

LIQUIDITY RISK MANAGEMENT IN CRISIS CONDITIONS

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In order to measure the liquidity risk we have developed an analysis model, based on stress-testing scenarios, that shows the ability of the bank to face different types of liquidity crisis. The scenarios were designed for each balance sheet position for assets and liabilities: Ordinary Course of Business, Name Crisis (Mild Name Crisis and Severe Name Crisis), Market Crisis (Mild Market Crisis and Severe Market Crisis) that reflects banking sector crisis and persistent recession. This offers a dynamic image about the bank's liquidity in report with different types of liquidity scenarios, but also about the time horizon of analyze. The research also wants to highlight the most significant features to consider in order to implement an effective liquidity risk management and to achieve a more integrated supervisory framework.

Key words: liquidity risk, name crisis, market crisis, liquidity limits, gap analysis

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1. Introduction

A series of studies on liquidity management have appeared during the financial crisis, many of them comparing the funding liquidity with the market liquidity. Drehmann and Nikolaou (ECB, 2009) found that the funding liquidity risk has similar properties as the market liquidity risk, both showing persistence at low levels with occasional spikes, the evidence being more stronger after the beginning of the turmoil in August 2007. They have analyzed 135 main refinancing operation auctions conducted between June 2005 and October 2008 in the euro area from 877 participating banks in the relevant auctions. Brunnermeier and Pedersen (2007) discovered that higher funding liquidity risk implies lower market liquidity during the turmoil. Also, the bank which has to raise liquidity in the interbank market has to pay a higher price in order to obtain it. In the extreme, prices may even be infinite if a bank is credit rationed (Stiglitz and Weiss, 1981).

The credit institutions have elaborated their own models for following and limiting the liquidity risk. Their procedure regards the following elements: more restrictive internal limits for the liquidity indicator, limits for establishing and monitoring the liquidity risk in report to a single person or group of persons, the bank's own indicators for liquidity risk, an information system that monitors the liquidity that is used by the top management. In order to measure the liquidity risk there have been developed a series of models, based on these scenarios, that shows the ability of the bank to face different types of liquidity crisis. This offers a dynamic image about the bank liquidity in report with different types of liquidity scenarios, but also about the time horizon of the analysis.

The banks from the Romanian banking sector have aligned to the central bank's requirements and each of them has elaborated its own plan for forecasting and limiting the liquidity risk. The alternative financing plan represents an important part of the risk administration process, taking into account the scenarios applicable after the turmoil.

2. Methodological approach

In order to measure the liquidity risk we have developed an analysis model, based on stress-testing scenarios, that shows the ability of the bank to face different types of liquidity crisis. Taking into account that the duration of a crisis has an important impact on the level of liquidity, we have analyzed separately a short period (1 month) and a longer period (1 year). Also, for

each scenario we have taken into account the next perceptions:

- the internal perception, which is applied especially to the name crisis, when only the bank knows about the existence of liquidity problems, from the internal indicators and the information. At this level it is more easier for the bank to attract supplementary resource at a reasonable cost;

- the external perception, when the whole market know about the problems regarding the liquidity situation in crisis period. At this level, it is difficult to attract supplementary resources at a reasonable cost, independently on the type of crisis, name crisis or market crisis.

The internal and external factors that release crisis in the Romanian banking system, show evolutions, which indicated that there is a potential liquidity problem for the banks. Because of this, the analyze result of their level and evolution can motivate the activation of the financing alternative plan. Due to the *internal perception*, the future estimations regard the following: the estimated cash-flow for RON and foreign exchanges, the net cash-flow result for the next five days at for the whole bank. Due to the *external perception*, are taken into consideration the following: macroeconomic indices; qualifying ratings for Romania and for the bank; indices showing unfavorable evolutions for the bank, worsen profit and losses reports; indices showing unusual evolutions on the monetary market like the instantaneously increase of the interest rate level and of the spreads (the difference between the monetary policy rate of BNR and ROBID overnight); indices regarding the functionality of the monetary markets and capital markets.

The daily cash flow report is based on the estimation of the banks' current account balance opened at the National Bank of Romania. It includes the following: inflows and outflows resulting from the transactions on the monetary market, interbank transactions on the foreign exchange market, readily marketable assets, volatile liabilities, demand deposits, maturing assets, interest receivable, asset sales, drawdowns, maturing liabilities, interest payable, disbursements on lending commitments, early deposit withdrawals. During liquidity crisis the cash flow would be adjusted with the new conditions regarding the pessimistic estimation of the early deposit withdrawals, the delay of the interbank settlements and also with the negative effects that occurs from the foreign exchange operations. When large volumes of deposits are at stake, outflows of funds should be assessed on the basis of probability, with past experience serving as a guide.

The existence of multiple currencies increases the complexity of liquidity management. A bank may face difficulty in raising funds or in selling assets in foreign currencies in the event of market disturbances or changes in domestic monetary or foreign exchange policies. In order to meet these requirements, the Risk Controlling Division of a bank may calculate and monitor the next liquidity indicators, for EUR, USD and RON and also at cumulative level in equivalent RON:

a) The liquidity indicator calculated as a report between the liquid assets for the next 7 days and the sight deposits of the individuals;

b) The liquidity indicator calculated as a report between the liquid assets for the next 7 days and the sight deposits of the individuals and companies, including the correspondent accounts of other banks (LORO);

c) The liquidity indicator calculated as a report between the liquid assets for the next 7 days and the total current accounts and the term deposits of the clients;

d) The liquidity indicator calculated as a report between the liquid assets for the next 7 days and the total current accounts, the term deposits of the clients, individuals and companies, including the correspondent accounts of other banks (LORO).

In the Romanian banking system most banks implement the following analysis and liquidity limits, adapted to the market conditions: short term liquidity limit based on the net cash flow for the next five days, liquidity limits based on stress tests scenarios, long term intergroup funding limits and the GAP analyze.

This liquidity analysis on crisis scenarios is the practical part of the research done, by presenting the liquidity limits, the immediate effects after the crisis starts and the measures taken for

improving the situation, but also for analyzing the efficiency of the results obtained after the application of stress-testing scenarios.

3. Case study of the liquidity limit based on stress testing

There are five liquidity scenarios, for each balance sheet position for assets and liabilities:

- Ordinary Course of Business (OCB): there aren't any internal or external problems;
- Name Crisis (NC): which could take the form of a Mild Name Crisis (MNC) characterized by the decrease of the profit and/or a negative perspective or of a Severe Name Crisis (SNC) characterized by the deterioration of the rating score with more than two units;
- Market Crisis (MC): which could take the form of a Mild Market Crisis (MMC) with mild recession and mild political crises or of a Severe Market Crisis (SMC) characterized by the banking sector crisis, severely and persistent recession.

For each scenario were established three sets of hypothesis:

- hypothesis regarding the primary and the secondary activity: what percent represents these activities in a class of products;
- hypothesis regarding the renewal of the positions: what percent from a class of products would be renewed with the given scenarios;
- hypothesis regarding selling or quick transformation in collateral and unanticipated withdrawals: what percent from a class of products could be sold or used as collateral (from assets) or early withdrawn (from liabilities) before its contractual maturity.

In the next tables are presented the percents for the hypothesis defined above, for one month period and for all of the liquidity scenarios.

Table 1: Scenarios regarding the base activity and the secondary activity

	OCB	MNC	SNC	MMC	SMC
ACTIVE					
Nonbank clients with contractual maturity - primary	90%	90%	90%	90%	90%
Nonbank clients with contractual maturity - secondary	10%	10%	10%	10%	10%
Nonbank clients without contractual maturity - primary	100%	100%	100%	100%	100%
Nonbank clients without contractual maturity - secondary	0%	0%	0%	0%	0%
Cash and balances with the central bank – primary	0%	0%	0%	0%	0%
Cash and balances with the central bank – secondary	100%	100%	100%	100%	100%
Interbank assets – primary	10%	10%	10%	10%	10%
Interbank assets – secondary	90%	90%	90%	90%	90%
PASIVE					
Nonbank clients with contractual maturity - primary	15%	15%	15%	15%	15%
Nonbank clients with contractual maturity - secondary	15%	15%	15%	15%	15%
Nonbank clients without contractual maturity - primary	85%	85%	85%	85%	85%
Nonbank clients without contractual maturity - secondary	15%	15%	15%	15%	15%
Interbank liabilities – primary	100%	100%	100%	100%	100%
Interbank liabilities – secondary	0%	0%	0%	0%	0%

Table 2: Renewal hypothesis at 1 month

	OCB	MNC	SNC	MMC	SMC
ACTIVE					
Nonbank clients with contractual maturity - primary	100%	100%	80%	100%	100%
Nonbank clients with contractual maturity - secondary	100%	70%	50%	75%	55%
Nonbank clients without contractual maturity - primary	100%	100%	80%	100%	100%
Nonbank clients without contractual maturity - secondary	0%	0%	0%	0%	0%
Cash and balances with the central bank – primary	0%	0%	0%	0%	0%
Cash and balances with the central bank – secondary	100%	70%	50%	70%	50%
Bonds	100%	70%	50%	70%	50%
Interbank assets – primary	100%	100%	100%	100%	100%
Interbank assets – secondary	100%	15%	5%	15%	15%
Loro/Nostro accounts	100%	100%	80%	100%	100%
Minimum reserve requirements	100%	100%	100%	100%	100%
Transition assets	100%	45%	0%	60%	25%
Less of interest assets	100%	100%	100%	100%	100%
PASIVE					
Nonbank clients with contractual maturity - primary	100%	80%	25%	100%	95%
Nonbank clients with contractual maturity - secondary	100%	90%	60%	100%	95%
Nonbank clients without contractual maturity - primary	100%	80%	50%	100%	90%
Nonbank clients without contractual maturity - secondary	100%	75%	20%	100%	95%
Interbank liabilities – primary	100%	100%	100%	100%	100%
Interbank liabilities – secondary	0%	0%	0%	0%	0%
Loro/Nostro accounts	100%	80%	70%	100%	90%
Subordinated debts	100%	60%	0%	75%	40%
Supplementary capital	100%	100%	100%	100%	100%
Less of interest liabilities	100%	100%	100%	100%	100%
Swaps	100%	100%	100%	100%	100%

Table 3: Selling/transforming hypothesis at 1 month

	OCB	MNC	SNC	MMC	SMC
ACTIVE					
Nonbank clients with contractual maturity - primary	0%	0%	0%	0%	0%
Nonbank clients with contractual maturity - secondary	0%	0%	0%	0%	0%
Nonbank clients without contractual maturity - primary	0%	0%	0%	0%	0%
Nonbank clients without contractual maturity - secondary	0%	0%	0%	0%	0%
Cash and balances with the central bank – primary					
Cash and balances with the central bank – secondary	100%	97%	97%	95%	85%
Bonds	100%	97%	97%	95%	85%
Interbank assets – primary	0%	0%	0%	0%	0%
Interbank assets – secondary	0%	0%	0%	0%	0%
Loro/Nostro accounts	0%	0%	0%	0%	0%
Minimum reserve requirement	0%	0%	0%	0%	0%
Transition assets	100%	97%	97%	95%	85%
Less of interest assets	0%	0%	0%	0%	0%
PASIVE					
Nonbank clients with contractual maturity - primary	0%	10%	60%	0%	3%

Nonbank clients with contractual maturity - secondary	0%	7%	50%	0%	3%
Nonbank clients without contractual maturity - primary	0%	10%	40%	0%	5%
Nonbank clients without contractual maturity - secondary	0%	12%	65%	0%	5%
Interbank liabilities – primary	0%	0%	0%	0%	0%
Interbank liabilities – secondary	0%	0%	0%	0%	0%
Loro/Nostro accounts	0%	10%	80%	0%	5%
Subordinated debts	0%	0%	0%	0%	0%
Supplementary capital	0%	0%	0%	0%	0%
Less of interest liabilities	0%	0%	0%	0%	0%
Swaps	0%	0%	0%	0%	0%

The results of the liquidity limit, for a Romanian commercial bank, are presented for each combination between crisis scenarios, time horizons and currency (the final results include the 1 year scenarios):

- the volume of the outflows could be covered by the inflows generated by secondary liquid assets (A);
- the volume of the outflows could be covered by the inflows generated by the total liquid assets , primary and secondary (B);
- the volume of the outflows is higher that the inflows generated by the total liquid assets , primary and secondary (C)

Table 4: Liquidity limits

1 month	OCB	MNC	SNC	MMC	SMC
All currencies	A	A	B	A	B
RON	A	A	B	A	B
EUR	A	A	B	A	B
1 year	OCB	MNC	SNC	MMC	SMC
All currencies	A	B	C	A	B
RON	A	B	C	A	B
EUR	A	B	C	A	B

4. Conclusions

Preoccupation with obtaining funds at the lowest possible cost and with insufficient regard to maturity distribution can greatly intensify a bank's exposure to the liquidity risk. Moreover, in practice, it is difficult to obtain funding when a dire need for it exists, especially that some unexpected situations also may have impact on liquidity risk, including internal or external upheavals, increased market activity, sectarian problems and economic cycles. All banks are influenced by economic changes, but sound financial management can buffer the negative changes. Management must also have contingency plans in the case that its expectations tend to be wrong, which identify the minimum liquidity needs and the alternative courses of action under different scenarios on short term liquidity limit based on the net cash flow, liquidity limits based on stress tests scenarios, long term intergroup funding limits and the GAP analyze. These scenarios may take into consideration, for each balance sheet position for assets and liabilities the ordinary course of business, but also the name crisis and the market crisis, from the mild ones to the severe ones.

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