risk averse
- When deposits are insured, depositor no longer impose higher liquidity via the threat of a run
- Banker shirks on risk-management in bad state and banking becomes socially wasteful
- Regulator imposes liquidity requirement despite no liquidity risk
Implications for regulation

- Liquidity (reserves) as risk prevention (ex ante) rather than risk insurance (ex post)
  - resolves "Goodhart’s Paradox" of liquidity regulation
- Need for reserve accounts
- Assets and liabilities are jointly determined
  - capital and liquidity regulation must be joint
- Deposit insurance, bail-outs or interbank markets all undermine control-right of depositors
  - stable deposits make matters worse, and yet lower LCR
Concluding remarks

- Reserves as a prudential tool
- Benefits of reserves: observable, safe and liquid
- Reserves can improve risk-management incentives
- Threat of withdrawal "imposes" reserve holding
- Deposit insurance eliminates liquidity risk but also threat of withdrawal $\rightarrow$ regulate reserves
- Share liquidity risk in an interbank market allows to free-ride on others’ reserves $\rightarrow$ regulate reserves