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CYCLICALITY OF BANK LIQUIDITY CREATION

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CYCLICALITY OF BANK BEHAVIOR

- implications for financial stability
- cyclicalness of bank behaviour can contribute to amplifying recessions
 - cyclicalness of bank lending studied in the literature (e.g., Micco and Panizza, 2006; Bertay, Demirgüç-Kunt and Huizinga, 2015)
- measuring bank behaviour - bank lending alone is not optimal measure (Berger and Bouwman, 2015)
 - => consider bank liquidity creation which is a major function of banks in the economy



BANK LIQUIDITY CREATION

- banks create liquidity by financing relatively illiquid assets (e.g. long-term loans) with relatively liquid liabilities (e.g. demand deposits)
 - => liquidity is created if a bank holds illiquid items and grants liquid items to the economy
- bank liquidity creation \neq bank liquidity
 - bank liquidity - ability to meet obligations without having to liquidate other assets (ratios of liquid assets/assets)
 - bank liquidity creation – qualitative asset transformation; by creating liquidity bank makes itself illiquid



WHY DO WE CARE

- enhances economic activity and growth (Fidrmuc, Fungáčová and Weill, 2015; Berger and Sedunov, 2015)
 - by facilitating transactions between lenders and borrowers
- more complex (“superior”) measure of a bank output (Berger and Bouwman, 2009)
 - considers all bank activities (both on- and off-balance sheet) instead of just looking at assets/lending etc.
 - recognizes both liquidity creation and liquidity destruction in one measure



OUR CONTRIBUTION

- to investigate cyclicalness of bank liquidity creation
 - given the key function of banks as liquidity creators, cyclicalness of bank liquidity creation can generate undesirable effects in the economy by amplifying recessions
 - no work has ever examined how bank liquidity creation reacts to business cycle fluctuations
- to analyze differences in cyclicalness of liquidity creation by bank ownership types
 - prior literature suggests that lending by state-owned banks is less procyclical and can even be countercyclical in times of financial crisis (Bertay, Demirgüç-Kunt and Huizinga, 2015, Davydov, 2016)
 - we examine if this result holds for liquidity creation



DATA

- all Russian banks - quarterly financial statements from Central Bank of Russia (CBR)
- time period 2004-2015
- as detailed as it gets
 - distinguishes corporate, household, government loans, different types of deposits including data on maturity
- ownership data
 - state ownership (Vernikov, 2016)
 - foreign ownership from CBR
- macroeconomic variables - Rosstat
- final sample constitutes unbalanced panel
 - over 36 000 bank-quarter-observations for 1 215 banks



DESCRIPTIVE STATISTICS

	N	Mean	Median	SD
Δ Liquidity creation (cat)	36 121	0,25	0,13	1,29
Δ Liquidity creation (mat)	36 121	-0,21	-0,03	2,27
Credit growth	44 227	0,17	0,20	0,11
GDP growth	35 152	0,28	0,19	0,47
Real investments growth (RIG)	44 227	0,18	0,18	0,16
Lagged Log(assets)	41 760	14,61	14,49	2,00
Lagged Equity/Assets	41 760	0,22	0,17	0,17
Lagged Overdue loans/Loans	40 796	0,03	0,01	0,06
Lagged Loans/Assets	41 760	0,57	0,62	0,21
State-owned	44 222	0,05	0,00	0,21
Foreign-owned	44 222	0,09	0,00	0,29



MEASURING BANK LIQUIDITY CREATION

- Berger and Bouwman (2009) develop comprehensive measures of bank liquidity creation
- three-step procedure to calculate the measures
 1. classify balance sheet items as liquid, semiliquid or illiquid
 2. assign weights to these items
 3. calculate the measures
- alternative classification of balance sheet items => category and maturity measures
- including or excluding off balance sheet items



CLASSIFICATION OF BALANCE SHEET ITEMS

- criteria used
 - assets - based on the ease, cost, and time for customers to obtain liquid funds from the bank
 - liabilities - the ease, cost, and time for banks to dispose of their obligations in order to meet the liquidity demands
- example – loans
 - NFC's loans are considered illiquid as they in general cannot be sold quickly without incurring a major loss
 - residential loans can be securitized
 - loans to governments or financial corporations are relatively easier to dispose of as counterparties are large and informationally transparent
 - shorter maturity indicates that those loans self-liquidate earlier e.g. consumer loans



CATEGORY BANK LIQUIDITY CREATION MEASURE

CATEGORY MEASURE	Illiquid assets (1/2)	Semi-liquid assets (0)	Liquid assets (-1/2)
	Corporate loans	Interbank loans	Cash
	Other assets	Loans to government	Correspondent accounts with other banks
		Loans to individuals	Total securities (stocks, debt securities, promissory notes)
	Liquid liabilities (1/2)	Semi-liquid liabilities (0)	Illiquid liabilities and capital (-1/2)
	Debt securities issued (bonds and promissory notes)	Debt securities issued (deposit and saving certificates)	Other liabilities
	Claims of non-bank sector: settlement accounts (firms, households, government)	Claims of non-bank sector: term and other deposits (firms, households, government)	Capital
	Claims of banks		



ASSIGNING WEIGHTS TO BALANCE SHEET ITEMS

- based on liquidity creation theory
- banks create liquidity as they hold illiquid items and provide liquid items => positive weights to illiquid assets (0.5) and liquid liabilities (0.5)
 - one euro face value liquidity creation when a euro of liquid liabilities (current account deposits, weighted 0.5) is used to finance a euro of illiquid assets (NFC loan, weighted 0.5)
 - $0.5 \cdot 1\text{€} + 0.5 \cdot 1\text{€} = 1\text{€}$
 - zero liquidity creation when time deposits (semiliquid liabilities) are used to finance loans to governments (semiliquid assets)
- following the same logic, negative weights are applied to liquid assets and illiquid liabilities
 - one euro liquidity is destroyed when one euro of illiquid liabilities or equity is used to finance a euro of liquid assets (e.g. government securities)



METHODOLOGY

- we use two alternative measures of liquidity creation
 - based on category classification – benchmark measure
 - based on maturity classification
- regress change in liquidity creation measure on the change in macroeconomic indicator for business cycle

$$y_{i,t} = \alpha_i + \beta M_i + OWN_{i,t} + M_i * OWN_{i,t} + X_{i,t-1} + \omega_i + \tau_t + \varepsilon_{i,t}$$

$y_{i,t}$ is the change in liquidity creation by bank i in quarter t

M_i is the change in the macroeconomic indicator for business cycle
(GDP per capita growth, real investment growth)

$OWN_{i,t}$ a vector of dummy variables for state and foreign ownership

$X_{i,t-1}$ a matrix of bank-specific control variables (size, equity to assets, nonperforming loans, loans to assets ratio)

ω_i and τ_t the bank and time fixed effects

$\varepsilon_{i,t}$ an error term



METHODOLOGY

- baseline regression model estimated with fixed effects
- due to possible endogeneity problem we estimate system GMM
 - include lagged dependent variable to the right-hand-side of the equation
 - assume that macroeconomic and ownership variables are predetermined implying that they are not correlated with future error terms
 - bank-specific controls considered endogenous and instrumented with their lags



MAIN RESULTS

Regression type	Dependent variable = Δ liquidity creation (CAT)			
	FE	Sys. GMM	FE	Sys. GMM
GDP growth	0.71	0.57	0.72	0.50
	(0.16)***	(0.13)***	(0.16)***	(0.15)***
Lagged Δ Liquidity creation (cat)		0.43		0.43
		(0.02)***		(0.02)***
State-owned			-0.02	-0.06
			(0.13)	(0.07)
State-owned x GDP growth			0.23	0.14
			(0.28)	(0.19)
Foreign-owned			-0.07	0.05
			(0.15)	(0.10)
Foreign-owned x GDP growth			-0.25	-0.33
			(0.43)	(0.29)
No. of obs.	35 349	33 099	35 347	33 097
Adjusted R-squared	0.04		0.04	
Number of banks	1 180	1 167	1 180	1 167
Number of instruments		720		740
AR(2) test p-value		0.195		0.206
Hansen OIR test p-value		0.118		0.298



MAIN RESULTS

- GDP per capita growth enters with positive and significant coefficients => bank liquidity creation procyclical
- interactions of GDP growth with ownership dummies are not significant
 - differs from the results observed on cyclicity of bank lending in Bertay, Demirgüç-Kunt and Huizinga (2015)



HIGH AND LOW GDP GROWTH

Dependent variable	Δ Liquidity creation (CAT)	
	FE	Sys. GMM
High GDP growth	0.27 (0.13)**	0.23 (0.11)**
Low GDP growth	-1.01 (0.24)***	-0.56 (0.22)***
Lagged Δ Liquidity creation (cat)		0.45 (0.02)***
State-owned	-0.02 (0.12)	-0.09 (0.07)
Foreign-owned	-0.08 (0.15)	0.004 (0.08)
State-owned x High GDP growth	0.28 (0.28)	0.18 (0.18)
State-owned x Low GDP growth	-0.06 (0.69)	0.07 (0.44)
Foreign-owned x High GDP growth	-0.14 (0.40)	-0.23 (0.26)
Foreign-owned x Low GDP growth	-0.50 (0.85)	-0.50 (0.61)
No. of obs.	35 347	33 097
Adjusted R-squared	0.05	
Number of banks	1 180	1 167
Number of instruments		821
AR(2) test p-value		0.117
Hansen OIR test p-value		0.852



HIGH AND LOW GDP GROWTH

- estimated coefficients for high and low GDP growth are significant - procyclical liquidity creation for all banks is observed in bust times and boom times
 - the results not driven by certain stage of the cycle
- no asymmetry in the cyclicalities of liquidity creation by ownership



ROBUSTNESS CHECKS

- alternative liquidity creation measure
 - based on maturity
- accounting for crisis
 - crisis dummy variable significant and negative but the main result remains
- alternative indicator of the business cycle
 - real investment growth



CYCLICALITY OF BANK LENDING

Dependent variable = Δ loans			
Regression type	OLS with FE	OLS with FE	OLS with FE
GDP growth	0.43	0.41	
	(0.05)***	(0.05)***	
High GDP growth			0.16
			(0.04)***
Low GDP growth			-0.29
			(0.07)***
State-owned		-0.07	-0.06
		(0.07)	(0.08)
State-owned x GDP growth		0.16	
		(0.13)	
Foreign-owned		-0.11	-0.10
		(0.07)	(0.06)
Foreign-owned x GDP growth		0.30	
		(0.17)*	
State-owned x High GDP growth			0.18
			(0.16)
State-owned x Low GDP growth			0.76
			(0.44)*
Foreign-owned x High GDP growth			0.35
			(0.16)**
Foreign-owned x Low GDP growth			-0.08
			(0.30)
No. of obs.	35 149	35 147	35 147
Adjusted R-squared	0.15	0.15	0.15
Number of banks	1 162	1 162	1 162



CONCLUSION

- liquidity creation of banks is procyclical
=> bank behavior in liquidity creation can amplify business cycle fluctuations
 - as liquidity creation has been shown to exert beneficial effects on economic activity
- state-owned banks do not have more or less procyclical behavior than foreign or domestic private banks
 - analysis of bank liquidity creation, a broader concept of bank output than lending, can provide different view than lending