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STRESS - TESTING IN BANKING

Abstract

The purpose of this paper is to analyze the negative impact of “mundialisation” on the banking sector. It is evident that the global banking system has become more fragile. As a response to progressing instability in financial architecture, policy makers have become interested in better understanding of high sensitivity in the financial sector, particularly in banks. One of the basic techniques for calculating banking fragility is stress - testing. In order to estimate the potentially harmful and unpredictable effects on their transactions, banks have created stress - testing models, which turned out to be an indispensable tool in the bank supervision process. Banking regulators have started using improved stress - testing methods for estimating aggregate risk and for defining the adequate capital level in the banking sector.

Key words: banking sector, control risks, stress - test

JEL Classification: G21

СТРЕС - ТЕСТИНГ У БАНКАРСТВУ

Апстракт

Сврха овог рада јесте да анализира негативан утицај „мундијализације” на банкарски сектор. Евидентно је да је глобални банкарски систем постао фрагилнији. Као одговор на прогресивну нестабилност у финансијској архитектури, креатори политика постали су заинтересовани за боље разумевање високе осетљивости у финансијском сектору, посебно у банкама. Једна од базичних техника за израчунавање банкарске фрагилности јесте стрес - тестинг. Како би проценили потенцијално штетне и непредвидиве ефекте на њихове трансакције, банке су креирале моделе стрес - тестинга, за које се испоставило да су неизоставан алат у процесу супевизије банака. Банкарски регулатори почели су да користе побољшане методе стрес - тестинга за процењивање агрегатног ризика и за дефинисање адекватног нивоа капитала у банкарском сектору.

Кључне речи: сектор банкарства, контрола ризика, стрес - тест

Introduction

The stress - testing is a common instrument of the monetary and crisis management. The prolongation of crisis has encouraged banks and supervisory agencies to review the validity and quality of the stress resistance test practice, that is, business resistance to changeable market shocks. Looking back, test results of bank stress resistance did not fully indicate the seriousness of the current financial crisis. Moreover, it is even possible that the global crisis was

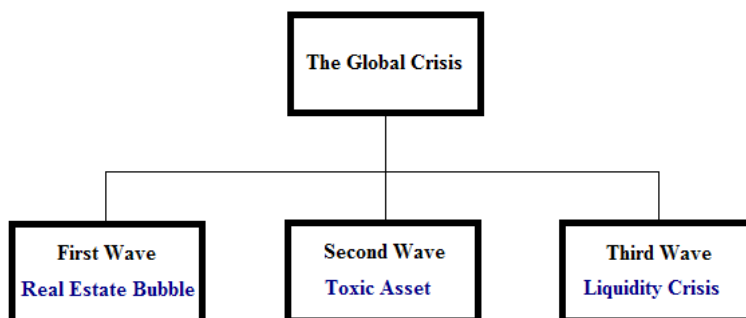
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deepened and accelerated due to the drawbacks in general stress resistance testing practice. It is essential to update the stress resistance testing framework. Stress resistance tests should be realistic, objective, comprehensive, far-reaching, multi-dimensional. Their purpose should be to properly understand, deduct and forecast. Results obtained from business “endurance” testing should be in the service of anticipatory decision making, planned and systematic reactions. Stress-testing results should also point to the adequate level of capital i.e. to suggest how much capital is necessary for the loss absorption, in case of oversized market “impacts” or overflow of banking “contagion”. Stress-testing is particularly important for providing ex-ante risk evaluation, overcoming limitations of the model in which only historical data are used, for spurring the development of risk minimization strategy and behavior in troublesome situations, for the whole set of various crisis scenarios.

The “casino” economy and unknown risks

The US mortgage market used to be regarded as one of the most developed and safest markets, where profit was almost guaranteed with a minimal risk. Owing to low interest rates, the US real estate market was flourishing. In a constant run for more profit and due to extensive cheap cash flow from abroad, American banks began uncontrollable placement of free reserves and taking over new risks. Consequently, it led to a total degradation of mechanisms for credit and portfolio risk management as well as to range of drawbacks in defining and realization of measures for regulating the financial sector and financial institution supervision. Banks and other financial institutions have started to apply new financial instruments that is, financial derivatives. *Hybrid financial instruments* also involved *unknown risks* (“Ponzi scheme”² and money multiplication, financial “Russian roulette” and speculative “bubbles” and dangerous financial “tailoring”). In order to invest and multiply as many free reserves as possible with the aim of increasing their revenues, financial institutions have reduced criteria for granting mortgage loans. After sublimating main reasons for the emergence of the global crisis and the transfer of the financial meltdown to the real economy together with the velocity of the financial “infection” spread of the US crisis on the European economy, three global crisis “zones” appeared.

Figure 1: Three global crisis “zones”



Source: <http://www.cb-mn.org>³

² http://en.wikipedia.org/wiki/Ponzi_scheme, (April 17, 2012)

³ http://www.cbmn.org/slike_i_fajlovi/fajlovi/fajlovi_publikacije/radne_studije/globalna_finansijska_

The crisis, that is, depression refers to a low level of absolute values, employment and domestic production, while the recession refers to the decrease in the level, that is, to the relative change of these values within at least two successive periods.⁴ Different phases of the crisis spread are mutually interdependent and overlap, so they have a sinuous form. Therefore, individual or periodic measures are hardly sufficient for the prevention and stopping of crisis. In the first phase of crisis, the mortgage “bubble”, that is, the consumer loan “bubble” burst. In the second phase, the banking system began to suffer huge losses caused by “poisonous assets”.⁵ These financial losses destroyed the reputation of banks as most reliable and professional institutions. The third phase was a logic consequence of the first two. The liquidity crises also emerged forcing banks to stop their core function: provision of loans to citizens and legal entities (retail and wholesale banking). This resulted in a drop in consumer demand which affected production and service companies. The economic “vicious” circle was then closed and the recession began. On the European continent, the financial-economic dependence spiral was similar to the one in the United States of America. The American sub-primary mortgage market had created the “financial contagion” and then spread it across the globe via “mutated” financial instruments. The result of suspicious financial transactions were “toxic assets” and “creative accounting”. The liquidity crisis paralyzed the global banking system.

The “spread” of the recession outside the US border was a result of a high level of connection and interdependence among global world financial markets and global economy in general. Under the influence of globalisation process, the wave of crisis spread over the planet easily, quickly and violently, like tsunami.⁶ The first to be affected were highly developed countries. However, the crisis spared neither countries in transition nor underdeveloped countries. The economic doctrine argues that the flaming wave of recession firstly overtakes the most developed countries, and then less developed ones. It remains in the most developed countries for the shortest period, while it spends more time in less developed countries in order to stay the longest in the most underdeveloped countries.⁷

Crisis management and stress resistance test

Due to a strong financial integration, that is, a possibility for the crisis to be transferred “instantly” from one country to countries on the opposite side of the planet, it is necessary to build an efficient mechanism which will ensure a financial stability. Proactive crisis management comprises activities which are directed towards the prevention of crisis occurrence. *Proactive crisis management has an offensive character*; it focuses decisively against potential and latent crisis. An adequate anti-crisis policy should involve effective measures of the crisis management, as well as system measures.⁸

kriza.pdf, (April 13, 2012)

⁴ http://www.cbmn.org/slike_i_fajlovi/fajlovi/fajlovi_o_nama/nagrada_cbcg/diplomski_marijana_scekic.pdf, (April 14, 2012)

⁵ Barjaktarović M., *Tržište kreditnih derivata - uspon i pad*, Ekonomika: Društvo ekonomista „Ekonomika“ Niš, (April - June 2012, No. 2), page 89

⁶ <http://news.bbc.co.uk/2/hi/7687101.stm>, (April 16, 2012)

⁷ http://www.cbmn.org/slike_i_fajlovi/fajlovi/fajlovi_o_nama/nagrada_cbcg/diplomski_marijana_scekic.pdf, (April 14, 2012)

⁸ http://www.cbmn.org/slike_i_fajlovi/fajlovi/fajlovi_publikacije/radne_studije/globalna_finansijska_

The stress - testing estimates the impact which the movement of relevant variables has on bank assets and liabilities, which, in turn, has an impact on its capital position.⁹ The stress - testing represents an analytical technique, which gives a quantitative estimate of the “vulnerability” of a bank portfolio. However, the stress - testing is a lot more than just a mere application of set of mathematical and statistical formulae. Therefore, it also includes a series of assumptions which may be essential for precise interpretation, obtaining of realistic results and drawing wise conclusions. The stress - testing uses a wide range of methodologies, from highly simplified “sensitivity” analyses, which study the influence of one risk factor only, up to complex scenario analyses, which are used for studying the cumulative impact of various factors on a financial situation of a credit institution. The stress - testing should establish whether the bank, due to certain unfavorable events, can normally and unobstructedly carry on its regular operations, whether it can settle its obligations timely that is, whether its available risk management funds are sufficient and whether it should engage additional sources of funding. Stress - testing techniques are also applied in a more comprehensive macro-context, with the aim of “the embodiment of sensitivity” of a group of financial institutions or a complete financial system to external shocks. Most frequently used variables in the scenario analysis process are: gross domestic product, unemployment rate, inflation, real-estate price, credit risk and profitability of certain industrial branches. After establishing values of these variables, at least two macro economic scenarios are created: real (basic) and pessimistic (extremely negative scenario), with stringent assumptions as compared to the previous year.¹⁰ Furthermore, such hypothetical conditions, bank loans, deposits and cash flows are tested. These indicators provide a wide insight into a liquidity situation and bank solvency, in case of stressful situations on the market. For example, in the liquidity risk management, the most analyzed scenarios are:

- panic “bank rush” (mass deposit),
- progressive growth of loan demands,
- disturbance on domestic and international financial market which blocks or causes difficulties for the access to fresh source of funding,
- degradation of credit rating, which has a detrimental effect on borrowing capacity.¹¹

The global financial crisis has only additionally intensified drawbacks of common stress resistance testing practice in the following four segments:

- in the manner of application of stress - tests and their integration in the risk management concept,
- in stress - testing methodologies,
- in the selection of scenarios,
- in the stress - testing for certain risks and products.¹²

kriza.pdf, (April 13, 2012)

⁹ <http://www.webcitation.org/60CfdC0TN>, (April 13, 2012)

¹⁰ <http://www.vijesti.me/kolumne/stres-test-banaka-kolumna-32115>, (April 13, 2012)

¹¹ <http://www.vibilia.rs/srpski/izvestaj/0508/Otpornost%20bankarskog%20sistema%20na%20sokove%20likvidnosti.pdf>, (April 13, 2012)

¹² <http://www.hnb.hr/supervizija/papiri-bazelske-komisije/h-tesatiranja-otpornosti-na-stres-i-supervizije.pdf>, (April 14, 2012)

A dedicated participation of bank management is crucial for provision of proper implementation of stress - tests in the risk management and capital planning. This comprises defining the goals of stress resistance testing, formulating various scenarios, discussing obtained results and estimation of possible alternatives for activism and mature and final decision making. Unfortunately, most banks do not go further from initial premises, that is, most banks do not deal with deeper “under surface” research and review. Also, the financial crisis has also revealed drawbacks in the organizational sphere. Prior to the beginning of crisis, stress resistance testing was most commonly carried out isolated from the risk management concept and insignificant interaction with other business functions. In certain banks, stress-tests were carried out completely mechanically. The routine approach does not take into account turbulent conditions of business activity, nor does it incorporate the latest qualitative knowledge. In many banks, stress resistance testing was carried out by separate units, focusing solely on certain business lines and risk types. This led to organizational barriers due to the efforts to permeate and integrate quantitative and qualitative results of the bank stress resistance testing. Although the stress resistance test related to the interest and market risk has been carried out for several years now, stress resistance testing for credit risk (whose movement has seen significant discrepancies in regular distribution and which has the highest degree of “obliqueness”) has appeared only recently. The most advanced forms of stress resistance testing are still in their initial phase of development. The consequence of insufficient comprehensiveness and unity was a fatal inability to recognize risk concentrations and exposure correlations. In most cases, frameworks for risk resistance testing were not flexible enough and thus not able to react quickly as the crisis was spreading. Risk resistant testing programmes should become an *integral part of the bank management structure*. Banks have to update and tighten existing frameworks, both from the detail aspect, and from the aspect of comprehensiveness. Undoubtedly, investments in the information technology infrastructure are also necessary for the provision of better access to risk information, which will further enable timely analysis and situational approach.

The stress resistance testing can be carried out on **different degrees of aggregation**, from individual instrument up to institutional level. The stress resistance testing is carried out for different types of risks, including market, operational, liquidity and credit risk. Most of the stress resistance tests carried out by banks were not designed to comprise extreme market events, the consequence of which was that obtained results not even closely matched reality. Various scenarios usually forecasted only minor shorter shocks. However, more sophisticated, more advanced models analyze the influence of stronger and more persistent shocks on several parameters simultaneously. The following risks were not comprised with enough detail in majority of stress resistance tests:

- behavior of complex-structured products,
- “pipeline” / security risk,
- “warehousing” risk on the market of derivative financial instruments,
- third party risk,
- unknown risks and modified protection strategies.¹³

Looking back, the common stress resistance testing practice did not recognize *dynamics of new risk development*. This significantly decreased the success of previous stress resistance tests. In numerous cases, the stress resistance tests dealt exclusively with the risk of main movement direction of crisis. However, they did not include analyses of

¹³ <http://www.hnb.hr/supervizija/papiri-bazelske-komisije/h-tesatiranja-otpornosti-na-stres-i-supervizije.pdf>, (April 14, 2012)

crisis “branching” and side causal relations, which had a negative impact on their logic and effectiveness. Nevertheless, the latest series of stress-tests has been assessed as the most complete and strictest than previous ones. Earlier banking stress - tests were usually regarded as too mild, due to the fact that some banks went bankrupt soon after passing the test.¹⁴

Minimizing fragility in banking sector

The interbank market plays a significant role in ensuring banking liquidity and efficient functioning of monetary policy. However, the interbank market can also represent a channel of “financial contagion”, which is used to transfer liquidity and solvency problems from one bank onto another (“*domino-effect*”), thus creating a risk of banking crisis. Using simulations and stress - tests, financial analysts (“*rocket scientists*”¹⁵) tend to estimate potential losses which would occur in case of direct “financial contagions”. However, more often than not it happens that stress - testing gains importance only after the crises has aroused, ex - post. Nevertheless, as stress - testing awareness increases together with changes, the stress - testing credibility, as an additional tool for risk management and capital planning, increases with time.¹⁶ Results of simulations and stress - tests show that the scope and direction of “financial contagion” depend on the characteristics of interbank market and/or structure and size of the interbank exposure. An assumption for the simulation is the collapse of each bank individually. If it is confirmed that a downfall of one company will not lead to the downfall of another, then there is no “financial contagion”. Otherwise, the “financial contagion” occurs and the simulation is continued, investigating further the impact that the “infected” bank might have on other, healthy banks. The simulation should last until it comes to a stage in which “financial contagion” does not occur. When carrying out a simulation, it is firstly necessary to determine the interbank exposure matrix, which reflects bilateral obligations and demand. The next step is an actual simulation. In order for “financial contagion” to appear, losses which result from interbank exposure at least in one bank, should surpass its capital. As opposed to the simulation of “financial contagion”, which presumes that the initial downfall of a certain bank was caused due to a specific, that is, idiosyncratic shock which was specific only for that bank, there are also simulations of “financial contagion” which presuppose that the initial downfall of a certain bank or banks was caused due to a macroeconomic shock which the whole banking sector is exposed to. The second assumption is closer to the reality since available data indicate that most downfalls are the result of shocks which several banks are simultaneously exposed to. This model observes the impact of various macroeconomic shocks: fluctuation of foreign currency, interest rates and financial instruments prices.¹⁷ The Law on Banks obliges all banks to continually perform risk planning and to provide adequate risk management mechanism, which should involve identification, measuring, monitoring and analysis as well as ex-ante risk control, which is adjusted to the bank size, exposure of its products and services, its geographical dispersion and assumed risk level.¹⁸ Pursuant to the Law on Banks, all banks shall test its “fragility” not only to certain individual types of risk,

¹⁴ <http://www.24sata.rs/vesti/ekonomija/vest/eu-planira-da-spasava-banke-koje-ne-poloze-stres-test/7390.phtml>, (April 13, 2012)

¹⁵ <http://visions.iop.org/v4.html>, (April 15, 2012)

¹⁶ <http://www.vijesti.me/kolumne/stres-test-banaka-kolumna-32115>, (April 06, 2012)

¹⁷ <http://www.hnb.hr/publikac/istrazivanja/i-023.pdf>, (April 14, 2012)

¹⁸ http://www.paragraf.rs/propisi/zakon_o_bankama.html, (April 14, 2012)

but on a summary basis as well. The stress - tests also include the estimate of the bank's ability to withstand a negative scenario without a recapitalization. The stress - test result is regarded as positive if the bank shows resistance to 70 percent of tested scenarios, while the testing period usually lasts from 6 to 18 months. Credit institutions which are on the verge to pass the stress - test should be placed on the "monitoring list", in case their situation worsens further. If a certain bank jeopardizes wider stability, the justification of efforts for its rehabilitation should be re-examined (above mentioned syndrome "too big to fail").¹⁹ Out of the banks with branch offices in Serbia, the Austrian Bank "Volks" and Greek bank "Eurobank EGF" failed the stress - test in 2011. On the other side, with the deposit guarantee up to 50,000 EUR, the state protects interests of depositors and prevents the panic of citizens (eases the "crisis of mistrust"), but at the same time it also reduces costs of "rescuing" jeopardized banks.²⁰ When talking about stress - testing, banks consider *future improvements* within following fields: permanent reviewing and finding futuristic scenarios, more careful study of new, unknown risks, improvement of abilities to identify and aggregate correlated risks, drawing conclusions on the interaction between market, credit and liquidity risks as well as forecasting the "timing" of the crisis and feedback estimate.²¹ As a response to global crisis, the European Union has established three new supervisory institutions: for banks, securities and for the field of insurance. The European Banking Authority was established at the end of November 2010, as a successor of the Committee of European Banking Supervisors. This Agency carried out a stress - test comprising 90 banks that is, 65 percent of the European banking sector. The bank with the adequacy capital ratio of at least 5 percent of risk assets passed the test. The stress - test from 2011 is much more rigorous as compared to previous ones, which should contribute to regaining the trust in testing of banks and in seriousness, transparency and responsibility of the European Union. It was agreed that the stress - test results should be as follow: "pass", "not pass" and "barely pass". The goal was to force the weak banks to recapitalize i.e. to increase their loss reserves.²² The key element of the **stress testing practice reform** is to end Basel II auditing, which means the implementation of set of rules which are a lot more comprehensive than the original Basel principles. The Basel committee on banking supervision has also issued new guidelines in the form of regulatory framework Basel III, with the goal of strengthening banks ability to absorb shocks which arise from financial "pressures", that is, strengthening their power to adjust to given circumstances. Consequently, the danger of the financial risk "overflow" and expressing the impotence of the real sector is reduced, the concept of risk management and strategic management in general is improved, and the level of banking transparency is also increased. Looking from the aspect of fixed capital and reserve capital, the new regulatory framework Basel III has tightened the requirements, thus influencing the creation of more **conscientious, cautious and sustainable banking**. Requirements tightening is planned for 2013 and new rules should completely be met by January 2019.²³ Therefore, the purpose of banks is not to avoid the risk, which is impossible, but to professionally manage all risks. The professional risk management does

¹⁹ <http://www.24sata.rs/vesti/ekonomija/vest/eu-planira-da-spasava-banke-koje-ne-poloze-stres-test/7390.phtml>, (April 13, 2012)

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²¹ <http://www.hnb.hr/supervizija/papiri-bazelske-komisije/h-tesatiranja-otpornosti-na-stres-i-supervizije.pdf>, (April 14, 2012)

²² http://www.cb-mn.org/slike_i_fajlovi/fajlovi/fajlovi_publikacije/radne_studije/globalna_finansijska_kriza.pdf, (April 13, 2012)

²³ http://www.ubs-asb.com/Portals/0/Casopis/2011/1_2/B01-02-2011-Ekoleks.pdf, (April 16, 2012)

not mean that the bank should choose only low risk activities. Professional risk management by a bank means optimization of relationships between accepted risk and accompanying returns.²⁴

Concluding remarks

Carrying out the stress - testing is particularly important after a long period of expansion, that is, the period of favourable economic and financial conditions, in periods when faded memories of negative conditions and a lull in the ostensible perfection can lead to a feeling of leisure and thus underestimation of risk. The stress - testing is a main instrument for the risk detection and risk management during the period of intensive and rapid growth, when innovations are easily transformed into speculations and when “financial snowboarding” occurs, when the number of “disguised” and “cancerous” risks is increasing thus creating an immense chance for “injury” and damage. The stress - testing should be more comprehensive and should include the most pessimistic scenarios in order to obtain as objective results as possible and develop an adequate, protection system of the new millennium. The Basel board has recently reviewed the stress resistance testing practice and its aim is to improve it. The stress resistance testing cannot cope with all the risk management problems on its own. However, as a part of the integral approach it holds a leading role in developing the banking management concept and strengthening their resistance. The unpredictability of the economic world points to the imperative of regular implementation of stress - testing in banking and to the need of its continuous improvement in order to prevent the “contagious” crisis or mitigate its negative effects.

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²⁴ Milutin Ćirović, *Bankarstvo*, Beograd: European Center for Peace and Development, 2006, page 333