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SCIENTIFIC REVIEW

Stress Testing Tool in Banking Risk Management – an Evidence from Serbia

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ABSTRACT – *In the Paper, the basic types of bank stress tests will be showed as examples from the practice of a relatively small bank in Serbia with assets of less than a hundred millions euro's. The tool is shown in two types of stress test (scenario of analysis and sensitivity test) with examples. Subject of the article is relevant to the problems that global economic crisis deeply affected and still affecting the Serbian banking sector. Crisis is prolonged and emphasizes the importance of more sophisticated tools and methods for risk management in financial institutions, especially those tools and methods dealing with the elaboration of sudden negative circumstances that could dangerously affect banks. According to extent of the crisis, bank management should envision possible situations and early signals to indicate any possible losses in future period. Special attention should be focused on actions of regulatory bodies in the forms of obligatory executions of complex and comprehensive stress tests. Stress tests are performed for banks individually and on level of national financial system. This article shows how relatively small changes in business environment can deeply affect a financial institution.*

KEY WORDS: *banking, risk management, stress test, scenario of analysis, sensitivity test*

Introduction

The global economic crisis inevitably led to the use and development of new tools for risk management in banking sector. Stress tests again stood out and gained importance compared to other risk tools because they are beginning to be used for risk management not only within the individual banks but also within the financial system at the state level (BIS, 2000). The main objective of these tests is to detect future problems if we apply certain criteria on current data. The theme of this study is the use of stress tests for risk management in financial institutions within banking system of Serbia. National Bank of Serbia uses the macro-prudential stress test of the financial system. The results of these tests are published as a part of annual report about stability of the financial system of Serbia (NBS, 2016).

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Stress tests

Considering that the risk management is increasingly important in banking business, stress tests are used for successful management of the bank. Stress test is a tool that is used to determine bank ability to resist unexpected adverse events and continue with regular work. Using stress tests it can be assessed whether the bank can continue to meet its obligations if something unexpected occurs or it is necessary to apply certain measures in advance. Measures to be applied are depending on conclusions from stress tests results, for example what could have happen to capital profits and cash flows, as a result of testing. Stress test analysis uses different methodologies, form simplest as sensitivity analysis of risk factors, to more complex as scenario analysis. Both types of stress tests should be performed regularly in order to evaluate the influence of multiple risk factors on the operations of the bank. These tests are necessary for effective management of the risks and bank leadership is able to timely make right decision and prepare for exceptional circumstances. Stress testing is widely accepted form Basle accord in 1996, and became standard part of bank business. Practice has shown that stress testing is usable and the results are good element for making decisions. Also, tools are important supplement for the risk management in banks, in addition to other standard methods such as ''Value-at-Risk'', where stress testing should be seen in broader context, not only as a statistical method. (Mirkovic, 2014).

Stress tests are carried out as projections' of potential negative effects and future problems. The main objectives of stress tests by Drehmann (Drehmann, 2008:56) are evaluating risk level, determination of the portfolio weaknesses, assisting the planning and decision-making process which makes clearer picture in financial institutions. After the global economic crisis, stress tests have greater significance and they are used in banks, international financial institutions and by regulators. Tests are used as an additional tool that provides information about bank's tolerance level, and how one can proceed in crisis situations. Within imagined conditions in future, considering stress tests, one can check the level of capital, cash flow, deposits as well as credit facilities. The most important goal of the stress tests is applicable way to point potential problems in banks and markets. Analysis may include one or more variables. Stress testing can be, for example, conducted through sensitivity analysis and scenario (simulation) analysis (BIS, 2009).

Stress tests entail projections of potential negative market trend, and the impact on the bank's results. Stress test, in general, belongs to the static group of model for evaluating risks, and the simplest stress test is the sensitivity analysis. This way, the estimation of results of possible scenario is done, and represents the easiest method is to assess the bank vulnerability. With the sensitivity analysis one can monitor only individual parameter of stress. It is about data connected with potentially real events and their consequences in the real environment. What's good about sensitivity analysis is offer of fast assessment of these harmful possibilities and level of sensitivity of the bank to many factors. The weakness of the sensitivity analysis is that it doesn't analyze multiple factors simultaneously. More complex - scenario analysis monitors multiple parameters simultaneously in some given unforeseen circumstances in the future. This analysis monitors correlation between multiple measured risks, too. The results of both models depend on the quality of imagined scenarios. If a lot of variables in reality differ from ones assumed. After defining the types of stress test to use,

the selection steps must be undertaken to identify data and indicators which will be analyzed. Two different types of approaches are used to select indicators: historical and hypothetical. Historical scenarios are based on historical data. It should be considered the time frame of measuring. Short-term time frames are those up to one year, and longer terms are up to five years and they provide less reliable results.

In practice, after determining the scenario, identifying risk factors and time frame next step is the stress test. Team of risk specialists collaborates with other organizational units of the bank. Testing phases includes collection of the data, determining risk factors, construction and launching stress test, calculation of potential losses, reporting results and undertaking corrective actions as well as re-evaluations of the stress test. When results are presented to the management, results and proposal should be examined to recognize problems and prevent potential losses that may appear if conditions of the stress test occur. In order to successfully manage the risks, it is necessary to conduct and improve stress tests on regular basis.

Sensitivity analysis

Each bank must maintain the appropriate level of liquidity in a way that the ratio between the total liquidity of the bank claims on the one hand, and the sum of liabilities of the bank deposits or without contractual maturity and deposits of the bank, with fixed maturity within the next month, following the date of calculation of the liquidity ration, on the other hand. The liquidity ratio is maintained so that at least 1.0 as the average for all working days in a month, not to be less than 0,9 for more than three consecutive working days and at the end of each work day, at least 0,8.

In presented sensitivity analysis of the bank from Serbia it is anticipated simultaneous withdrawal of a part of domestic and foreign currency deposits, which are deposited for a period of one month and longer. In Table 1 it is shown the liquidity ratio, analyzed hypothetical withdrawal of total 20% of the local currency term deposits and 20% of term deposits in euro's.

Table 1: Stress test of liquidity risk at the date of 31st December 2015

Indicator	Actual data	After the stress test	Effects
Daily liquidity ratio	4,35	1,72	+6,23

In the event that we have shown, it can be seen that the bank showed resistance to this hypothetical case of withdrawal of deposits and that is an indicator of liquidity remained above the prescribed limit.

Scenario analysis

In the above example unknown are the other consequences of such massive withdrawal of deposits on other important indicators of the bank. For example such event could indicate high reputational risk which in turn could trigger other losses. A hypothetical event shown

in the following scenario analysis also presents stress test of the bank's liquidity. Displayed scenario analysis belongs to combination of systemic and specific events. The scenario includes potential deterioration of quality of the bank's portfolio due to reduced economic stability of the domestic market. Simultaneously bank must extraordinary repay the full amount of taken long-term loan from abroad, due to breaches of contractual clauses concerning the quality of the portfolio of that bank. The bank develops scenario and observe development in this hypothetical scenario, as the worsening of the economic situation in the country develops. Austerity measures anticipated are abolishing government subsidies to milk producers who are very significant segment of customers for the bank, and a further increase in import of pig's because, due to high inflation and high prices farmers have no profit from growing pigs. The example also shows increase in unemployment, the decline in average earnings, and the increasing price of fuel which consequently leads to additional increasing of problematic loans in all sectors. After detailed analysis and calculation of the effects of the hypothetical bank, in following table are the results:

Table 2. Results of scenario analysis on the date 31st December 2015

Indicator	The actual data	Scenario analysis	Effect
Capital in million EUR	15,1	13,9	-1,8
The share of problematic loans	2,87%	10,01%	+7,14%
Return on equity indicator (ROE)	14,97%	-3,30%	-18,27%
The daily liquidity ratio	4,35	1,34	-3,01

In the proposed situation, all business and personal clients and most of the agricultural segment of the portfolio are late with payments, and consequently the bank has worsening portfolio quality. This situation quickly causes the creditor from abroad to clam all the long-term borrowed funds immediately. The latter automatically adversely affects the liquidity of the bank. Furthermore, there are additional negative effects on liquidity due to that clients massively cease to pay obligations to the bank and thus reduce the expected inflows. Also, the reduced quality of the portfolio the bank required increased provisions for loan losses in the income statement and reduction of capital, which added burdens profitability and capital and also, reduced capital adequacy ratio. Particular heaviness of this scenario is the fact that everything happens simultaneously. This is a complex scenario that is possible in extreme circumstances, but it deserves to be closely examined by the bank. Scenario analysis assesses the impact of variables related to each other, and then as the sum of all the negative impacts there is the further deterioration of portfolio quality, than, probably further crisis of profitability, and after that, at the end we have again deeper liquidity crisis. Bank leadership after the scenario analysis examines possible options to implement in the near future, an advance plan for a case described in scenario, in order to possibly reduce or neutralize negative effects.

Conclusion

It is important to note that for reality of stress test is necessary to have a team that has experience and team which is inventive while choosing parameters and develop scenario analysis. In elaboration of the assumptions, participants must know causes and consequences of events that have occurred in the country and abroad historically. Stress testing is a standard tool in risk management, and is always the result of teamwork. Sensitivity test is a simple and fast method, but it can also be insufficiently precise. Scenario analysis requires a lot more time and participants. It can provide a more precise picture of the effects of larger number of indicators. There is always a real danger that during the development of stress tests it could go to extremes where the assumptions are too conservative or optimistic, or that the tests are either too simple, or too complex. When elaborating scenario, it is very important to apply well known historical shocks i.e. it is important to elaborate repetition of familiar events.

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