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Emerging Market Queries in Finance and Business

Bank liquidity and its determinants in Romania

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Abstract

Recently, the global crisis has proven that the lack of bank liquidity was the main trigger of all the negative events. Many profitable banks faced difficulties in managing their own funds due to the misunderstanding of liquidity risk. I conducted this research paper with the aim of identifying the factors that influence bank liquidity through a multiple regression model, over a panel of commercial banks in Romania. The results reflect both common and different determinants for the two liquidity rates analyzed and are consistent with the previous literature on this topic. The pre-crisis years are observed separately from the crisis period (2008-2010). An important indicator for bank stability, Z-score, has a significant influence over bank liquidity in the crisis years. In the pursuit of designing efficient liquidity management tools, I built the conceptual and empirical framework for enhancing bank liquidity, as a variable difficult to stress test.

Keywords: bank liquidity; bank solvency; credit risk; Z-score.

1. Introduction

The recent global crisis has shown that banks, as major players in the financial universe, need to adjust their aims for profitability in order to get protection against liquidity risk. Inappropriate management incentives, systemic risk neglect and unregulated financial innovations have led to a world crisis that has not finished yet. Latent vulnerabilities have been revealed by the general lack of liquidity and we are witnessing an historical period of global financial architecture reform. This research paper is a first step in achieving the fundamental purpose of optimizing the liquidity-profitability relationship, being acknowledged that many financial institutions have faced difficulties/defaulted even if they were profitable – as it was the case of Lehman Brothers in 2008 – due to the mismanagement of liquidity. Under these circumstances, identifying the determinants of bank liquidity is necessary for a better understanding of the concept and also for an appropriate

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positioning of the liquidity risk in relation with the other financial risks. The paper is structured as it follows: Section 2 reviews the related literature on the determinants of bank liquidity, Section 3 describes the data and the methodology used, including the variables selected for the analysis and the econometrical model, Section 4 outlines the empirical results and Section 5 concludes this paper and offers paths for further research.

2. Literature Review

Literature on the topic of bank liquidity determinants offers a limited range of studies that empirically validate the influence of internal, bank specific and external, macroeconomic factors over the liquidity of banks. In 2006, an analysis over a panel of English banks (Valla, Saes-Escorbiac, 2006) reported a determinant negative correlation with liquidity of the GDP real growth and also, of the net interest margin, seen as an opportunity cost for holding liquid assets. In the banking system of the emerging economies (Bunda, Desquilbet, 2008), the capital adequacy measure is validated as a positive influence over the liquidity and the inflation rate, which increases banks' vulnerability to nominal values of loans, is directly related to liquidity. Furthermore, a study over a panel of European banks (Lucchetta, 2007) confirms that the more liquid the bank is, the more it lends in the interbank market. Also, the study shows that the interbank interest rate will be an incentive for holding liquid assets. At the same time, assuming a lower credit risk (measured as a ratio between loan loss provisions and net interest revenue) will ensure a higher level of liquidity. In 2009, the liquidity of the state-owned savings banks in Germany has been validated to be negatively related to the monetary policy interest rate and the level of unemployment rate (Rauch *et. al*). Also, the level of liquidity in previous period has been directly determinant for the analysed liquidity.

3. Data and methodology

In the table below I describe the internal and external variables that I considered to be explanatory for the dependent variable, liquidity, measured through the following ratios, L1 and L2:

$$L1 = \text{Net Loans} / \text{Total Assets}$$

$$L2 = \text{Liquid Assets} / \text{Deposits and short term funding}$$

and the hypothesized relationship between these variables.

Table 1. Explanatory variables and their hypothesized effect on liquidity

Independent Variables	Measure	Hypothesized relationship
<i>Internal Factors</i>		
1. Capital Adequacy	a) Tier 1 Capital Ratio	+
	b) Z-score = (Equity/Total Assets + ROA) / σ_{ROA}	+
2. Assets Quality	a) Impaired Loans/Gross Loans	-
	b) Loan Loss Provisions/Net Interest Revenue	-
3. Interbank Funding	Interbank Assets/ Interbank Liabilities	+
4. Funding Cost	Total Interest Expense/Total Liabilities	-
5. Cost to income ratio	Total expenses/Total generated revenues	+
<i>External Factors</i>		
1. Interest rate ROBOR	ROBOR 3 months	+
2. Credit risk rate	Total exposures/Total Loans and Interests	-
3. Inflation rate	Consumer Price Index	+
4. GDP real growth rate	GDP Relative Growth·GDP Deflator	+
5. Unemployment	Unemployment Rate	-

3.1. Data

The sources of data used are Fitch's BankScope database for the bank-specific factors, a database providing comprehensive financial information on an annual basis for banks in 180 countries around the world and for the macroeconomic factors, Eurostat – the statistical office of the European Union and National Bank of Romania Statistics.

I analyzed a panel of 27 banks active in Romania over the period 2002-2010, emphasizing the differences between the pre-crisis years (2002-2007) and the crisis years (2008-2010).

3.2. Econometrical model

In order to empirically investigate the relationship between the selected variables, I use a linear multivariate regression model, which is widely used in the literature:

$$Y = \alpha + \beta_1 \cdot X_1 + \dots + \beta_n \cdot X_n + \varepsilon \quad (1)$$

where:

Y – liquidity L1 or L2

α - constant

$X_1 \dots X_n$ - independent variables

$\beta_1 \dots \beta_n$ - estimated regression coefficients

ε - a disturbance term

The estimated model was tested so as the errors to be normally distributed, independent and with constant variance (homoscedasticity condition). Furthermore, the simultaneous inclusion of certain variables did not raise concerns of multicollinearity as the tests performed have indicated.

4. Results

The estimated coefficients that fit best the regression model for the entire period 2002-2010 are presented in Tabel 2 and Tabel 3.

Table 2. Bank liquidity L1 determinants over the period 2002-2010

Model L1	Standardized Coefficients			Collinearity Statistics		
	Beta	t	Sig.	Tolerance	VIF	
R²	(Constant)	58,118	12,213	,000		
Adjust. 0,376	Tier 1 Capital	-,402	-3,305	,002	,649	1,540
	Z-score	,333	2,562	,013	,567	1,762
	Impaired Loans	-,557	-4,510	,000	,631	1,586
	Interbank Funding	-,202	-2,009	,049	,947	1,056
	Cost to income ratio	,290	2,311	,024	,610	1,640
	Credit risk rate	,393	3,085	,003	,591	1,691

As expectable, there are totally different influences over the two liquidity rates for the whole period. We observe the influence of Tier 1 Capital Ratio and Z-score as the most important for L1, among which only Z-

score will be determinant in the crisis years. Also, the Impaired Loans indicator has a constant significant negative influence for all the three pooled cross sections.

Table 3. Bank liquidity L2 determinants over the period 2002-2010

Model L2		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
R²	(Constant)	41,998	8,807	,000		
Adjust.	Loan Loss Provisions	,248	2,036	,046	,517	1,933
0,503	Funding Cost	,229	1,949	,056	,555	1,803
	ROBOR 3M	-,411	-2,365	,021	,253	3,953
	Unemployment	,294	2,167	,034	,416	2,407

For the pre-crisis period, again, there are different determinant correlations for both liquidity rates L1 and L2, except for the Tier 1 Capital Ratio that appears for both, a predictable effect, taking into account the mandatory regulations of Basel Accords.

Table 4. Bank liquidity L1 determinants over the period 2002-2007

Model L1		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
R²	(Constant)	67,935	16,423	,000		
Adjust.	Tier 1 capital	-,348	-2,340	,029	,913	1,096
0,475	Impaired Loans	-,820	-3,109	,005	,291	3,441
	Loan Loss Provisions	,569	2,154	,042	,290	3,447
	Interbank Funding	-,389	-2,639	,015	,929	1,076

Significant influences seen before for the whole period are validated also for the pre-crisis years, as it is the case of Tier 1 capital Ratio and Impaired Loans.

Table 5. Bank liquidity L2 determinants over the period 2002-2007

Model L2		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
R²	(Constant)	68,820	5,744	,000		
Adjust.	Tier 1 Capital	,402	2,267	,033	,881	1,136
0,281	Credit Risk Rate	-,803	-2,823	,010	,342	2,926
	Inflation Rate	-,624	-2,122	,045	,320	3,125

The analysis over the crisis years reveals the most interesting results in Tabel 6 and Tabel 7:

Table 6. Bank liquidity L1 determinants over the period 2008-2010

Model L1		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
R²	Z-score	,292	2,036	,049	,941	1,062
Adjust. 0,264	Impaired Loans	-,400	-2,790	,008	,941	1,062

The influence of Z-score, the most relevant measure of bank stability, is significant in the crisis years, together with, again, the Impaired Loans, an indicator that is under the scrutiny of bank managers since it stands for potential loss due to unfavorable market conditions.

Table 7. Bank liquidity L2 determinants over the period 2008-2010

Model L2		Standardized Coefficients			Collinearity Statistics	
		Beta	t	Sig.	Tolerance	VIF
R²	(Constant)	-19,291	-1,334	,191		
	Loan Loss Provisions		2,005	,053	,744	1,345
Adjust. 0,236	ROBOR 3M	,385	2,424	,021	,798	1,253
	Inflation Rate	,332	1,892	,067	,653	1,531

5. Conclusions and further research

The synthesized results of my analysis are listed in the following table. Obviously, the crisis brought substantial changes also over the structure of bank liquidity determinants. We observe more macroeconomic determinants for the second liquidity rate, a fact that highlights the importance of continuous report to the aggregate risk.

Table 8. Summary of results

Liquidity Determinants	2002-2010	2002-2007	2008-2010
<i>Bank specific factors – L1</i>	Tier 1 Capital (-)	Tier 1 Capital (-)	
	Z-score (+)		Z-score (+)
	Impaired Loans (-)	Impaired Loans (-)	Impaired Loans (-)
	Interbank Funding (-)	Interbank Funding (-)	
	Cost to income ratio (+)	Loan Loss Provisions (+)	
<i>Macroeconomic factors – L1</i>	Credit Risk Rate (+)		
<i>Bank specific factors – L2</i>		Tier 1 Capital (+)	
	Loan Loss Provisions (+)		Loan Loss Provisions (+)
	Funding Cost (+)		
<i>Macroeconomic factors – L2</i>			
	ROBOR 3M (-)	Credit Risk Rate (-)	ROBOR 3M (+)
	Unemployment (+)	Inflation Rate (-)	Inflation Rate (+)

These results must be carefully analyzed and understood since it is possible to be induced by certain circumstances. For example, a reduction of the interbank interest rate is improbable to determine the reduction of bank liquidity (L2) as my results report for the crisis years.

In what regards further research, I intend to extend the analysis to include other East European countries and more significant indicators in order to create the premises of researching the impact of liquidity over profitability and the optimum model for the liquidity-profitability trade-off.

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