BANK CAPITAL, LIQUIDITY CREATION AND DEPOSIT INSURANCE

Zuzana Fungáčová (BOFIT)

Laurent Weill (Université de Strasbourg)

Mingming Zhou (University of Colorado)

INTRODUCTION

♦ banks perform two central roles – they transfer risk and create liquidity

– risk transformation role widely investigated

– liquidity creation neglected in the literature

♦ liquidity creation measures important to investigate policy-relevant issues

♦ recent paper from Berger and Bouwman (RFS, 2009) and forthcoming papers on liquidity creation

BANK LIQUIDITY CREATION

♦ Berger and Bouwman (2009)

  – suggest four measures of liquidity creation

  – analyze liquidity creation for different groups of US banks

  – investigate the role of bank capital in liquidity creation

BANK CAPITAL AND LIQUDITY CREATION : TWO HYPOTHESES

♦ 1. "risk absorption" hypothesis : positive impact of capital
  – bank capital absorbs risk and enhances the risk-bearing ability of the bank by creating liquidity

♦ 2. "financial fragility-crowding out" hypothesis : negative impact of capital

    two different effects
  – "crowding-out effect": greater capital ratio contributes to crowding out deposits and thus reduces liquidity creation
  – "financial fragility effect"

THE FINANCIAL FRAGILITY EFFECT

♦ Based on Diamond and Rajan (2000, 2001)

The bank transfers funds from depositors to borrowers, and then monitor borrowers and collect loans

=> the bank obtains private information on the borrowers

=> this informational advantage creates an agency problem : the bank can extort rents from depositors by asking a greater share of the loan income and threatening to withold monitoring or loan collecting effort

=> as depositors are aware of the possibility that the bank will abuse their trust, they are reluctant to give their money to the bank

=> the bank commits to the depositors by having a fragile financial structure (large share of liquid deposits)

=>the bank risks to lose funding if it attempts to abuse the trust of depositors => the possibility of a bank run disciplines the bank

THE FINANCIAL FRAGILITY EFFECT

=> by allowing the bank to receive more deposits and to finance more loans, financial fragility favors liquidity creation

=> ↑ capital => ↓ financial fragility => ↓ bank commitment to the depositors => ↓ liquidity creation

♦ Deposit insurance plays a role on this negative relationship :

– With deposit insurance, the threat of bank runs is weaker and then the negative impact of capital on liquidity creation through financial fragility is weaker

=> The impact of capital on liquidity creation should be stronger in the presence of deposit insurance

IN THIS RESEARCH

♦ we examine how the introduction of deposit insurance influences the relationship between bank capital and liquidity creation

♦ we use introduction of the deposit insurance scheme (DIS) in Russia as a natural experiment

♦ our results are important

   – for a better understanding of how bank capital influences financial stability

   – since we investigate some effects of the deposit insurance scheme that have been neglected so far

WHY THIS IS IMPORTANT?

♦ bank capital contributes to financial stability (motivation for capital requirements) but may be detrimental for liquidity creation as the negative effects of bank capital on liquidity creation may dominate the positive ones

♦ if the implementation of deposit insurance contributes to the reduction of the negative link between bank capital and liquidity creation, it may promote the benefits of bank capital for the economy

TWO ADDITIONAL CONTRIBUTIONS

1. this is the first investigation of the relationship between bank capital and liquidity creation in an emerging market

   => important to know the implications of bank capital requirements in these countries particularly concerned by financial stability

2. we analyze whether this relationship differs when accounting for bank ownership

   => helpful argument for the debates on privatization and foreign ownership of banks in emerging markets

DATA

- ♦ quarterly data on all Russian banks (Interfax)
- ♦ unbalanced panel, more than 25 000 bank-quarter observations
- ♦ 1Q2001 – 1Q2007
- ♦ balance sheet & profit and loss statement data
- ♦ ownership data
  - – foreign ownership from the CBR
  - – state-controlled banks (Vernikov, 2009)
- ♦ regional data
  - – bank branches by regions collected from the CBR website
  - – regional data come from the Russian Federal State Statistics Service

LIQUIDITY CREATION MEASURES

♦ we calculate three measures of liquidity creation

  – gross liquidity measure (LC1)

  – category-based liquidity creation measure (LC2)

  – maturity-based liquidity creation measure (LC3)

♦ three-step procedure to construct these measures (Berger and Bouwman, 2009)

  1. classify balance sheet items as liquid,semiliquid or illiquid

  2. assign weights to these items

  3. calculate the measures

CLASSIFICATION OF ASSETS AND LIABILITIES

<table>
<tr><td rowspan="5">LC1: GROSS MEASURE</td><td colspan="2">Illiquid assets (1/2)</td><td colspan="2">Liquid assets (-1/2)</td></tr>
<tr><td colspan="2">Total loans</td><td colspan="2">Correspondent accounts with other banks</td></tr>
<tr><td colspan="2"></td><td colspan="2">Securities investments</td></tr>
<tr><td colspan="2">Liquid liabilities (1/2)</td><td colspan="2">Illiquid liabilities (-1/2)</td></tr>
<tr><td colspan="2">Total deposits</td><td colspan="2">Capital</td></tr>
<tr><td rowspan="8">LC2: CATEGORY MEASURE</td><td>Illiquid assets (1/2)</td><td>Semi-liquid assets (0)</td><td colspan="2">Liquid assets (-1/2)</td></tr>
<tr><td>Loans to firms</td><td>Interbank loans</td><td colspan="2">Correspondent accounts with other banks</td></tr>
<tr><td>Other assets</td><td>Loans to government</td><td colspan="2">Government securities (incl. securities issued by regions and municipalities)</td></tr>
<tr><td></td><td>Loans to individuals</td><td colspan="2">Investments to promissory notes</td></tr>
<tr><td>Liquid liabilities (1/2)</td><td>Semi-liquid liabilities (0)</td><td colspan="2">Illiquid liabilities (-1/2)</td></tr>
<tr><td>Debt securities issued (promissory notes)</td><td>Debt securities issued (deposit and saving certificates, bonds)</td><td colspan="2">Other liabilities</td></tr>
<tr><td>Claims of non bank sector : settlement accounts (firms, households, government)</td><td>Claims of non bank sector : term deposits accounts (firms, households, government)</td><td colspan="2">Capital</td></tr>
<tr><td>Claims of banks</td><td></td><td colspan="2"></td></tr>
</table>

CALCULATION OF LIQUIDITY CREATION MEASURES

◆ liquidity creation (LC)

{ ½ × *illiquid assets* + 0 × *semi-liquid assets* – ½ × *liquid assets* } + { ½ × *liquid liabilities* + 0 × *semi-liquid liabilities* – ½ × *illiquid liabilities* }

◆ definitions of the right-hand-side terms in the equation change for different measures

VARIABLES

♦ dependent variable – measures of liquidity creation (% of assets)

♦ explanatory variables

  – **capital-asset ratio**

  – size (log of assets)

  – measure of risk (nonperforming loans ratio)

  – Herfindahl index

  – household income growth

  – small business growth

EMPIRICAL INVESTIGATION

consists of two parts:

1. difference-in-difference approach

♦ to check whether the implementation of the DIS influences the relationship between bank capital and liquidity creation

2. separate regressions before and after the introduction of DIS

♦ to check whether the sign of the relationship between bank capital and liquidity creation changes with this event

♦ to investigate the role of bank ownership

1st PART: DIFFERENCE-IN-DIFFERENCE APPROACH (DD)

♦ this approach informs on the change in the magnitude of the relationship by controlling for the changing economic conditions that might coincide with the implementation of deposit insurance

♦ state-controlled banks serve as control group to analyze the effects of the implementation of DIS

♦ we compare changes in liquidity creation around the time of DIS introduction for banks affected by the scheme (i.e., treatment group) and banks unaffected by the scheme (i.e., control group)

DIFFERENCE-IN-DIFFERENCE APPROACH (DD)

♦ $\Delta LC = \alpha + \beta \times \text{Treatment} + \gamma \times \Delta \text{capital} + \delta \times \Delta \text{size} + \phi \times \text{Treatment} \times \Delta \text{capital} + \varphi \times \text{Treatment} \times \Delta \text{size} + \lambda \times z + \varepsilon$

♦ ΔLC : changes in liquidity creation after the implementation of DIS

♦ *Treatment* : dummy variable equal to 1 if the bank was enrolled in the DIS, to 0 if the bank is state-controlled.

♦ ϕ : the mean difference in changes of the effects of capital ratio on the liquidity creation for the banks after the DIS between the treatment group and the control group

DIFFERENCE-IN-DIFFERENCE ESTIMATIONS

Liquidity creation measure (% of assets)	LC1 (difference)		LC2 (difference)		LC3 (difference)	
Constant	-0.182*** [7.91]	-0.182*** [7.90]	-0.100** [2.11]	-0.100** [2.12]	-0.067 [1.22]	-0.068 [1.24]
Treatment dummy variable	0.129*** [5.23]	0.131*** [5.29]	0.129*** [2.68]	0.125*** [2.59]	0.107* [1.91]	0.100* [1.81]
Capital asset ratio (difference)	-0.621*** [6.65]	-0.621*** [6.64]	-1.288*** [4.02]	-1.290*** [4.03]	-0.433 [1.64]	-0.435* [1.65]
Size (difference)	-0.044*** [3.01]	-0.044*** [2.99]	-0.115*** [2.77]	-0.115*** [2.79]	-0.096** [2.45]	-0.097** [2.48]
Treatment × capital assets ratio difference	**0.036 [0.36]**	**0.002 [0.02]**	**0.829** [2.58]**	**0.894*** [2.77]**	**0.008 [0.03]**	**0.105 [0.39]**
Treatment × size difference	0.076*** [4.84]	0.079*** [4.95]	0.126*** [3.00]	0.121*** [2.89]	0.081** [2.02]	0.073* [1.84]
Treatment × capital assets ratio difference × size difference		-0.022 [1.12]		0.042** [2.47]		0.063*** [2.93]
Nonperf. loans (difference)	0.394 [1.39]	0.400 [1.42]	-0.082 [0.30]	-0.094 [0.35]	-0.556* [1.94]	-0.574** [2.02]
Herfindahl index (difference)	-0.130** [2.40]	-0.126** [2.32]	0.137*** [2.63]	0.131** [2.51]	0.281*** [5.05]	0.271*** [4.89]
Household income growth (difference)	0.001 [0.26]	0.001 [0.33]	-0.001** [2.30]	-0.001** [2.18]	-0.001*** [3.24]	-0.001*** [3.10]
Small business growth (difference)	-0.002 [0.72]	-0.002 [0.80]	-0.006 [1.12]	-0.005 [1.04]	-0.011* [1.92]	-0.010* [1.83]
Observations	19011	19011	19011	19011	19011	19011
F-statistics	73.87	67.77	42.55	43.74	27.13	28.00
R-squared	0.34	0.34	0.22	0.22	0.13	0.14

DIFFERENCE-IN-DIFFERENCE RESULTS

♦ the interaction between treatment and difference in capital ratio is always positive, and significant with LC2 measure

=> limited evidence that the effects of capital ratio on liquidity creation grow stronger for banks participating the deposit insurance program after it was implemented, compared to the banks in the control group

=> **limited support for an impact of deposit insurance on the relationship between bank capital and liquidity creation**

♦ but does this effect change the sign of the relationship between bank capital and liquidity creation?

2nd PART: SEPARATE ESTIMATIONS

♦ we check if the introduction of DIS influences the sign of the relationship between bank capital and liquidity creation

♦ separate estimations for the period before (2001 – 2003) and after (2005 – 2007) the introduction of DIS

♦ fixed effects estimations

♦ robust standard errors clustered by banks

♦ lagged explanatory variables

ESTIMATIONS BEFORE AND AFTER DIS

Liquidity measure (% of assets)	Before DIS			After DIS		
	LC1	LC2	LC3	LC1	LC2	LC3
Constant	0.231*** [5.40]	0.194*** [5.20]	0.262*** [6.51]	0.206** [2.57]	0.087 [0.98]	0.142 [1.53]
Capital-asset ratio	**-0.293*** [11.68]**	**-0.258*** [11.47]**	**-0.266*** [11.44]**	**-0.310*** [8.42]**	**-0.221*** [5.36]**	**-0.197*** [4.77]**
Size	0.023*** [3.18]	0.021*** [3.49]	0.005 [0.79]	0.044*** [4.30]	0.035*** [2.97]	0.009 [0.71]
Nonperforming loans	-0.549*** [2.92]	-0.285 [1.56]	-0.351* [1.70]	-0.102 [0.45]	-0.091 [0.38]	-0.223 [0.84]
Herfindahl index	0.045 [0.77]	0.117** [2.35]	0.049 [0.95]	0.097 [1.15]	0.172** [2.26]	0.319*** [3.49]
Household income growth	-0.001* [1.84]	-0.001 [0.40]	-0.001 [0.92]	0.001 [1.08]	-0.001 [0.96]	-0.001*** [3.60]
Small business growth	-0.001 [0.58]	-0.002 [1.17]	-0.002 [1.54]	-0.001 [0.33]	0.001 [0.41]	0.002 [0.68]
Observations	10324	10324	10324	7323	7323	7323
No. of banks	916	916	916	916	916	916
R-squared	0.38	0.24	0.2	0.37	0.24	0.09

MAIN RESULTS

◆ major finding - the relationship between bank capital and LC is significantly negative before and after DIS

  => DIS does not change the sign

◆ finding is robust to the LC measure

◆ implications:

  ⇒ policies aiming at increasing bank capital may hamper liquidity creation in emerging markets

  ⇒ trade-off between the benefits of financial stability and the costs of diminished liquidity creation

BANK SIZE MATTERS

♦ Berger and Bouwman (2009) for US banks: positive link for large banks, not significant link for medium banks, negative link for small banks.

=> relevant to analyze the results by size

♦ we separate Russian banks in three samples according to their size

RESULTS BY SIZE

♦ **the introduction of DIS does not change the relationship of bank capital and liquidity creation for size classes**

=> confirmation of our main result

♦ **the link between bank capital and liquidity creation differs across size classes** - significantly negative for small and medium banks, but not significant for large banks

♦ results rather in line with those from Berger and Bouwman (2009)

RESULTS BY OWNERSHIP

♦ 3 groups: state-controlled, foreign-owned, domestic private banks.

♦ **the relationship between bank capital and liquidity creation is not influenced by the introduction of the DIS in any group**

♦ **the relationship is significantly negative for private domestic banks, whereas it is not significant for state-controlled and foreign banks**

CONCLUSION

♦ Our results:

1. limited empirical support on the fact that the implementation of the DIS influences the relationship between bank capital and liquidity creation

2. DIS does not change the sign of this relationship: negative before and after (it makes the impact of bank capital less negative)

3. the relationship differs with bank size and with ownership

♦ Policy implications:

– the negative link suggests that bank capital requirements implemented for safety reasons may deteriorate liquidity creation

– DIS does not help much to solve this tradeoff

– to increase the size of banks and to favor foreign bank entry may help