Liquidity and capital: Substitutes or complements?

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1. Why is liquidity regulation necessary?

2. Capital and liquidity as substitutes
   – Both prudential tools that limit bank default risk
   – Historical evidence on substitutability

3. Capital and liquidity as complements
   – Why (and when) liquidity may be more effective than capital

4. Policy take-aways

1. Why is liquidity regulation necessary?

Is liquidity regulation necessary?

- There is **capital regulation** in place:

  – Addresses credit / default risk

  – Better capitalized banks $\rightarrow$ funding at better conditions, lower risk of bank runs (lower liquidity risk)

  – **Lender of Last Resort** (LOLR) can step in to save illiquid but solvent banks

- **In practice,** deciding whether bank is illiquid or whether it is illiquid and insolvent difficult $\rightarrow$ optimal LOLR design?

- Suboptimal LOLR design can lead to:

  1. Moral hazard due to deposit insurance / liquidity assistance
  2. Credit risk for the central bank when doing LOLR

- **Credit and liquidity risks are intertwined in banking**
  - And LOLR design affects these risks

- Liquidity regulation is an ex ante tool to make banks avoid or internalize liquidity risk (e.g., Stein, 2012, Calomiris, Heider and Hoerova, 2015)

- "… liquidity guidelines must take into account the risks that inadequate liquidity planning by major **financial firms** pose for the broader financial system, and they must ensure that these firms do not become **excessively reliant on liquidity support from the central bank**."

  Ben Bernanke, 2009

2. Capital and liquidity as substitutes

Capital and liquidity as substitutes

- A simple bank balance sheet:

$$C(ash) + L(oans) = D(eposits) + E(quity)$$

- **Both equity capital and cash holdings can reduce the probability of bank failure**

- Rationale for why cash and capital are substitutes comes from Merton (1974,1977)
  - Credit risk is a function of asset volatility and leverage, $E/(C+L)$
  - Holding volatility constant, increasing E (decreasing the face value of debt) reduces the probability of default
  - Holding leverage constant, increasing C reduces the volatility of assets and the probability of default

- NYC banks decreased Loans-to-Cash ratios during Great Depression to address default risk

	Loans/Cash	Equity/Assets	Asset Risk	p
1923	2.2	0.20	1.9	0.0
1929	3.3	0.33	17.5	33.5
1933	1.0	0.15	6.1	41.7
1936	0.6	0.17	4.3	1.3
1940	0.3	0.10	2.0	2.1

Notes: Loans/Cash is loans and discounts divided by reserves plus Treasuries. Equity/Assets is the ratio of the market value of equity to the market value of assets. Asset Risk is the implied standard deviation of asset returns. "p" is the actuarially fair default risk premium on deposits based on Black-Scholes model.

Source: Calomiris and Wilson (2004), "Bank Capital and Portfolio Management: The 1930s Capital Crunch and Scramble to Shed Risk," Journal of Business 77, 421-456.

Capital as a prudential tool can be problematic

- Equity is assets minus liabilities

- Since bank assets - like loans - are opaque and risky, so is bank equity

- Citibank had regulatory capital ratio of 11% when bailed out; Dexia had 12% capital ratio in July 2011 but had to be bailed out in October 2011

- $\rightarrow$ Cash may be a more transparent buffer against loss

3. Liquidity as a complement to capital

- Cash has a prudential history:

    – Cash ratio requirement in National Banking System (1863-64) and Federal Reserve Act (1913) (Calomiris and Mason, 2008)

    – Privately demanded by banking coalitions: 25% reserve requirement for members of New York Clearing House (Wicker, 2000)

- **Cash is observable and verifiable**

    – Equity may evaporate exactly when you need it: inherits the risk profile of assets

    – Liquidity holdings can save on "verification costs"

- **Liquidity saves on liquidation costs** if a bank subject to a run

  – holding more liquidity may help when liquidation of other assets costly

- **Liquidity is more resilient to changes in risk environment**

  – If risk of loans suddenly increases, bank holding more loans is more exposed

  – If withdrawals suddenly increase, bank holding less liquidity is more exposed

  – Equity can be expensive to raise when risk environment deteriorates; liquidity can be carved out of existing assets

Liquidity as a complement: Calomiris, Heider and Hoerova (2015)

- State s of the economy: good or bad; in the bad state, moral hazard problem for a banker

- Raising additional equity subject to adverse selection costs, particularly high in the bad state

- Banker moral hazard $\rightarrow$ incentive constraint in state s:

$$\left(L - \frac{\Delta C_s}{1 - l} \right) P_s + \Delta C_s \geq D$$

Liquidate some Loans, turn them into Cash

- Liquidity is impervious to moral hazard (fully pledgeable): for a given level of equity, can improve risk-management incentives

- Incentive constraint in bad state *b* binds:

$$\left(L - \frac{\Delta C_b}{1 - l}\right) P_b + \Delta C_b = D$$

- In the bad state, liquidating some loans and turning then into cash can relax the incentive constraint

  – If moral hazard sufficiently severe and liquidation cost l moderate

  – If the bad state is ex ante sufficiently unlikely

  – If fire-sale dynamics in the bad state, ex ante cash holdings to reduce the need to liquidate ex post

4. Policy take-aways

Policy take-aways

- Capital and liquidity can both decrease bank default risk
  - LOLR policy also affects default risk; must be designed properly to reduce the need for costly capital and liquidity requirements

- Liquidity can be more effective to deal with liquidity risk or unexpected shocks; tames moral hazard when equity scarce

- What should count as "liquidity"?
  - must be impervious to bank moral hazard
  - e.g., cash, (safe) bonds

- Liquidity holdings must be ring-fenced from bankers' moral hazard
  - e.g., reserves held with the central bank

Selected references

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Rochet and Vives (2004), "Coordination Failures and the Lender of Last Resort: Was Bagehot Right after All?" Journal of the European Economic Association December 2(6), 1116–1147.

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- If leverage constraint, holding more liquid assets can reduce default risk

- If risk-weighted capital ratio, and if liquid assets have zero risk-weight, $E = \alpha\, L$:

  – Holding more liquid assets does not reduce default risk

  – May even increase risk: e.g., if liquid assets costly and hurt bank profitability (Hoerova et al., 2016)

- Marginal cost of either capital or liquidity is likely increasing → optimal to combine capital and liquidity requirements

- State s of the economy: good or bad; in the bad state, moral hazard problem for a banker

- Raising additional equity subject to adverse selection costs, particularly high in the bad state

- Banker moral hazard $\rightarrow$ incentive constraint in state s:

$$\frac{P_s}{1 - P_s} E_0 + \frac{1}{1 - P_s}\left(1 - \frac{P_s}{1 - l}\right) \Delta C_s \geq D$$

Liquidate some Loans, turn them into Cash

- Liquidity is impervious to moral hazard (fully pledgeable): for a given level of equity, can improve risk-management incentives