
Theoretical aspects regarding systemic risk and managerial decisions during the crisis

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Abstract

The Romanian National Bank's governor, recently said, that for the first time in Romania it was identified a severe systemic risk. In this paper we try to analyse the context when a risk can be considered having the level of systemic risk and which are the main factors (external or internal) that can cause this process. We also analysed the context when due to the large scale interconnection between the financial institutions, a shock suffered by one or more market players, could be spread toward to other players generating a systemic crisis. Finally, we analysed shortly the role of National Bank of Romania in the Romanian banking system monitoring/supervising and its effort for keeping the systems stability and to avoid the crisis, or at least limiting the effects of a crisis by introducing diminishing measures for systemic shocks. We shall try to foreshadow the role of managerial decisions in maintaining microstability.

Keywords: Systemic risk, financial crisis exposure, contamination, interconnected, liquidity shock, network, Value at Risk

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Introduction

One of the main causes which generated the financial crisis from the years 2008 could be considered as emerging from a financial component that led to the financial market volatility. The main players affected by the crisis were the financial institutions, which had also the main losses encountered. The banks being the main financiers of the economy, by the shock suffered they transmitted toward to the economy the effects, causing a domino effect, defined as “systemic risk”, meaning a kind of risk which can affect a large part of the economy of a country, or a certain area, or an entire economical sector. In this context, it generates a chain reaction.

It is interesting that Romania, which passed through the worldwide financial crisis without significant major shocks on its financial system, without state intervention/helps to avoid failure of any bank, despite the fact that the country faced a systemic risk. Now, Romania faces a severe systemic risk situation.

It is important for us to understand what are the factors that can trigger a crisis due to the systemic risk, how the interconnection of financial institutions contribute to the propagation of systemic risk, which are the elements that amplify the shock, and what measures can be taken to mitigate - absorb - these shocks.

One of the major sources of dysfunctions in business administration are due to the lack of short-term liquidity. More precisely, although some companies assume that they have sufficient liquidity to cover future payments, but as long as that liquidity is not in form of cash, then difficulties can occur. Why this can happen? Let see an example, and suppose that a company owns a real estate property whose value is

estimated to X EUR. Let us assume, for simplicity, that the same value is recorded in the company's books as asset. So the company holding (among others) assets which in simulation/modelling could be used for generating cash by selling them. Let suppose further, that the manager of the company is risk averse and took into consideration a safety factor of 10%, which is expected a lower value in case of crisis the asset can be capitalised – turned into cash. At a certain moment in time, from whatever reason, the company need liquidities (cash) for value Y, and decides to sell the real estate property. But within the available timeframe the only buyer who manifest interest to purchase the asset offer value V which is much lower than the value X registered in the company's books. Than we can have the following situations:

The debt $Y < V < X(1 - 10\%)$, so the company covered the short term need – it can be considered that the event triggered the short of cash did not generated a shock; $X(1 - 10\%) < Y \Rightarrow V < X$, case when the safety factor covers the difference between the market value and debt – the shock was absorbed by the introduction of a preventive measure; $V < X < Y$, the company's debts remains uncovered, the sale could not generate cash to cover the debt – the company cannot repay entirely the debt, and creates a deficit for the partner too – the shock is transmitted forward

If the manager would have more time available it would wait for better offers, but the time constraints forced him to sell at the price available for that moment in time. Or even he found a buyer who offered a better price and there were agreed the sale-purchase conditions, the money could arrive in the account with delay. Out of there emerged the temporal aspect influencing the decision making process in the crisis (of liquidity).

It can be seen that five aspects are determinant in decision making, that is: the asset's value recorded in the books of company; the estimated market value; the real value of sale (liquidation); the available time horizon and the real deadline cashing in the money.

From the above analysis we can conclude the first two characteristic of a liquidity crisis are: the dimension of the shock and its temporal effect.

It is worth to mention that within this simplified model we did not took into consideration the cost related to the internal activities associated with the recovery process. This cost is much lower as sooner the buyer is found. The manager must weight all aspects and decides operatively. He may decide to sacrifice a part of the sale price and to get immediately the liquid cash.

Going further with the model generalisation, we shall emphasize additional causes. Within the above example we did not consider the cause which generated the liquidity shortage, which can be specific, and we suppose that the manager find the right way meaning that he found a proper solution within the useful timeframe. But if he did not finding liquidities within the available timeframe, this will generate an adverse effect with negative consequences

But let us observe what happens if the case is external to the economic system, which can generate a significant economic distress. An example would be the political decisions without economical support, unusual to attract the attention of great majority of voters, but can generate a shock (rupture) in economic systems.

Literature review

In the past 10 years due to the financial crisis a large amount of attention was given to the study of financial systems and how they react to events which can be considered shocks. In case of financial stability (relative equilibrium) the economic

mechanisms are self-regulating and the financial systems components operate in normal limits. That does not mean that there are no losses caused by punctual situations, but usually the systems redress themselves, and are able to absorb the relatively small shocks.

The engineering systems include well studied and applied elements and their evolution and stability can be very clearly determined, and a similar approach could be applicable to economic systems too. Here interferes the human factor, whose behaviour it is difficult to be modelled. In engineering the causality it is very clearly defined, while in the economy and social sciences the studies are at the beginning. There is also existing the economic conjuncture and the temporary factors, which means that one model which was proved in the economy at a certain time, will not show the same result elsewhere in the world or in another moment in time. The problem seems more complex than the engineering related, the social and political factors being involved which could have unpredictable effects.

Among the first models we can consider the Structural Models, which uses the structural variables of a company (Assets and Liabilities) in attempt to determine/ model the moment in time when crisis situation might appear. The structural model of Merton (1974) describes the crisis situation as that point in time at which the outstanding debts of a company are higher than the value of liquid assets. Another approach to the structural framework was proposed by Black and Cox (1976) who described the crisis situation could arise anytime when the company's assets fall below a certain threshold. These models are based on inputs from external causes – market changes, and internal causes – from the company's performance indicators.

These first models were improved and extended over time, until the recent models where the impact of risk is presented as Value at Risk (VaR). There are three VaR approaches, one based on historical simulation, another based on variance-covariance and that used with Monte Carlo simulation. As it was presented by Lambadiaris et al. (2003), Sollis (2009) we cannot determine which one is the optimum one.

As extension of the classical vision in which the agents/companies are seen as distinct entities, the recent approaches consider the interconnection between the economic agents, all of them being part of a network-system (Upper and Worms, 2004).

On the other hand the increasing complexity of the network structure leads to the diversification of the risk, what under normal conditions should give a higher stability to the system (Allen and Gale, 2000). When crisis strikes, the high degree of interconnection can amplify the propagation of the problem within the system, and as the network is more complex, more players can be affected by the outbreak of a crisis situation and spread of the losses, which leads to the contamination.

It is worth to study the factors that determine the speed of propagation of the shock in the network. In their recent work, Elliot et al. (2014) and Acemoglu et al. (2015) tries to explain how the propagation of shock to the banking network and the high degree of interconnection of these due to contamination can amplify the effect of systemic crisis and cause losses beyond expectations.

Anghelache et.al. (2016), Anghelache et.al. (2012) have studied the banking risks. Anghelache, Anghel and Diaconu (2016) have focused on risk aversion.

Methodology and database Managerial considerations

Risk analysis is an important issue regarding the management of a company, and in the process of developing a strategy. Risk can be associated with a variety of events, but in general understanding refers to the possibility of appearance an unwanted incident that may lead to losses. If we consider the main causes which leading to the appearance of risk, we can classify the risk in several categories, all of them might influence in a greater or lesser extend the company's financial performance. Such we can distinguish: market risk, financial risk, operational risk, liquidity risk, credit risk, risk associated to the brand, legal risk, country risk, and not least so far as regulatory risk or systemic risk.

Even if we would be able to identify major causes of risk, to classify them, to estimate their probability of occurrence, it is rather difficult to quantify their precise impact on financial outcomes of the company because within model development process many subjective elements should be considered, which are difficult to quantify.

On the other hand, even a model is considered and accepted by scholars as being sufficiently accurate at one time, the same model could not give similar relevant results in different economic circumstances, or in different moment in time. Despite these difficulties increasing number of researches focuses on the improvement of modelling the risk, on predicting the probability of occurrence and also on assessing the impact of them.

In the period prior the financial crisis, one of the most profitable investments were the ones in capital markets, these having a performance much higher than other segments. This aspect has led some banks to invest in highly volatile areas but with much higher expected return, in this way exposing themselves to significantly higher risks.

Financial contracts such as forwards, futures and options are derivative instruments that banks had used to secure their portfolio exposures. Placing a certain amount in such instruments, they were supposed to "know" that at maturity they will collect a certain amount of money. All these operated well during stability period of time and when markets grew, which led to considerable increase of institutions assets. As soon as factors of discomfort occurred, it enters the liquidity crisis, which spreads rapidly in the American system and from there all over the world of finance and banking.

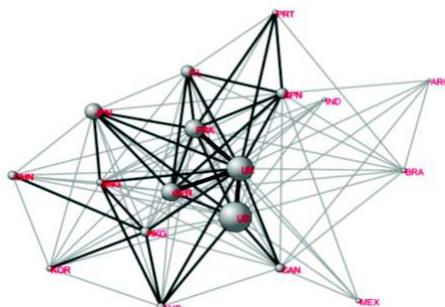
The race of leaders expecting higher income associated with large success bonuses, a relatively deregulated surveillance system (considered as engine of economic growth in the last 20-30 years). Managerial decisions taken without a proper objective analysis, based on feelings and past experience, the myopia of investors actually led to triggering the financially crisis in USA in 2007.

It seems that the decisions taken by managers to turn toward higher but more risky incomes were taken rather based on their past experience and subjective factors than based on rigorous simulations.

Interconnection – Network structure

The modern financial system is exposed to very high degree of interconnection, which was facilitated by both the technological evolution and the by unwrapping of markets (globalization). The interconnection is realised at both its assets and liabilities side, and it is not limited only to financial institutions, being engaged also, investors, companies and even private individuals. As the network complexity increases the more difficult is developing the system model, following the continuous overlap of the network scheme and the related parameters. The regulatory bodies are working hard to develop functional system models and to perform simulations on sets actual data collected from the reporting requirements of the players, in this way they are attempting to prevent crisis situations which can affect the entire system.

Schema regarding the network structure



The nodes from the graphical representation are the economic or financial entities. As the node size is bigger, the greater is the respective company, country etc. The links between them represents the exposure to other players - as the line is more prominent, so the exposure is greater. Since the entity has more connections, the more lines go / reach him.

The exposure of a bank can be considered from two perspectives: the bank is in the same time both debtor and creditor, i.e., attract deposit and provides loans. And this is organised on two or even three different segments: (1) customers, (2) banks partner, (3) capital markets / investment (financial).

As the exposure is higher toward another entity, the likelihood of contamination is greater - the exposure level. It is limited in the banking system to max 20% of total lending limit of the respective bank.

Value at Risk - VaR

The level of risk to be measured and managed by an economic entity is the overall risk. In reality, this approach is extremely difficult. Initially, firms are focusing on their specific activities and the specific types of risk, and only then, they focus on aggregate risk at the firm level. Despite all the measures taken into account but without considering the macroeconomic situation and time, this approach cannot be considered a perfect model.

VaR - is the most used method for estimating the risk that calculates the maximum amount of potential loss that could be caused by a certain risk factor in a predefined time horizon. Although this is an important instrument in risk analysis, it cannot be used for an economic/financial entity, for modelling the systemic risk.

The concept of Value at Risk (VaR) has been adopted by major American banks during the time of developing the financial derivatives markets. The emergence of capital markets required a new type approach of risk that the classical instruments/ models do not cover entirely.

Nowadays, the VaR models are widely used in all kind of financial institutions, especially those that are actively traded on the stock exchange. The models represents an important part of the internal control system, and they are designed to optimise the assumed risk level. The models are also used to assess the portfolio risk, internal capital allocation and assessment of alternative investment strategies, in order to detect excessive risk assumption in trading processes.

The banking supervision and role of the Central Bank

In the risk management process it is important to analyse, to identify, to evaluate etc. of risks and to take measures to analyse the risk. NBR has taken a series of measures concerning the commercial banking activity supervision, just for not to repeat the "famous" failures before 2000 (Bancorex, Bankcoop, Banca Agricolă, Banca Religiilor, Banca Turco-Română, Banca Română de Scont ...etc). As a result of these measures the 2008 financial crisis did not caused significant damages, compared with other European countries, where the financial system was more relaxed, with few restrictions. In Romania was not necessary the state intervention in order to save some strategically important banks, which could have amplified the effect of the crisis.

Watching that the indicators framing a set of values can be useful to determine the status of a bank as seen individually and in isolation, but this is not offering a full picture, because 85% of the financial-banking market capital is coming from abroad, and it is exposed to other market volatilities. For example banks from Greece, Austria Italy, Portugal have had difficulties in their country of origin, and transmitted the related risks to the Romanian subsidiaries too. The effect was not so alarming, due to the Vienna agreement which regulate the capital withdrawals from Romania and forecasted additional prudential measures imposed by NBR.

Thus, a stress test is performed every 6 months - simulating the effects of external changes in the administration of banks, financial effects, liquidity, and, where needed additional measure were imposed in order to counteract the negative effects (additional provisions, increase of capital etc.).

Also, periodically, is performed the assessment for the capability of financial banking institutions to absorb shocks.

However the level of impact depends on the size of the market player. For example in Romania top 5 banks have a market share over 54%, which leads to the hypothesis that the difficulty of such a bank could create a big trouble in Romanian financial system.

That is why NBR requires additional supervisory measures for these banks.

In addition, for those institutions that failed to fit within the imposed limits of prudential indicators, in order to prevent a further deterioration of the situation, the central bank (NBR) establishes special administration measures, such as was the case of Volksbank, Bank of Ciprus, Marfin Bank, RBS, Banca Carpatica etc.

The banks were hit by the crisis, either have been entirely restructured or were absorbed by other entities. In case of merger/acquisition the buyer inherit the liabilities of the acquired company and at the same time the associated risks too. For example of Volksbank Romania where the acquiring bank Banca Transilvania, "inherited" also the portfolio of loans in Swiss Franks (CHF), all having a high related to the exchange rate instability. This variability can be caused by the foreign exchange market evolution, that was actually happened across the years, when the CHF/RON exchange rate evolved from 1,5 in 2006 up to 4,2. We can notice an increase of 280% over the 10 years, meaning an average of 28% per year, much more that the level of provisions of 10% set by the prudential rules for foreign currency lending.

Also for those banks where was identified a higher risk level, which by spreading to other entities in the system would generate systemic risk, which could trigger a major crisis strict restrictive measures were imposed on both banking entity and the shareholders.

Conclusions

First of all, it is mandatory to establish the factors that determine a specific event (socio-political-economic) to be considered a systemic risk.

We must also establish how can be improved models regarding risks with macroeconomic surveillance measures, in order to be able to prevent the occurrence of crises, especially the major ones that could cause severe systemic risk.

Network theory, and modelling of the balance sheets are theoretical aspects that enable researchers and supervision institutions to build dynamic models that can help prevent crises, or at least to limit their effects

The severe systemic risk can be considered the political factor, which by populist measures interfere with the economic mechanisms, and adopting an exchange rate that disregards economic reality in fact threaten the macroeconomic stability of the financial and banking system Romanian.

Another case of political interference in economic processes is considered BREXIT - whose effects are difficult to assess / shaped now.

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