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Systemic Risk Evaluation

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Abstract

Financial stability, along with the improvement of stress resistance of financial sector and efficient distribution of resources in the real economy, is important for the sustainable development of the economy. The central bank together with other state institutions supervises financial stability, but this cannot be just a national matter if we consider an open economy. Systemic risk affects the financial stability and this can be defined as a state of being in which systemic risk occurrence is prevented. Identification and proper assessment of systemic risk are the foundation for appropriate macro prudential instrument and progress were made after the financial crises. The paper follows theoretical aspects present in the literature and the enhancement of the practice used for the systemic risk analysis and the insurance of the financial stability in our country.

Key words

Risk evaluation, credit institution, analysis, financial stability

JEL Codes: E50, G32

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1. Introduction

Financial stability, along with the improvement of stress resistance of financial sector and efficient distribution of resources in the real economy, is important for the sustainable development of the economy and it is a global and public possession. The central bank together with other state institutions supervises financial stability, but this cannot be just a national matter if we consider an open economy (BNR, 2015). Systemic risk affects financial stability and this can be defined as a state of being in which systemic risk occurrence is prevented. Systemic risk is the risk of financial stability to be affected up to the point in which economic welfare and growth are affected. Central banks, other public institutions and international organizations that play a role in ensuring financial stability, are constantly looking for possible risk and vulnerability sources of the financial systems and their main objective is preventing economic crises. The banking system is essential in saving and investment process so its stability is also a priority. Central banks developed methods and processes for supervision and continuous evaluation of banks for preventing a variety of bank crises.

Considering the importance of financial stability, as well as the impact that systemic risk has on it, the objective of the paper is analyzing the theoretical concepts after the literature review and highlight the practical methods used for systemic risk analysis and for the provision of financial stability in our country. The study includes the literature review for systemic risk concept for which there isn't a single definition adopted and therefore it is a matter of research for many authors such as de Bandt, Hartmann or Schwarcz. Management and evaluation technics of systemic risk are also revised, as well as the organizations that take part in these activities. Examples of macro prudential instruments used by the central bank for financial stability provision complete the paper.

2. Literature review

Systemic risk in a broad matter is not limited to the economic or the financial field. In fact, an eloquent side of the term is the one from the medical domain of contagious diseases. If we consider the term in our natural habitat it refers to a threat of more individuals that behave for their own interest causing an imbalance in the global ecosystem. The imbalance affects all of the entities. The recent literature contains a number of papers on the subject of systemic risk in the context of the recent financial crises, but there is not a definition that is universally accepted. It refers to any risk that affects the entire financial system, unlike other risks that can affect only some categories of the system.

The fact that systemic risk is a characteristic of the financial system is debated in the economic field as an economic systemic crisis can have severe consequences for the economy. According to de Bandt and Hartmann, the systemic crisis is defined as „a systemic event that affects a significant number of institutions or financial markets, in a powerful way that it

severely distorts the proper functioning of the entire financial system” (De Bandt and Hartmann, 2000). Other definitions of systemic risk are cited by Schwarcz in 2008 and they all have in common the fact that there is a trigger event, as an economic shock or collapse of a certain economic sector and these can create a chain reaction for instabilities affecting financial institutions or markets. The systemic risk is referred to as (Schwarcz, 2008):

- The probability that cumulative losses follow an event that triggers more losses in a chain of institutions or markets that are part of a system;
- The possibility that a modes economic shock induces significant volatility in the price of the assets, a decrease of liquidity, bankruptcies and efficiency losses;
- The risk that the default of a player on the market can have ramifications over the other players, due to the interconnectivity of the financial markets.

Narrowly speaking, when referring to fair value accounting, the systemic risk is about contamination. Contamination implies the transfer of financial instabilities between institutions or market sectors and the phenomenon is interesting as it is possible for entities that have no connection apparently. The contamination phenomenon is a brief definition of systemic risk and a vector of it at the same time. The global report on financial stability, issued by the International Monetary fund in 2009, defines the systemic risk an imbalance of financial services, caused by an impairment of all the financial system's parts and that can have a negative impact over the real economy (IMF, 2009).

2.1. The sources of systemic risk

There are the following types of systemic risks:

- The inclination of financial institutions to take a high external risk (credit risk, liquidity risk, market risk) during economic boom period;
- The contamination effect between the markets, intermediaries or infrastructures. The contamination mechanism works through participants' interest in minimizing additional losses by examining the other units that are of economic importance to them in order to find out to which extent they are exposed to risk. This is typical for banks. The greater the loss of probability is, the more possible it is for the participants to withdraw their funds as soon as possible. This response can lead to liquidity and solvency problems. The participant will try not to expose themselves to risks and to follow their own interest by temporarily transferring funds to safer units without waiting for final analysis when the times are confusing. Besides, there is a tendency to rule their portfolios, adjusting the quantities and not the prices during stressed and uncertain periods. In this stage of contagion, the common shocks appear indiscriminately and reflect a general loss of trust in all the units. The interest risk, inflation risk, political risk, and the exchange rate risk can be assigned to systemic risk.
- Aggregate shocks at a large scale that affect the entire economy or financial system.

2.2. Systemic risk forms

The Central European Bank recommends concentrating attention on three main forms of systemic risk. This limit is aimed to reduce the dimensions that result from the causes' combination of system risk. These causes can develop systemic risk into a complex phenomenon and they can be endogenous, exogenous, sequential or simultaneous. These three forms that are recommended do not exclude each other and they can manifest independently or in relation with each other (European Central Bank, 2009):

- Contagion refers to a problem of a bank's collapse that can cause the collapse of another participant that was solvent initially. In other words, it is the situation in which the failure of a financial intermediary can lead to others' failure even in situations when the latter did not invest in the same risks and are not the subject of the same original shock as the first (Allen and Gale, 2000);
- The second form of systemic risk is the spread exogenous shock that affects a category of intermediaries and markets simultaneously. For example, banks are more vulnerable during the recession. Sorge (2004) shows historical research reveals that many bank crises are related to economic recession.
- The third form refers to an endogenous escalation of some imbalances of the financial system, in time, such as an excess of lending.

The last two forms of systemic risk are relevant especially for procyclicality of financial systems, but contagion can also have a role in determining it.

3. Methodology of research

The present paper is the result of the literature review on evaluation and management of systemic risk using databases such as ScienceDirect, Emerald Insight, JSTOR, EBSCO and also search engines with key terms like bank systemic risk, macro prudential policy, financial stability. There were found over twenty relevant titles for the research theme and nine of them, published between 2000-2016 were selected for detailed analysis. Systemic risk theme was approached both from an empirical and a theoretical point of view, and present research is mainly qualitative. The methods used are descriptive and comparative for emphasizing the resemblance between different opinions of the authors. Most of the papers that have been studied are based on quantitative analysis that is important for systemic risk measurement and it is a needful management tool for the managers.

3.1. Management and evaluation of systemic risk

Efficient systemic risk management is a constant concern for national and international supervising authorities. They develop methods and techniques for detecting, estimation, and monitorization of bank contagion.

The European Bank Authority together with the European Systemic Risk Board, develop identification and measurement criteria for the systemic risk and a proper system for crisis simulation that includes an assessment of systemic risk growth potential that financial institutions face during crisis time. Those financial institutions that can face systemic risk, are supervised and strengthened, or if necessary, they are the subject of recovery and restructuring plans. The authority considers the relevant international approaches when developing the identification and measurement criteria, including the ones issued by Financial Stability Committee, the International Monetary Fund and the Bank for International Settlements (European Parliament and European Union Council, 2010).

The early identification of institutions that present systemic importance is very important for the management of systemic risk and these are usually the international institutions that have a complex activity and that are considered “too big to fail and too interconnected to fail” because of their devastating effect they could have on other banks.

The quantification techniques of system risk start with fair value accounting and with balance sheet analysis and also use different indices and stress testing. The European Systemic Risk Board publishes a set of quantitative and qualitative risk indicators on a quarterly basis for the European financial system. There are more indicators that provide the assessment of systemic risk for it and they are included in the macro prudential database of the European Central Bank. The main components of an efficient frame that is necessary for the systemic risk management are grouped in two levels, macro prudential and micro-prudential. These two types of analysis allow optimal use of information for better coverage of elements that can cause a crisis.

3.2. Micro prudential policy

Micro-prudential analysis has the banking rating as a central element whose purpose is the separation of the performing credit institutions from the ones that are underperforming while aiding the focusing of the limited resources of the surveillance authorities in order to avoid the spread of individual imbalance at the system level. There is a number of banking rating models among which we list: CAMEL (USA), ORAP (France), BAKIS (Germany), PATROL (Italy), RATE (The United Kingdom), CAAMPL (Romania). These are built on similar bases.

The system implemented in our country, from 2001, is based on the analysis of an extra component in comparison with the CAMEL model (Capital, Assets, Management, Earnings, Liquidity); the component which we refer to is the quality of the shareholder/stockholder. Therefore, through CAAMPL the following aspects are analyzed: the adequacy of the capital, the quality of the shareholder/stakeholder, the quality of the actives/shares, the management, the profitability and the liquidity of a financial or banking institution. Another element used in the micro-prudential analysis is the issue of the early warning systems. The advantages of the rating systems are recognized by the surveillance authorities from around the world, a fact that is proven by their excessive use in the prevention of the banking contamination phenomenon.

The banking rating systems are mainly used with the purpose of preventing the start of the indirect contamination phenomenon. This refers to the situation in which the market operators react in a disproportionate manner in the case of some solvable banks as a repercussion of their distorted perception on the existence of direct contagion effects even when it is not the case. In this context, the banking rating allows for both the identification of the credit institutions with low financial performance and for the increase of their chances of rehabilitation, and for the communication improvement of the surveillance authority with the market operators when the insolvency of a credit institution appears. On the other hand, in order to quantify the probability of appearance and severity of an eventual direct inter-banking contamination phenomenon,

respectively contamination forged exclusively on inter-banking exposures, the specialized theory and practice have established the banking contamination test as the most effective instrument (Upper and Worms, 2004).

3.3. Macro prudential policy

The maintenance of the financial system's stability is the final objective of macro prudential policy and this objective is accomplished on the one hand, through the consolidation of the financial system's stability, and on the other hand, through the reduction of the systemic risks accumulation (BNR, 2015). The big picture of macro prudential policy is focused on the limitation of the risks and of the costs that are generated by systemic crises. In Romania, the central bank and the National Committee are overseeing the Macro prudential Surveillance (CNSM), and at the level of the European Union, the European Committee of Systemic Risk (CERS). This committee offers the European framework for the operationalization of the macro prudential surveillance through the publication of certain recommendations regarding the intermediary objectives and the macro prudential policy's instruments. These objectives have been implemented by the National Bank of Romania (BNR). BNR established the macro prudential instruments package based on the objectives, but there are instruments that had already been in use at the time of the implementation of the CERS recommendations in 2004.

3.4. Instruments of macro prudential policy and systemic risk evaluation methods in the case of BNR

In this part, the macro prudential instruments adopted by BNR are synthesized based on the intermediary objectives taken into account for the operationalization of the macro prudential policy and the methods of evaluation and quantification of the systemic risk developed by BNR.

Table 1. Macro prudential instruments based on the intermediary objectives

Intermediary objective	Recommended macro prudential instruments
Decrease and prevention of the excessive growth of credit and debt	<ul style="list-style-type: none"> • Countercyclical capital amortization creates additional capital reserves in the case of an increase of the risks as a result of excessive credit; • Capital demand at the level of the field of activity contributes to the consolidation of the institutions' capacity of managing risks that arise from a certain field of activity, by increasing the capital reserves. • Macro prudential lever effect – ponderosity of personal level 1 owned funds of the total of exposures; • Demands regarding the ratio loans/security deposits – limitation of the value of a loan in relation with the security deposit (LTV); • Demands regarding the ratio loans/incomes and the ratio debts(debt service)/incomes – limitation of the debt service in relation with the available income (DSTI);
Decrease and prevention of excessive imbalance of the due dates between assets and liabilities, and the lack of liquidity on the market	<ul style="list-style-type: none"> • Macro prudential adjustment of the liquidity indicator – liquidity rate which measures the banks' capacity of dealing with a default short period of tensions regarding the liquidity; • Macro prudential restrictions regarding financing sources – their purpose is to establish an inferior limit of the long term financing volume held by the banks in exchange for less liquid assets; • Unweight macro prudential limit applied to less stable financing (for instance: loans/deposits ratio) – it can be used to limit the less stable, excessive, structural, financial dependency; • Demands regarding margins and adjustment factors – they determine the correlation level of guaranteed financing and the transactions with derived instruments.
Limitation of the concentration of direct and indirect exposures	<ul style="list-style-type: none"> • Restrictions regarding significant exposures – exposure to a client or a group of clients that are connected cannot exceed a certain share of own funds (capital); • The demand regarding compensation through central counterparties – certain transactions of financial institutions have to compensate through central counterparties in order to limit the contagion effects and to maintain the stability on the interbank market.
Limitation of the systemic impact of the moral hazard	<ul style="list-style-type: none"> • Additional capital demands for systemically important financial institutions – capital buffer which can be in a quantum up to 2% of the total risk exposure value, out of the basic personal level 1 funds elements (capital, reserves, undistributed profit), in order to increase the capacity of financial institutions of systemic importance to absorb the losses.

Intermediary objective	Recommended macro prudential instruments
Consolidation of the financial infrastructure stability	<ul style="list-style-type: none"> • Demands regarding the margins and the adjustment factors for the compensation through central counterparties – in the establishment of the adjustment factors and the initial margins, central counterparties should take into consideration the liquidities on the market, the pro-cyclical effects, and the systemic risks; • Increased reporting - the introduction of additional reporting demands in order to increase transparency; • Structural systemic risk buffer – it is applicable at an individual level, at an institutional group level, or at the level of the whole banking sector in the case of identification of certain systemic or macro prudential risks that are non-cyclical on long term (others than the ones that arise from the dimension of the institutions and from the excessive loaning). The objective is the increase of the banks' stability through the increase of their capacity to absorb the losses.

Source: BNR (2015)

The macro prudential instruments already implemented by BNR at the time of the passing of the CERS recommendations are:

- The debt service reported to the disposable income (since 2003);
- The credit value reported to the security deposit value (since 2003).

The Romanian macro prudential strategy is approved by the National Committee for Macro prudential Surveillance and it is implemented at a sectoral level by BNR, The Financial Surveillance Authority and by the Government, based on the recommendations transmitted by CNSM.

Table 2. Means of assessment and quantification of systemic risk used by BNR

Means of systemic risk evaluation	Characteristics	Period
1. Stress testing exercises of the banking sector solvency	During stress testing exercises, the credit risks effects, the market risk and the financing costs are quantified with the purpose of testing the capacity of financial institutions to deal with some macroeconomic shocks while maintaining the proper capital level.	The testing exercise in 2014 covered a three year period
2. Systemic banks identification	There are periodical (quarterly) evaluation analyses of the Romanian banking system from the perspective of the systemic character of credit institutions with the purpose of identifying the structural systemic risk that arises from their dimension.	Quarterly
3. Financial stability indicators	They have been developed with the purpose of evaluating the vulnerabilities of the real and financial sectors to shocks and they evaluate the capital's adequacy degree, the quality of assets, and the profitability and efficiency of the banking sector.	Monthly/ Quarterly
4. Stress testing of banks liquidities from a macro prudential perspective	It evaluates the banks' capacity to counteract a liquidity shock with the available resources half-yearly.	Semestrial
5. Stress testing of banks liquidities from a micro-prudential perspective	Consists of three methods: a test that consists of an unexpected withdrawal of an important part of a credit institution's financing for a week time; a test that evaluates a credit institution's capacity of dealing with some liquidity shocks during the course of a month; a test of the structural analysis of the liquidity (the estimation of the maturity range in which the credit institutions might record a deficit of liquidity).	Semestrial
6. Early warning systems in case of a crisis or in case of a sudden stopping of foreign capital entry	The methodology consists of the developing of some econometric models which estimate the probability of currency crisis and the probability of a sudden stop of foreign capital entries by using quarterly data.	Quarterly
7. Estimation of the non-reimbursement for non-financial institutions	The econometric model which estimates the yearly rate of non-reimbursement for non-financial institutions with banking credits.	Yearly
8. Balance sheet analysis of the real sector	Balance sheet indicators of the non-financial institutions and of the population are periodically analyzed with the purpose of evaluating some potential systemic risks.	Periodically
9. Liquidity use index in the high value payment system	It measures the liquidity requirements for the offset/clearing of the transfer orders from the high value payment system reported to the available resources.	Quarterly

Means of systemic risk evaluation	Characteristics	Period
10. Contagion index of the capital markets	It facilitates the study of crisis episodes, as well as those of non-crisis while offering intuitive results concerning the impact of the effects of interconnectivity and the interdependency over the international capital markets.	Quarterly
11. Composite index of systemic risk	It has the capacity of emphasizing the episodes in which the crisis manifests itself simultaneously on multiple segments of the market. It is estimated through the gathering of some sub-indices, that are specific to each financial market (monetary market, currency market, sovereign debt market, government securities market, as well as the capital market), while taking into consideration the time variable correlations which are established among these.	Quarterly
12. CoVaR index	It uses financial data, as well as balance sheet information in order to determine the contributions of the financial institutions to the systemic risk. It measures the financial system's potential loss as a percentage of market capitalization of financial institutions that are marketable to the BVB.	Quarterly

Source BNR (2015)

4. Conclusions

The proper identification and evaluation of the systemic risk are very important for the development of adequate macro prudential instruments, and progress was made in this direction following the financial crisis. There is a continuous necessity of research for identification of early warning models that are crucial for the macro prudential measures. The Romanian National Bank has an important role in maintaining the financial stability, it is a member of CNSM and it receives recommendations from this institution which have the purpose of limiting the financial system's risks as it is a financial surveillance authority. The macro prudential instruments that are recommended by CERS are in the process of being implemented by BNR, while others have already been implemented. In regard to the systemic risk, BNR disposes of the adequate means for evaluating it, the procedures being conducted regularly.

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