

Stress Testing as a Tool for Assessing Systemic Risk of Organizations of the Russian Banking Sector

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Abstract

Under the conditions of competition improvement in banking sector, i.e. - on the part of international financial institutions, sophistication of operations and simultaneous access of banks to the instruments of risk hedging the task of building of risk-management system by banks with use of stress-testing becomes specially prioritized and relevant. The current instability on world financial markets being the consequence of global crisis stipulates the necessity for more searching examination and assessment of probable risks. The most important factor stipulating the stability of the commercial bank is being the application of adequate assessment of financial losses under the conditions of market's instability. This will provide creation of prerequisites for effective control and management of risks in the period of increase of recessionary situation in the Russian economy. The goal of this paper is the conceptual research of stress-testing evolution as the method for assessment of systemic risks in the epoch of financial globalization, and also – the substantiation of recommendations on improvement of the system of practical realization of stress testing method in the framework of counter-cyclic regulation with account of tendencies for development of international banking supervision. The methodological background of research is based on the principles of comparative and system analysis, unity of qualitative and quantitative, historical and logical approach. In the paper the historical background is considered, novations in the area of legislative regulation of banking risks in Russia and abroad are analyzed. In the framework of research the main problems and disadvantages of existing practice of stress testing are defined, the approach of the Bank of Russia to conduction of stress-tests is characterized, the affairs, the implementation of which will help stress testing to take its proper place among the instruments for regulation and supervision of banking system of Russia.

Keywords: stress testing, risk assessment, vulnerability of banking system

1. Introduction

The global financial crisis and the long-drawn stage of post-crisis recovery have enhanced the relevance of development of effective methods for assessing the level of vulnerability of banking systems to systemic risks under the conditions of changing macroeconomic situation.

The introducing of large-scale economic sanctions – mainly, against such biggest national banks as Sberbank, VTB, Gazprombank and others, which have lost the access to long-term financing abroad, has seriously "stricken" the banking sector of Russia. Some Russian experts consider the blockade of big banks will have the most serious consequences. On the background of the Ukrainian events the Russian banks can lose 25 bln. dollars. Such a figure was declared on the conference of Prime Minister Dmitry Medvedev in October, 2014. However, earlier – in February – the Fitch agency estimated potential damage in respect of Russian banks in the Ukraine 28 bln. dollars. The biggest number of risks was referred to Vnesheconombank, the assets of affiliated Ukrainian bank of which made almost third part from capital, and also to Gazprombank.

However, the full collapse of Russian banking system is of low probability. Big banks with administrative resource will hardly be badly harmed, while small and medium-sized banks that are being active in the most vulnerable sectors of

market will leave the banking market. Nevertheless, one cannot speak about banking panic in the Russian Federation, although there is some nervousness due to the uncertainty of the situation. In general Russian banking sector looks quite well, despite all the difficulties. Many experts remain positive and consider the damage from the banking sanctions will be confined. Payments in roubles and settlements inside the country in any way will not suffer from external decisions, as they are controlled by the Bank of Russia, while the deposits of population, i.a. – in foreign currency, are insured by the government.

The leading role in determination of the ability of banking system to response to external risks is played by the stress testing method, which is widely applied by regulatory bodies of economically developed countries.

The dissemination of results of stress-tests of the biggest banking institutions conducted in a number of western countries in the recent five years within the scientific community has provided increase of visibility of leading world banking systems and growth of investors' confidence in respect of key emitters representing the banking sector. The stress-tests of banks in such a way have become one of advantage factors in overcoming of financial crisis consequences, despite subsequent numerous remarks of specialists in regard of their forecasting accuracy (Nixon, 2011).

Central banks of countries, including the Bank of Russia, set a course for implementation of Basel requirements, implement the practice of stress testing on regular basis (Recommendation of the Bank of Russia, 2010). However, as opposed to above-mentioned public assessments, its results most commonly bear confidential character and are used by regulatory bodies for internal purposes of banking sector subjects' financial stability monitoring.

The stress-testing is the general notion that consolidates the aggregate of methods for assessing the degree of influence of negative events, which can be characterized as "exceptional, but probable", on the financial state of credit organizations. Thus, the sphere of stress-testing application covers the events, the probability of occurrence of which is rather high under the condition of instability and which can be forecasted with quite high certainty.

2. Literature Review

The conceptual approaches to the problem of assessment of financial losses under the conditions of market's instability are represented in a number of scientific works. In the recent years the active studies of banks' stress-testing process were performed by both – foreign and national scientists. Researcher Drehmann M. has studied the impact of stress-testing goals, such as risk assessment, making of decisions and communication, on choice of adequate models for its conduction (Drehmann M., 2008). Another one scientist Oyama T. has developed the methodic approaches to assessment of occurrence of stressful scenarios (Oyama T., 2007). Researcher Rebonato R. has specified the disadvantages and opportunities of stress-testing in assessment of the impact of extreme events on the financial state of economic entities (Rebonato R., 2010). Russian scientists Bezdudniy M.A. (Bezdudniy M.A. et al., 2010), Meshkova E.I. (Meshkova E.I., 2013), Larionova I.V. (Larionova I.V., 2013), Mamonov M.E. (Mamonov M.E. et al., 2012), Moiseev S.R. (Moiseev S.R., 2010), Salmanov O.N. (Salmanov O.N., 2015), Ananiev A.N. (Ananiev A.N., 2014), Nikitina T.V. (Nikitina T.V., 2007), Simanovskiy A.Y. (Simanovskiy A.Y., 2012) have published a number of articles dedicated to the aspects of stress-testing application for assessing liquidity risk, bank's credit or market risk, and also have developed new and improved the existing research techniques for use on micro- and macro-levels. Taking into account the significant number of approaches, types and methodologies for stress-testing of banks, there is a demand in development of single theoretical foundation for assessment of their efficiency, what remains impossible without integral examination of essence and stages of the present process.

The stress-testing of banks is represented with complex multiple-stage process of assessing vulnerability of banking system and also its ability to stand against the impact of risks generated by a number of exceptional, but probable events. The main result of stress-testing is the forecasting of changes of the cost of researched banking portfolio or their aggregate in given variations of financial variables set. Under definite conditions such an assessment can turn out to be quite accurate forecast of change of banking risk value in consequence of stressful scenario realization. However, at most the results of stress-testing reflect only approximate quantitative values of influence of undesired events on the researched portfolio of banking assets. As Ricardo Rebonato notes, stress-testing is not so much an accurate instrument that can be used with scientific scrupulousness, as the art, which demands application of econometric methods, expert evaluation and series of sober-minded assumptions (Rebonato R., 2010).

At the same time the analysis of modern studies has revealed the paucity of works exposing the specificity of stress-testing when assessing systemic banking risks in developing economies. Our research is aimed to some degree at closing this gap.

3. Results and Discussion

From the point of view of the bank's stability one of the most important factors for its achievement is the application of adequate assessment of financial losses under the conditions of market's instability. This will provide creation of prerequisites for effective control and management of risks in the period of increment of crisis situation in economy.

The analysis has shown that at the present day the stress-testing is the important and necessary part of banking risks management systems, despite its apparent secondary role in the priority system. Such situation can be explained with probabilistic nature of criteria and indicators that are used in assessment and analysis of risks (Zaernjuk, 2014).

International Monetary Fund defines stress-testing as "methods for assessing the sensibility of portfolio to significant changes of macroeconomic indicators or to exceptional, but probable events" (Blaschke et al., 2001).

In the practice of Bank for International Settlements stress-testing is considered as the aggregate of various methods used by banks for assessing their vulnerability in respect to exceptional, but probable events (Committee on the global financial system, 2000).

At last, Russian regulator (the Bank of Russia) in its provisions considers stress-testing as "assessment of potential impact of a number of given changes in the risk factors, which correspond to exceptional, but probable events, on financial state of a credit organization" (Approaches to the organization of stress-testing..., 2003).

The key advantage of stress-testing is that credit organization relying on the results of stress-testing can foresee probable occurrence of risks, assess them and in advance to allocate funds for losses recovery.

As study has shown, there are many different types and methods for stress-testing. At the same time it requires the analysts to have research, diagnostic and interpretation skills together with the skill to combine them in different correlation at each of subsequent stages (figure 1).

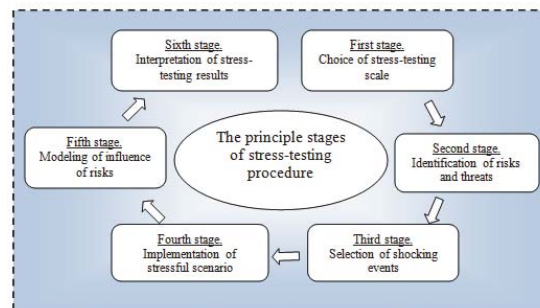


Figure 1. The principle stages for conduction of stress-testing

The analysis has shown that further improvement of stress-testing methodologies will happen on the basis of optimization of each of research stages represented in figure 1. Let us examine the content of stress-testing stages in details.

At the first stage we choose the group of researched banks, on which the stability of banking system depends. The stress-testing selection is recommended to be added with a part of main banking institutions, which have significant impact on the stability of banking system and are sensitive to action of common factors of risks. The cut-off point for stress-testing selection can be determined by means of analysis of banks' market shares. The selection of banks should be quite wide, but at the same time not too bulky: for the purpose of adequate reflection of systemic consequences of shocks without complication of technical aspect of stress-testing process. Optimal scale of banks' selection for stress-testing depends also on the chosen approach to assessment.

The second stage is necessary for identification of points of the biggest vulnerability of banks. For credit organizations, the business activity of which is concentrated on internal credit market, the important aspect is the assessment of influence of credit risk, interest rate dynamics, unemployment, costs for real estate, as the present factors have the biggest potential impact on the development of such banks.

When stress-testing large transnational banks, another set of risk factors is put in the forefront: the dynamic of world costs for resources, exchange rates, share indexes, etc. The liquidity risk obtains special significance in the countries with high share of banking resources borrowed from abroad, and also – in case of deficit of internal deposits.

The third stage provides, as it is shown in figure 1, the formation of a number of suppositions concerning the influence and certainty of shocks, i.e. causing the realization of risk events that can include the growth of costs for raw materials, change of interest rates, decline of real estate market and many other economic phenomena of threatening nature.

Although the stress-testing do not imply change of probability of occurrence of stressful scenarios, they,

nevertheless, should be rather realistic. The main problem in identification of stressful scenario is the matter of choice between historical and hypothetical approaches.

In our opinion, the most effective approach in the process of selection of stressful phenomena is so-called hybrid approach that combines hypothetical scenarios of economic shock built on the basis of analysis of former crises with account of existing structural shifts.

The fourth stage implies the choice and adaptation of statistical methodologies describing influence of macroeconomic environment on banks' financial indicators. In practice the macroeconomic models used for stress-testing can rarely take into account the action of full spectrum of shocks and risk factors and, consequently, require additional "satellite" models. These additional models are represented with equations that describe interrelations in separate sectors included into stressful scenario.

The fifth stage linked to modeling of risks' influence, requires application of statistical methodologies that help to estimate the level of interrelation between critical values of macroeconomic variable, which are used for description of threats, and resulting banking variables, which reflect the financial losses of bank as a result of action of the present stress factors. The goal of the modeling process is the description of influence of fluctuations of macroeconomic threat indicators on financial stability of banks. The choice of adequate approach to modeling depends on analyzed risk, accessibility of data and target of stress-testing.

And at last, the sixth stage (the interpretation of stress-testing results) is linked to assessment of stress-testing results, on the basis of which the recommendations in regard of probable regulatory response in the framework of governmental economic policy are formulated.

In the process of study we have figured out the significant amount of various types of stress-tests. In the specialized economical literature (Consultative Paper «Credit Stress-Testing», 2002) dedicated to the examined subject there are the following types of stress-tests (figure 2).

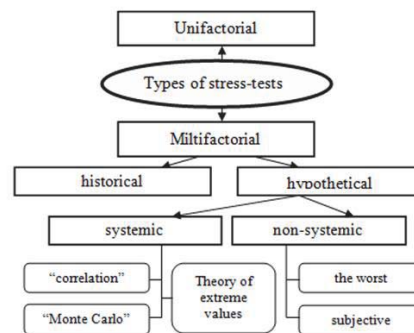


Figure 2. The main types of stress-tests

On the one hand, when forming stressful scenario one can rely on historical events supposing that the previous shocks possess the ability to repeat in future. On the other hand – on hypothetical scenarios, which despite their absence in historical practice can to a definite degree of certainty realize themselves in future. The historical scenarios are being easier in formation and at first sight seem to be more proved. However, the hypothetical scenarios often remain the only possible variant in stress-testing, if there were structural shifts in the banking system (deregulation, consolidation, change of currency systems, etc.), which reduce the informativity of historical data.

Development of macroeconomic stress-testing in Russia, despite its relevance and necessity, is complicated by a number of factors, overcoming of which will promote more intensive use of the present instrument in the system of banking activity regulation.

Above all, this pertains to insufficient level of used sophisticated econometric instruments in the process of economic policy coordination, what is being paid with attention of designers of new stress-testing programs. The main motives, in opinion of some researchers, are that economical models do not reflect the actuality of economy of developing countries to the full extent. Besides, programs' designers often note the absence of authentic statistical and historical databases necessary for analysis as per too high share of informal sector and accountant's manipulations with financial reporting.

Along with specified ones, the complicity of settlement requires high professional level of personnel and management of commercial banks, which gains crucial significance when implementing modern stress-testing programs. The lack of experience in conduction of stress-testing stipulates significant errors in suppositions, results and conclusions. As a result banks have to train own top-ranked specialists, or address outsourcing companies for the

purpose of installation of modern IT-systems for collection and processing of data necessary for stress-testing. All these aspects lead to significant expenses – especially in case of banks being minor in their assets – which will hardly be paid off by the results of conducted stress-tests.

We should also put an emphasis to insufficient, to our mind, level of visibility of macroeconomical stress-testing, which can promote the turning of the risk identification process into formal mechanical procedure performed at request of regulator. In such a case bank's shareholders will be interested only in formal refill of reserves by the sum required by supervision body. The information asymmetry that is observed in Russia by means of methodology and results of stress-testing can turn this useful instrument into trivial bureaucratic procedure.

As the main approaches to stress-testing procedure the Central Bank of the Russian Federation in correspondence with international banking policy applies two approaches – the analysis of sensibility and the scenario analysis. The application of these approaches allows getting overall assessment of potential risks not only in respect of some banks, but also in respect of the whole banking sector of Russia.

In the scenario analysis the Bank of Russia uses macroeconomical model represented by aggregate of equations of regression, which provides assessing the influence of macroeconomical parameters (gross domestic product, American dollar's rate, consumer price index, a number of social indicators, such as, for example, personal income, employment level, etc.). The model considers the fundamental volumetric indicators of organizations of banking sphere, such as: fund balances on clients' accounts, retail deposits and deposits of corporate customers, amounts of finances on interbank credits that are reflected in the structure of assets and liabilities sides of the balance-sheet, amount of funds on securities, amount of loans and equated loan indebtedness issued to population and corporate clients, dynamics of expired loans in credit portfolios, etc.

In the calculation basis in forecast period there is a simulation balance model that reflects probable behaviour of credit organization in the framework of given stress parameters oriented at formation of financial result assessment, what makes it possible to correct the size of probable losses in future. At the final stage of modeling the total losses of bank due to the impact of all the risks introduced to the model, and also the size of probable capital deficit are estimated.

In Table 1 there are data summarizing the results of stress-testing for assessing systemic stability of banking sector with use of macromodel as of 01.01.2014 conducted by the Bank of Russia. The calculation was carried out on the basis of two macrosenarios – the pessimistic scenario providing significant deceleration of economic growth in Russia due to reduction of rates of increase of world gross domestic product, oil price downturn at the level of 25-30% and other items of national export accompanied by growth of interest rates on financial market and decrease of share indexes; and the extreme scenario that is characterized with decline in GDP by 6,1% and large-scale stress on financial markets.

Table 1. The characteristics for scenarios of stress-test of banking sector of the Bank of Russia as of 01.01. 2014

Indicator	Pessimistic scenario	Extremal scenario	Information for 2013
Characteristics of scenarios			
Surplus of GDP, %	-1,0	-6,1	1,3
Consumer price index, %	5,0	5,6	6,5
Investments in basic capital (surplus), %	-3,0	-9,8	-0,3
Real income (surplus), %	0	-0,5	3,3
Growth of interest rates on government securities (the parallel shift of yield curve), basis points	200,0	350,0	-
Growth of interest rates on corporate securities (the parallel shift of yield curve), basis points	500,0	1000,0	-
Increase of value of dual currency basket, %	20,0	30,0	9,9
Assessment of losses of credit organizations			
Losses due to all the types of risks, trln. rbs.	2,6	4,0	-
Including:			-
a. Losses due to credit risk, trln. rbs.	1,5	2,3	-
b. Losses due to market risk, trln. rbs.	0,4	0,6	-
where:			-
due to interest-rate risk, trln. rbs.	0,24	0,36	-
due to equity risk, trln. rbs.	0,12	0,18	-
Due to currency risk, trln. rbs.	0,04	0,06	-
c. Losses due to liquidity risk, trln. rbs.	0,7	1,1	-
The financial result of banking sector, trln. rbs.	0,5	0,1	1,0
The average share of expired loans, %	12,0	15,0	6,0

The table was made by the authors in accordance with the data of report of development of banking sector and banking supervision in 2013: <http://www.cbr.ru/publ/?PrId=nadzor>

The conditions for work of Russian banking sector in 2013 were interlinked to structural liquidity shortage. In this connection the assessment of liquidity risk by means of stress-testing on the basis of sensibility had been remaining quite relevant. The present type of analysis provides an opportunity for assessing reaction of credit organizations to shocks of all sorts assigned by expertise. It should be noted that such shocks can be higher than ones assigned to the macromodel. Besides, when analyzing sensibility one can assess probable losses without account of mitigating factors, what helps to get more conservative assessment of the risks introduced to the model.

As a result of carried out analysis of sensibility to liquidity risk as of 01.01.2014 the realization of shock in the framework of negative suppositions has shown the possibility of liquidity deficit occurrence in 58 Russian banks for the amount of almost 61 bln. roubles.

The stress-tests are regularly conducted by European Central Bank, one of the main tasks of which is the identification of the most problematic banks for the purpose of understanding if the financial system of EU will be able to hold its ground in case of new strikes of financial crisis and take the necessary steps on EU financial system's restructuring.

The test carried out by ECB together with European Banking Authority and included several scenarios, according to Bloomberg agency with reference to the concluding document on inspection results, was failed by 25 of 130 European banks participated in integral assessment, which consisted of asset quality analysis and stress-tests of bank balances.

4. Conclusion

The research of national and international experience, analysis of examples of the best practice and fundamental principles of macroeconomical stress-testing provided developing a number of affairs, the implementation of which will help stress-testing to take its proper place among the instruments of regulation and supervision of banking system of Russia.

1. Stress-tests should be used as the main instrument of banks' risk-management. Their integration to risk-management systems of banks requires initiative as on the part of regulator, so on the part of owners and direction of banks. The increase of stress-tests' role in making of banking decisions requires attraction of strategic banks to the practice of macroeconomical stress-testing, the principles of which should be developed in the framework of consultations with specialists of banking business.

Since in the modern banking system of Russia many banks conduct stress-tests for separate risks or portfolios of assets at the level of subdivisions and do not integrate them into the common risk-management system, there is a need for task-oriented transformation of stress-testing into efficient instrument of making management decisions. For these purposes the role of regulator should consist in combination of different methods, improvement of their quality and reduction of stress-testing practice to definite reference level.

In our opinion, the regulatory body in provision of general performance of the process of macroeconomical stress-testing has to increase the efficiency of argumentation of given threshold values of criterial indicators of stress-tests and set the volatility corridors for economical variables (exchange rate, interest rate, etc.), develop, interpret and assess the results of system-wide stress-tests.

2. When forming selection of banks for macroeconomical stress-testing one should take into account the fact that in macroeconomical stress-testing of total financial stability of banking system, as opposed to microeconomical stress-testing, along with the aggregate of target indicators of banks' capital adequacy the volume of assets of researched banks is of importance. It should be said that the consequences of bankruptcy of small banks can be absorbed by banking system, while the problems with credibility of major players often provoke financial instability and can increase the losses of economy's real sector.

When choosing the scale of macroeconomical stress-testing the banks being small in their assets' amount and comparatively unsophisticated in their structure should confine themselves to simple analysis of sensibility and not to be included into system-wide selection. It will be reasonable to refuse from the practice of stress-testing of all the banks of the system, as the expenses for research of financial stability of small banks possess no effect, and their introducing to the selection will decrease the depth of exploration of system-significant banks.

3. At the stage of identification of risks and threats for banking system for the purpose of macroeconomical stress-testing programs' improvement it is necessary to extend the range of researched risks in combination with integrated approach to their consideration. It will also be reasonable to include the specific risks to the research program, as except for stress-tests of reliability the regular stress-tests of banks' liquidity should be

conducted.

As the experience of European countries has shown that prior to occurrence of financial crisis the majority of banks' stress-tests had not taken into account the maximum possible historical values of economical downturn and extreme market events. The same can be said about Russian practice of stress-testing.

In Russia it is necessary to take into account the influence of currency risk on credit risk, which has revealed itself in banking sector in 2015 (introducing of sectoral sanctions, etc.) and the consequences of which, according to available assessments, can be overcome not in the short term.

4. At the stage of selection of shock events and formation of scenarios of stress-testing we recommend to apply the scenario approach for assessment of influence of shock events on the indicators of banks' activity. The dissemination of macroeconomical shock in stress model should be logical and start with consensus forecasts of initial macroeconomical parameters making the mathematical model and delivery of the shock on the indicators of separate banks' quality indicators. In this context we can use the experience of USA, where the extreme values of indicators of basic and negative scenarios formed on the basis of independent consensus forecasts.

The important element of formation of macroeconomical stress scenarios is linked to the level of their rigidity. That is why one should avoid "softness" of unfavourable scenarios and increase their rigid level by extending it to maximal range of volatility of variables in stress-testing models.

5. Improvement of stress-testing methodology when modeling and assessing the impact of shocks on risks' escalation provides use of common instruments and techniques of econometric modeling. One should also take into account the fact that the majority of stress-tests is based on use of historical and statistical interrelations, i.e. it is suggested that on the basis of historical interrelations between economical variables it is possible to forecast the future course of realization of risks. However, as the experience of world financial crisis of 2007-2009 (and of 2014-2015 crisis in Russia) shows, statistical interrelations based on the historical data of before-the-crisis periods are often broken during crisis.

That is why under the conditions of lack of historical data in respect of relatively young banking system of Russia the alternative way of stress-testing modeling, to our mind, can be applying of expert methods, as far as statistical and econometric methods often turn out to be inefficient. At the same time one should beware of the circumstance the insignificant discrepancies in expert reasoning and suppositions, which are used in modeling of stress situations, can be easily extrapolated into large-scale errors in results.

6. At the stage of interpretation and use of results of macroeconomical stress-test when manifesting the list of "weak" banks it is important to avoid probable banking panic that can cover the whole banking system. That is why the development of efficient mechanism for recovery of financial stability for the banks, which have demonstrated negative results, is extremely important. The plan of anti-crisis affairs should consist of a number of sources of bank's capital refill, plan for optimization of assets' structure with fixed exact terms, during which the banks that had not passed stress-test will have to recover the level of target indicators up to the specified level set in the stress-test.

It is also necessary to perform regular correction of banks' stress-testing macroeconomical programs, especially if there are some significant changes in strategic policies, business-plans, operational conditions and other factors that have significant impact on suppositions or methodology used in stress-tests.

In particular, recently it has become known that the European Banking Authority (EBA) had published in August 2013 the final format of patterns for conduction of stress-tests in the banks of European Union. The patterns being common for all the banks illustrate the type and format of data, which will be exposed by banks. Under such conditions EBA will appear to be the concentrator of the data publishing up to 12 thous. positions on separate bank of European Union. The data subject to exposure cover the structure of capital, capital charge, benefit and losses, credit risk, securitization and other indicators in the context of stress-test. That is why the Bank of Russia has to transit the mentioned novations to the practice of Russian stress-testing – after all the information will be exposed on the basis of stress-tests' results in the period from the end of 2013 to the end of 2016.

Thus, it appears that before organization of new round of stress-testing the regulator should hold more discussions with specialists from the sphere of banking theory and practice and also represent open press-releases of such affairs for maintaining relations with mass media and general public.

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