

Capital, Liquidity and Prudential Regulation

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Motivation

- What do banks do? They create liquidity!
 - \$1.5 trillion in 1984Q1; \$5.9 trillion in 2014Q4 (Berger and Bouwman, Elsevier 2016).
 - Partly “funding liquidity creation” (Donaldson, Piacentino, and Thakor, JFE 2018) wherein banks’ liquidity creation is an expansion of resources invested in real projects.
 - Incredibly important to Main Street.
 - Liquidity creation is disrupted during crises.
 - Federal Reserve Bank of Dallas: cost of the recent crisis is an output loss of \$6 trillion to \$14 trillion.
 - \$50K to \$120K for every household.
 - Liquidity creation and lending dropped significantly.
 - Need more regulations to minimize the likelihood of disruptions?
 - Basel III and Dodd-Frank.



Motivation

- The crisis raised fundamental questions about the role of bank equity capital.
- Various proposals suggest: more capital?
 - Safety net → externalities → more capital, esp. during crises?
 - E.g., Kashyap, Rajan, and Stein (JF 2008); Acharya, Mehran, and Thakor (RCFS 2011); Hart and Zingales (ALER 2011); Calomiris and Herring (JACF 2013); Admati, DeMarzo, Hellwig, and Pfleiderer (Anthem Press 2014).
- In contrast, bankers often argue that being forced to hold more capital would jeopardize their performance.
- Post-crisis regulation: tighter capital requirements and novel liquidity requirements.

Research questions

1. How does bank capital affect bank liquidity creation?
2. How does bank capital affect bank performance during crises / bad times and normal times?
3. What are implications for bank regulation?

Key takeaways

1. Effect of bank capital on bank liquidity creation:
 - Positive at large banks; negative at small banks (Berger and Bouwman, RFS 2009).
2. Bank capital improves bank performance:
 - Enhances survival, market share, and profitability of large banks during banking crises; enhances performance of small banks at all times (Berger and Bouwman, JFE 2013).
 - Higher risk-adjusted stock performance for higher-capital banks during bad times (Bouwman, Kim, and Shin, working paper 2018).
 - Higher market valuations (Mehran and Thakor, RFS 2011).
3. Implications for bank regulation:
 - Higher capital requirements seem beneficial... ***even to bank shareholders.***
 - More work is needed on the interaction between capital requirements and liquidity requirements.

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Bank capital and liquidity creation

- According to the modern theory of financial intermediation, banks exist because they perform two central roles.
 - **Role 1: Create liquidity**
 - On balance sheet: transform illiquid assets into liquid liabilities. Banks provide depositors with improved risk sharing when s.t. shocks. (e.g. Bryant, JBF 1980; Diamond and Dybvig, JPE 1983).
 - Off the balance sheet through loan commitments and similar claims to liquid funds (e.g., Holmstrom and Tirole, JPE 1998; Boot, Greenbaum, and Thakor, AER 1993; Kashyap, Rajan and Stein, JF 2002).
 - **Role 2: Transform risk**
 - Issue riskless deposits to finance risky loans (e.g., Diamond, Restud 1984; Ramakrishnan and Thakor, ReStud 1984).
- Most of the empirical literature has focused on risk-transformation role.
 - **No** comprehensive measures of bank liquidity creation existed until Berger and Bouwman (RFS 2009).

Financial fragility-crowding out hypothesis

- Bank capital may *reduce* liquidity creation.
 - Financial fragility facilitates liquidity creation. Capital diminishes financial fragility (e.g., Diamond and Rajan, JF 2000, JPE 2001; builds on Calomiris and Kahn, AER 1991; Flannery, AER 1994).
 - Bank needs to monitor entrepreneur to ensure loan pays off.
 - Hold-up problem between bank (may shirk in monitoring) and investors affects bank's ability to raise funds.
 - Depositors can run the bank → threat to do so mitigates hold-up problem → *more* liquidity creation.
 - Capital providers cannot run the bank → *less* liquidity creation.
 - May 'crowd out' deposits (e.g., Gorton and Winton, JMCB 2017).
 - Higher capital ratios shift funds from relatively liquid deposits to relatively illiquid bank capital, reducing liquidity for investors.

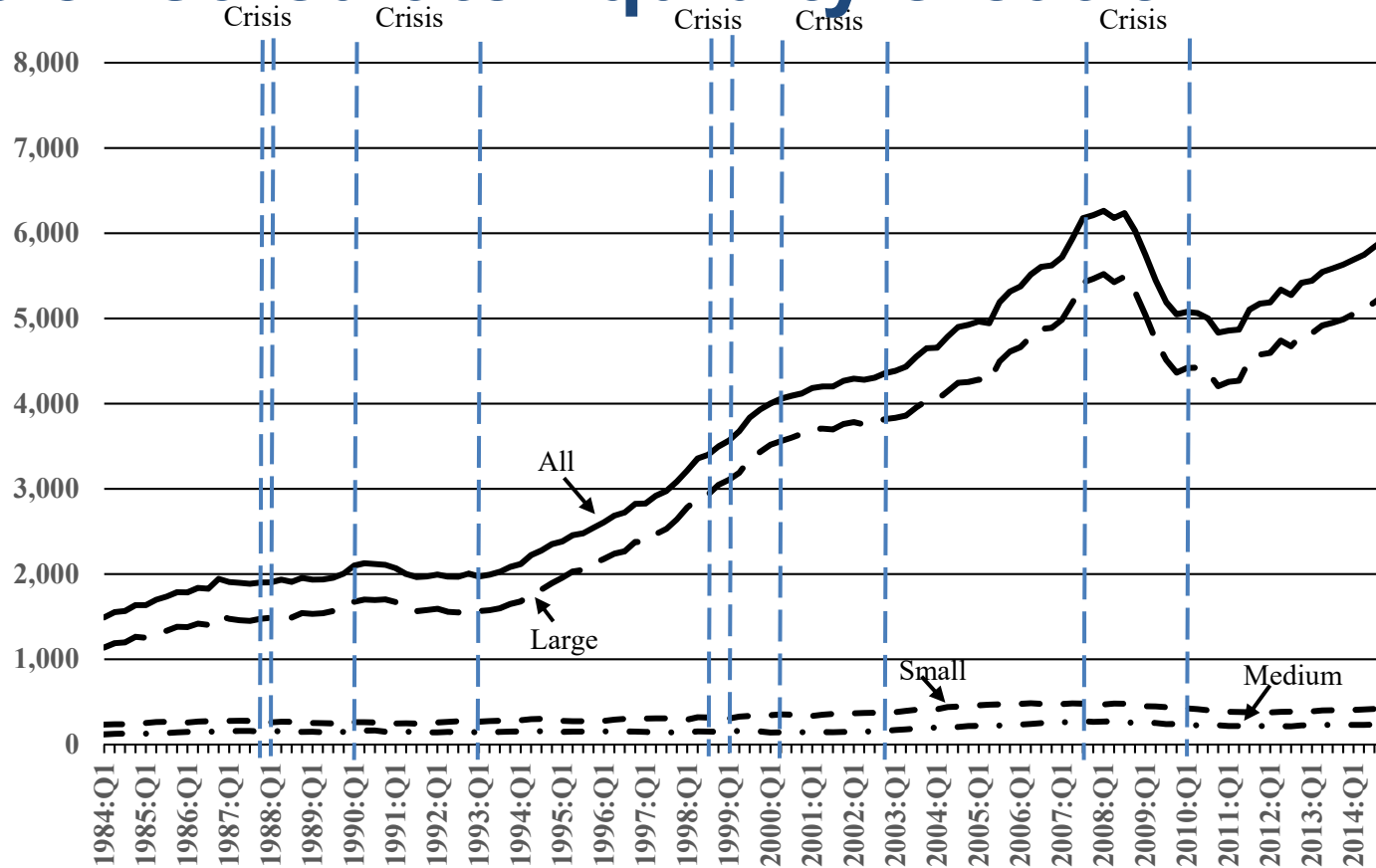
Risk absorption hypothesis

- Bank capital may **increase** liquidity creation, leading to higher real output (Donaldson, Piacentino, and Thakor, JFE 2018).
 - Liquidity creation exposes banks to risk (e.g., Allen and Santomero, JBF 1998; Allen and Gale, Ecta 2004).
 - More liquidity creation increases potential losses from having to dispose of illiquid assets quickly to meet clients' liquidity needs.
 - Bank capital acts as a buffer to absorb risk (e.g., Bhattacharya and Thakor, JFI 1993; Repullo, JFI 2004; Von Thadden, JFI 2004).
 - ➔ Higher capital ratios may allow banks to create liquidity with lower risk exposure.
 - ➔ Banks with higher capital ratios may create more liquidity.
- ***Financial fragility-crowding out and risk absorption: opposite predictions about effect of capital on liquidity creation.***

Measuring liquidity creation by banks

- **Step 1:**
Classify all on-balance sheet and off-balance sheet activities as liquid, semi-liquid, or illiquid.
- **Step 2:**
Assign weights to activities classified in Step 1.
- **Step 3:**
Combine activities classified in Step 1 and weighted in Step 2 to calculate:
\$ liquidity creation = Σ (weight * \$ activity)

Step 3: Calculate liquidity creation



- Cat Fat liquidity creation increased from \$1.5 trillion in 1984Q1 to \$5.9 trillion in 2014Q4 (Berger and Bouwman, Elsevier 2016).
 - GDP was \$17.4 trillion in 2014Q4.
 - Large banks create the most liquidity.
 - Roughly half of the liquidity is created off the balance sheet (not shown).

Effect of capital on liquidity creation

- Berger and Bouwman (RFS 2009):
 - Empirical strategy: use OLS and IV
 - Instrument for capital for large banks: state income tax rate.
Instrument for capital for small banks: fraction of people aged ≥ 65 .
 - Findings:
 - Large banks: *positive* (risk absorption dominates).
 - Recall: large banks create most of the liquidity in the economy.
 - Small banks: *negative* (financial fragility-crowding out dominates).
 - International evidence is limited (Fungacova, Weill, and Zhou, JFSR 2010; Horvath, Seidler, and Weill, JFSR 2014):
 - Large banks: *no significant effect* (few off-balance sheet activities?).
 - Small banks: *negative effect*.

Caveat

- These papers focus on the effects of capital, not capital requirements.
 - Thakor (ARFE, 2014) argues: capital requirements \uparrow \rightarrow liquidity creation may \downarrow in the short run. This may be OK when there is some overlending: overlending \downarrow (Berger and Bouwman, JFS 2017).
 - Long-run effects of higher capital on liquidity creation will be positive (e.g., Donaldson, Piacentino, and Thakor, JFE 2018).

Excessive liquidity creation may create crises

- Liquidity creation is important for the macroeconomy, but may also sow the seeds of a financial crisis.
 - Acharya and Naqvi (JFE 2012): during uncertain times, deposits flow into banks, who may lower their lending standards and lend more → increases on-balance sheet liquidity creation and may generate asset price bubbles that heighten the fragility of the banking sector.
 - Thakor (JMCB 2005): excessive risk-taking and greater bank liquidity creation may also occur off the balance sheet during booms, when banks shy away from exercising material adverse change clauses in loan commitment contracts due to reputational concerns.
 - Brunnermeier, Gorton, and Krishnamurthy (NBER Macro Annual 2011): models that assess systemic risk should include liquidity build-ups in the financial sector.
 - Studies of early warning systems for financial crises typically do not use bank liquidity creation. They tend to focus on macroeconomic variables (GDP growth, balance of payments problems, and real interest rates, etc.), and include banks only as part of domestic credit growth (e.g., Demirguc-Kunt and Detragiache IMF 1998; Kaminsky and Reinhart AER 1999; Edison IJFE 2003; Bussiere and Fratzscher JIMF 2006; Reinhart and Rogoff AER 2009).

Excessive liquidity creation may create crises

- Detrended liquidity creation: very high prior to financial crises (Berger and Bouwman, 2017 JFS).
 - Problem: analysis that tries to examine whether high levels of liquidity creation precede financial crises would be strongly affected by the long-run trend (and possibly seasonal components). Important to focus on *deviations* from the trend.
 - First deseasonalize liquidity creation and then detrend it using the Hodrick Prescott (HP) filter.
 - Find: liquidity creation relative to trend (particularly off-balance sheet liquidity creation) has explanatory power in predicting crises even after controlling for other macroeconomic variables.

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Hypothesis 1 (Survival) Berger and Bouwman (JFE 2013)

- ***Capital enhances the bank's survival probability during financial crises and normal times.***
 - Buffer role: Higher capital acts as a buffer to absorb shocks to earnings (Repullo JFI 2004, Von Thadden JFI 2004).
 - Incentive effects: High bank capital:
 - Induces higher levels of monitoring by the bank (Holmstrom and Tirole QJE 1997; Allen, Carletti, and Marquez RFS 2011; Mehran and Thakor RFS 2011).
 - Improves screening of borrowers (Coval and Thakor JFE 2005).
 - Reduces asset-substitution-moral-hazard induced by limited liability and government guarantees (Freixas and Rochet Elsevier 2008; Acharya, Mehran, and Thakor RCFS 2016).
- Some theories suggest that Hypothesis 1 might not hold
 - Banks could increase their portfolio risk when capital is sufficiently high (Koehn and Santomero JF 1980; Calem and Rob JFI 1999).
 - Benefit of reduced asset-substitution moral hazard < cost of lower effort by insiders due to diluted ownership (Besanko and Kanatas, JFI 1996).
- These papers do not focus on financial crises per se.
 - However: buffer role may be more important during a crisis → effect of capital on survival may be more positive during a crisis.

Hypothesis 2 (Mkt share) Berger and Bouwman (JFE 2013)

- ***Capital enhances the bank's market share during financial crises and normal times.***
 - Banks derive a competitive advantage from higher capital → higher-capital banks end up with higher market shares (Holmstrom and Tirole, QJE 1997; Allen and Gale, JMCB 2004; Allen, Carletti, and Marquez, RFS 2011; Mehran and Thakor, RFS 2011).
- Some theories suggest that Hypothesis 2 may not hold:
 - Nonfinancial firms: levered firms more aggressive product-market-expansion strategies → capital and market share negatively correlated (Brander and Lewis, AER 1986; Lyandres, JB 2006).
- These papers do not focus on financial crises per se.
 - However: competitive advantage of capital may be more pronounced during crises, particularly during banking crises.
 - Customers more sensitive to bank's capital during a crisis → easier for better-capitalized banks to take customers away from lesser-capitalized peers.
 - Higher-capital banks: greater flexibility to make certain types of loans unavailable to lower-capital banks due to regulatory and market constraints during crises.
 - Banking crises: numerous bank failures and near failures → higher-capital banks may find it easier to obtain regulatory approval to buy such banks.

Approach and findings Berger and Bouwman (JFE 2013)

- Analyses focus on five financial crises that occurred between 1984:Q1 and 2010:Q4.
 - **Banking crises** (originated in the banking sector):
 - Credit crunch (1990:Q1 – 1992:Q4)
 - Subprime lending crisis (2007:Q3 – 2009:Q4)
 - **Market crises** (originated outside banking in the capital market):
 - Stock market crash (1987:Q4)
 - Russian debt crisis / LTCM bailout (1998:Q3 – 1998:Q4)
 - Bursting of the dot.com bubble and Sept. 11 terrorist attacks (2000:Q2 – 2002:Q3)
- **Main finding:** High capital benefits small banks at all times and large banks especially during banking crises.

Evidence on capital and stock performance

- Baker and Wurgler (AER 2015): high-capital banks have lower betas and low-beta bank stocks have higher realized stock returns.
- Bouwman, Kim, and Shin (working paper 2018): High-capital banks earn higher risk-adjusted stock returns during bad times.
 - See next page.

Evidence on capital and stock performance

- Bouwman, Kim, and Shin (working paper, 2018) ask:
How does bank capital affect the bank's *risk-adjusted* stock returns during bad economic times and other times?
 - Study alphas, controlling for numerous sources of risk.
 - Find: High-capital banks generate higher alphas than low-capital banks (in sample) and also based on specific trading strategies (out of sample).
 - Effect is concentrated during bad economic times.
 - Effect is robust to using different bad times and capital definitions, numerous alternative asset pricing models, and *ex ante* expected returns; and to controlling for Gandhi-Lustig's (2015) size effect, non-synchronous trading, performance-type delistings, short-sale constraints, and trading costs.
 - Effect does not hold for industrial firms or non-bank financials → banks are special!
 - The results seem driven by a Surprised Investor Channel (analysts / investors seem to underestimate the benefits of capital in bad times) instead of by an Informed Investor channel.

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Bank regulation after the recent crisis

- Dodd-Frank Wall Street Reform and Consumer Protection Act (“Dodd-Frank”):
 - Increasing extra oversight and requirements for institutions with:
 - Assets > \$10B.
 - Assets > \$50B (systemically important financial institutions, SIFIs).
 - SIFI size cutoff increased to \$250B in 2018.
 - Requirements include stress tests:
 - Assess potential impact of adverse economic scenarios on earnings, losses, and capital levels.
 - Viewed as forward-looking capital requirements...
- Basel III:
 - Enhanced capital requirements
 - Introduced capital conservation buffer, countercyclical capital buffer, and G-SIB surcharge

Bank regulation after the recent crisis

- Basel III liquidity requirements:
 - Liquidity Coverage Ratio (LCR): promotes short-term resilience.
 - To survive a specified stress scenario which lasts one month, banks have to operate with enough high-quality liquid assets.
 - Net Stable Funding Ratio (NSFR): promotes long-run resilience.
 - To be able to survive an extended closure of wholesale funding markets, banks have to operate with a minimum acceptable amount of “stable funding” over a one-year period.

Evidence: increase capital further!

- Thakor (JFS, 2018): Empirical evidence suggests that the crisis was an insolvency crisis, not a liquidity crisis.
 - Most banks did not experience reduced funding during the crisis.
 - Huge liquidity injections by the Federal Reserve in 2008 did not lower the LIBOR-OIS (Overnight Index Swap) spread.
 - Banks with higher capital ratios were less affected by the crisis.
- Recommends: deemphasize/drop liquidity requirements, increase capital requirements substantially.
 - It is more efficient for the Central Bank in its role of Lender of Last Resort (LOLR) to provide liquidity to banks in need than for individual banks to keep sufficient liquidity on their balance sheets.

Evidence: increase capital further!

- Engle (ARFE 2018): to eliminate systemic risk (SRISK) early 2007, US banks needed \$200B in extra capital.
 - SRISK currently over \$300B.
- Basel's capital surcharges for globally systemically important banks (G-SIBs) are too small.
 - Passmore and Von Haften (working paper 2018) estimate:
 - Surcharges for G-SIBs should be 375-525 basis points higher;
 - Some very large and systemically important banks that are currently not subject to these surcharges should be subjected to a 225 basis point surcharge.

How to increase capital?

- Increase capital requirements.
- Use countercyclical capital buffers.
 - Banks should be asked to increase their buffers!
- Build up capital through dividend reductions and earnings retention.

Liquidity versus capital requirements

- We have a big literature on capital requirements...
- ... a small literature on liquidity requirements...
- ... and a tiny literature on the interaction effects.
 - Calomiris, Heider, and Hoerova (working paper 2015), Acharya, Mehran, and Thakor (RCFS 2016), Carletti, Goldstein, and Leonella (working paper 2018), Van den Heuvel (working paper 2018).
- More work is needed on the effects of liquidity and capital requirements: Complements / substitutes? Effects on bank output?

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