POSSIBILITIES OF IMPROVING THE METHODS AND TECHNIQUES USED IN THE SURVEILLANCE OF CREDIT RISK MANAGEMENT

Bolocan Mihail-Dragos
"Babeş-Bolyai" University Cluj-Napoca

Balogh Peter
"Babeş-Bolyai" University Cluj-Napoca,

Through their daily activities, credit institutions are subject to various risks which could affect both the bank and the whole banking system, national and transnational. The activity field of the banks, marked by volatility, by the internationalization and liberalization of the financial markets, is in a continuous change. The contagion effect, as it has been proved by the spread of the financial crisis' effects, determines the surveillance authorities to pay increased attention to the financial risks and implicitly to the systemic risk.
In this study, to start with, there shall be presented some aspects regarding the banking rating systems used by the surveillance authorities and then some ways of improving the models of managing credit risk in banks. In the end, there will be demonstrated that the risk profile of the banking institution has a determining role in the management of the credit portfolio.

Key words: banking system, banking risk, surveillance, rating systems, credit portfolio, investment.

Cod JEL: G32

1.Introduction

By promoting the new agreement (Basel II), it is intended to improve the surveillance methods of the credit risk, as well as to develop a methodology for each banking institution for the measurement and management of the banking risk, to increase discipline on the financial markets, but also to offer some stimulents for the banks that implement the best practices in this domain. Thus, it is intended to reach a convergence between the reglemented capital (established by the national banks) and the economic capital [1]. Establishing the reglemented capital on the basis of the assumed risk level by each bank will allow these to manage their resources better (Maniu, 2006).

The integration of the financial markets and infrastructures in the European Union, together with the growing number of big and complex financial groups, which have cross-border operations, contributes to the efficiency and stability of the financial system of the European Union. At the same time, the financial/monetary integration increases the possibility of cross-border and cross-regional contamination and it consequently amplifies the possibility of a systemic crisis which could affect one or several state members. The financial stability is, consequently, a common preoccupation for all "euro states" and it must be protected through an open collaboration.

In order to limit the economic impact of a systemic cross-border financial crisis, there must be allowed a response at the appropriate and efficient moment. In-time preparation for a crisis is necessary, allowing sufficient flexibility in order to solve the specific circumstances of each potential crisis. Consequently, it is important that at the level of the European Union there are common principles, procedures and agreements regarding the cooperation between the authorities responsible for maintaining the financial stability.

2.The banking rating systems used by the surveillance authorities.

685

The main objective of the surveillance system is represented by the identification in an incipient stage of those banks considered inefficient, according to the evaluation criteria of the financial and operational aspects established by the monetary authority or by the manifestation of adverse trends, requiring special surveillance.

Credit risk is one of the most important risks encountered in the activity of a banking institution and it expresses the possibility that the debtors or the title issuers cannot accomplish obligations in time, as a result of the degradation of their financial situation which can be determined by the lending conditions or by the general economic situation.

In the surveillance activity, surveillance authorities generally use a top-to-bottom approach, starting from the financial rapports which give a lead and reaching the particular, stressing the identification quantification, management and control of risks, all these by the help of some instruments called *early warning systems* [2]. The best known bank surveillance system is CAMEL [3], model used in The United States of America. Federal Reserve Bank evaluates credit institutions based on some events, limits etc., included in the CAMEL system. SEER Risk Bank Model (System for Estimating Examination Ratings) utilized by FED established the possibility of banking bankruptcy or severe sub-capitalization by the means of a probit-like regression. Part of the same category of early identification instruments of the credit institutions whose performance degrades is the SCOR model (Statistical Camels Off-site Rating) utilized by FDIC.

The Banking Commission in France utilizes the SAABA system based on historical data in order to evaluate possible losses at the credit portfolio level for the following three years. The diagnostic element and the alert mechanism are based on the indicator's solvability level and on the shareholding's quality.

The Bank of Italy (BdI) estimated a survival function of the credit Italian institutions by using the Cox Proportional Hazards model. This quantifies the probabilities of the appearance of some severe difficulty states at the level of the Italian banks during a period of two years. In this respect, the severe difficulty state is evaluated on the basis of bankruptcy events in the juridical sense, of the overtake of a credit institution by a stronger one from the financial point of view and in which the banking rating system (PATROL) [4] classifies the credit institution into category 4 or 5.

The new concept introduced by The Basel II Agreement is represented by the risk-based analysis [5] of banks, which presupposes a permanent analytical revision of the bank's activity, thus ensuring the maintenance of stability and trust in the financial system. This approach presupposes the extension of instruments used by the traditional banking analysis, these being starting points for anticipating risks and forming simulations, their change offering in time a dynamic image of the bank's performances. On the other hand, the financial indicators (referring to the structure of the balance, profitability, market risk and credit risk, liquidity or exchange rates) are the object of the banking surveillance, each bank having the obligation to calculate these indicators.

Taking into account the requirements of the Basel II Agreement, the elements which can be developed in the rating systems refer, in our opinion, to:

-completing the quality marking modality of the shareholding by individual ratings for each shareholder [6], among which we can mention the shareholders' financial situation, the type of shareholder, the type of rapports with the credit institution etc.;

-quantifying the sensibility to the market risk;

   -measuring the credit risk by using the verified databases received from the credit

-institutions regarding credit types, activity domain, data obtained from the Banking Risk Authority (BRA) and from the Payment Incident Authority (PIA) verified by macroeconomic elements regarding the activity sectors where credit institution have investments with a considerable concentration.

3.Possibilities of improving the models of managing credit risk in banks.

For the management of a credit portfolio there are several models [7], each stressing different aspects (entrances). Thus, on the one hand, the stressed items are the historical data of the counterparty (SD, debtor's rating, non-reimbursement incidents, frequency etc.), among which we mention the CreditRisk+ or CreditMetrics models and, on the other hand, models of credit portfolio management which also take into consideration the macroeconomic indicators (CreditPortofolioView or PortofolioManager), thus positioning the counterparties in a more realistic context regarding the non-reimbursement probability.

There certainly is an impressive number of models for the management of a credit portfolio but, in our opinion, the great challenge is represented by the identification of minimal elements that must be included in composing that model by the credit institution.

In elaborating models there are some principles which have to be taken into consideration [8] (according to the recommendations of the Basel Committee):

-credit institutions must not forget that the main responsibility in the formation process is theirs;

-the model must have real predictive abilities for the risk estimations of a bank and the analysis of the way in which these are utilized in the relevant activities of the credit institutions;

-there is no universal elaboration method for these, only minimal elements that have to be introduced;

-they must comprise of both qualitative and quantitative elements;

-the process and the results must undergo independent reviews.

It is recommended for each credit institution that the entire credit risk exposure is monitorised by limits and a rapporting system.

In the best known scoring methodologies, the credit risk value is calculated by the method of a scoring equation:

$$Y = w_o + w_1 \ X_1 + w_2 \ X_2 + \ldots + w_n \ X_n,\text{where:}$$

$X_1, X_2, \ldots, X_n$ – entrance variables of the model (in case the scoring is meant to measure the credit risk of a company, these variables usually represent indicators calculated based on the data from the financial situations)

$w_o, \ w_1, \ w_2, \ \ldots, \ w_n$ – interception coefficient and constant which describe the balance of the model's particular variables, the so-called *weights* (balances)

Y – the number that describes the stability/state of the entity's credit under verification and it depends on the determination of the Y bigger model, meaning a weaker evaluation of the credit; nevertheless, the relationship can also be the other way round.

The formation process of a scoring model consists of the following stages:

1.Defining the case of the neglect of duties.

2.Gathering historical data from the counterparties.

3.Selecting the variables $X_1, X_2, \ldots, X_n$.

4.Evaluating, on the basis of historical data of the parameters $w_o, w_1, w_2, \ldots, w_n$.

5.Verifying the model taking into account the forecasted accuracy.

The formation process of a scoring model

Source: created by the authors
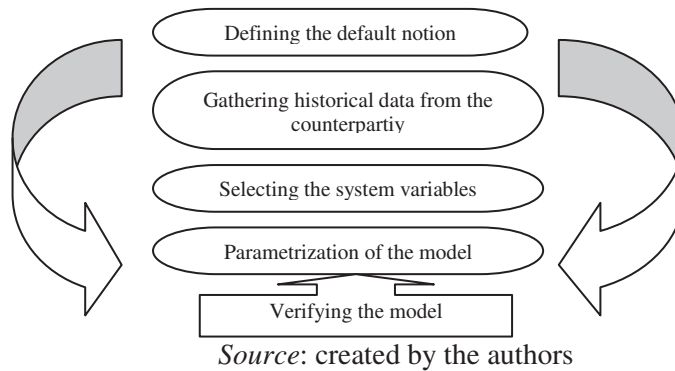
In case a credit institution selects a *logit model* these explicative independent variables $X_1, X_2, ..., X_n$ with which the state of the Y entity can be modelled, the so-called dependent variables. In the scoring based on logistic regression, the state of the Y entity has the following interpretation:

$$Y = P (\text{default} \mid X_1, X_2, ..., X_n,),$$

and thus Y reflects the probability of neglect during a prolonged period, starting with the rapport date at which the variables $X_1, X_2, ..., X_n$ were calculated. Through such an interpretation Y, by $X_1, X_2, ..., X_n$, on the basis of the linear regression and consequently the attempt to build the regression of the formula $Y = w_o + w_1X_1 + w_2X_2 + ... + w_nX_n$ encounters problems of a fundamental nature: Y probably belongs to the row $[0,1]$, and to the linear combination $Y = w_o + w_1X_1 + w_2X_2 + ... + w_nX_n$ and it can take any values $(-\infty, \infty)$.

In the models formed by the logit methodology, the Y result certainly represents a function of the default probability, during a future period, for example an year from the result calculation. Thus, through a good model calibration, the more ample the function of the neglect definition utilized for the calibration of the model, the greater Y exit results.

The evaluation and estimation systems of the credit risk implemented in the financial (banking) institutions attempt to quantify the losses that might appear as a result of the counterparty's default (payment inability). Credit risk factors are generally specific to each company, but they must also include a series of macroeconomic variables which reflect the state of the economy and the specific branches.

4. The risk profile of the banking institution –determining factor in the credit portfolio management.

In the demarches regarding the utilization of a work methodology, in order to elaborate some credit risk management models, there must be taken into consideration two items. Firstly, specialty literature should be consulted, including the requests expressed by laws, regulations, work procedures, and then there must be taken into consideration the peculiarity of each banking institution's activity. Thus, the conceptual models used for the marking system regarding the identification of credit risk to which the counterparty exposes itself before offering the credit, respectively assuming the payment engagement, must take into consideration, on the one hand, the creditor's experience in the process of offering credits and, on the other hand, the automated models of previewing the non-reimbursement possibility of the assumed engagement, this being realized by sophisticated models, estimation statistics of the counterparty's behaviour during the engagement.

The elaborated models should preferably comprise both rating and statistic elements, in the form of mathematical models, well established. The scoring function [9], which is an important step in the formation of the rating system, does not necessarily presuppose determining the non-

688

reimbursement probability for each counterparty, only the transfer of the risk characteristics considered relevant, in a small amount, represented by a value called score. As a result of the interconnection and classification of the scoring models, the counterparties will be included in the marking classes.

Thus, after the analysis of a hazardous sample of the clients' portfolio of a credit institution for which the balance data were available in December 2008, financial indicator like gross/nett margins, "equity ratio", "debt-equity ratio", the rapport between the operational expenses and incomes, EBIT (EBITDA), ROE, but also date referring to the debtors' behaviour as client of the banking institution (ex. debt service), together with a set of standard financial indicators (solvability, debt degree, current rate, economic profitability) which are compulsorily calculated for each client by the credit institution, there has been noticed different behaviour as regards reimbursement ability, especially if the debtor belongs or not to a different activity sector.

The econometric model of the logit type on the basis of which we estimate the probability of non-reimbursement of companies from the existing sample has the following formula:

$$\log \frac{p}{1-p} = ct + \sum_i \beta_i \cdot Indicator\_Microfinanciar_i$$
$$\sum_j \beta_j \cdot Aspect\_macroeconomic_j$$

For each activity domain of the debtors in the sample there has been built a "dummy" variable, thus observing that the most important sector as representation in the sample is the services one and the least represented is the agricultural-fishing one.

In any regression we have estimates during the analyses; we have started from a specification that includes the variables for each client calculated by the credit institution: solvability, debt degree, current rate, economic profitability. In regression there were taken into consideration the linear correlations between certain indicators like the economic profitability and the debt degree, where the correlation of 97% is negative. This implies that from the two variables there must be included only one in the logistic regression and there was an option for the variable debt degree. This variable is also negatively correlated, in a proportion of approximately 98% with the variable „equity ratio", which determines us to eliminate from the regression specification also this last mentioned variable.

As a result of the analyses there has been noticed that a company from the services sector has a non-reimbursement probability greater with 6,5 percentage points than a company in any other sector, if both companies are characterized by the same solvability and market quality. This result does not seem surprising at all for the analysis of a clients' portfolio at the end of the year 2008, a raised macroeconomic risk of the services sector compared to the other sectors. Practically, the logistic regression catches the beginning of a phenomenon latter confirmed by the macroeconomic evidences, an example being the below graphic.

The contribution of the main activity branches to the decrease of PIB during 1.I.-30.IX.2009 compared to the period 1.I.-30.IX.2008
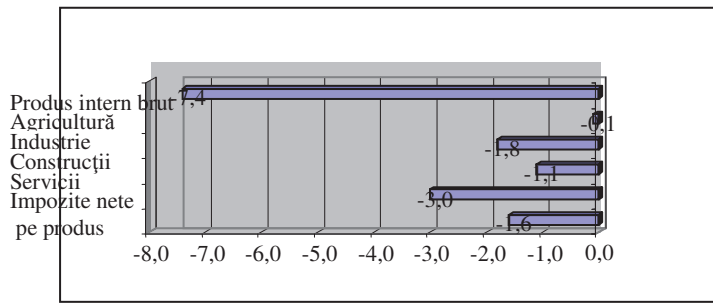
Source: *Rapports National Statistics and the National Bank, own adaptation*.

5.Conclusions

When defining a neglect of obligations, the banking institution that forms the analysis model of the credit risk, both ex-ante and post-factum, there must exist the possibility of answering to the following question: *"Which of these credit institutions wouldn't have given a credit/wouldn't have made that investment, had it previously known that this situation might arise?"*

Extremely important in the analysis of the credit risk is determining the *default.* This presupposes the extension of the definition, for the purpose of the credit risk management, thus being subordinated to the profile of aversion towards risk of that credit institution. It is wrongly stressed the fact that the way of defining a neglect of an obligation is limited by the quality of historical data utilized in forming the model. The too detailed definition can be useful at a certain stage, as it might similarly be impossible to determine the moment whether the neglect manifested itself in the past for too many counterparties.

An individual element from CPP or BS has little importance taken singularly. A rate, on the contrary, taken as a rapport/combination between two or more elements can bring about important clues, especially if it is compared to the similar one of industry, of competitors. In Romania, such references, databases are almost absent, and the instability registered so far determines many analysts to regard this demarche without much trust. Nevertheless, this way is the only valid reference point, although it has imperfections or its realization brings about inherent implementation difficulties.

Comparisons with the industrial standards (benchmarks) are important so that all societies are influenced, to a greater or smaller degree, by the economic expansion or recession (contraction). It is unlikely that a growth of sales, profits intervenes when the economy (a certain sector) is on a descendent road. Similarly, there can't appear a growth of activity, business volume, although it might seem attractive if it is under the industry' average, of the main counter-candidates, this meaning loss of competitivity and market share.

In order to overcome the eventual "contracted" degradations right from the start and which now are part of the credit portfolio, banks must conceive and implement *alarming policies*, more precisely minimum and maximum limits which offer to the board of the credit institution a continuous feedback upon the efficiency of the control process of the quality of credits, investments, so that those with problems are detected and amended (as much as possible) in time.

Notes

1.The notion of *economic* stresses the fact that measuring risk is done in the conditions of the economic realities and not based on accounting or settlement rules.

2.Moinescu, Bogdan (2007) "*Sistem de previziune a evenimentelor de deteriorare a ratingului CAAMPL*", Caiete de studii, Banca Naţională a României.

3.Acronym formed out of elements included in the verification process of the security and solidity of credit institutions: solvability, actives' quality, management quality, the quality of incomes and liquidity.

4.Adapting the capital, profitability, credit risk, organization, liquidity.

5.*Organization 's pure risk* – utilized for the first time in 1956 by Russel Gallanger *Risc Management: A new Phase of Cost Control*, Harward Business Review.

6.Banking rating methodologies utilized by the surveillance authorities especially represent expert systems which furnish evaluations only for the period during which the evaluation is being made, without offering signals regarding future evolutions. The ex post results must be completed based on the information furnished by the prediction instruments whose utilization offers more time for the surveillance authority to take the necessary measures.

7.A description of the formation of the scoring models based on the linear regression is presented by R. A. Johnson, D. W. Wichern, *Applied Multivariante Statistical Analysis*, 2002, Prentice-Hall or L. C. Thomas, D. B. Edelman, J. N. Cook, *Credit Scoring and Its Applications*, 2002, SIAM

8.www.bis.org.

9.The scoring function is a statistical or heuristic (subjective) method which offers the possibility to organize counterparties according to the risk level, level established either by the credit analyst (by verifying the counterparty's characteristics considered relevant, based on a manual or evaluation form conceived by the institution) or automatically calculated by the help of a statistical model (created on the basis of an initial data set which comprises interest characteristics and the registered events of non-reimbursement) or as a combination of the two.

References

1.Philippe Jorion (2007), Value at Risk, The neu benchmark for Managing Financial Risk, third edition, McGraw-Hill Companies.

2.Van Greuning, H. & Brajovic Bratanovic, S. (2003), *Analyzing and Managing banking risk*, The World Bank

3.Edward P. Borodzicz (2005), *Risk, Crisis and Securitz Management*, John Wilez & Sons LTD, England

4.Comisia Europeană (2009) „*Communication from the Commissionregarding an EU framework for Cross-Border Crisis Management in the Banking Sector*",*http://ec.europa.eu/internal_market/bank/docs/crisis-anagement/091020_communication_en.pdf*

5.Basel Committe on Banking Supervision (2006): International Convergence of Capital Measurement and Capital Standards, http://www.bis.org

6.Artigas, C.T. (2004), A review of Credit Registers and their use for Basel II, Finacial Stability Institute

7.Engelmann B., Rauhmeier R. (2006), *The Basel II Risk Parameters*, Berlin - Heidelberg