ESSENTIAL ELEMENTS OF OPERATIONAL RISK

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Abstract

Operational risk is one that manifests itself no matter how many measures we take to eradicate it.

Avoiding unexpected losses is one of the reasons for investing and managing operational risk, and the appropriate policy is to quantify the chances of risk occurrence and anticipate the losses resulting from this manifestation of operational risk.

Of course, the Basel Committee I, II, III suggested the conditions that the financial system must meet, so that losses due to operational risk are reduced. Of course, this risk arises due to deficiencies or deficiencies that occur during the future activity.

The purpose of this article was to present the essential elements that define operational risk, to describe it in its complexity and to take some measures for a careful analysis, based on which to identify, predict, the risks that may arise.

Operational risk usually acts in association with other economic and financial risks, being a system of risks that develops in close interference.

We used an appropriate methodology to study the risks such as induction and deduction, the study of dynamic series to draw the necessary conclusions, the use of the index method or some statistical-econometric models to determine the parameters based on which we can make a reliable prediction. for the next period.

Keywords: *risks, losses, financial system, models, forecasts.*
JEL classification: *C10, G30*

Introduction

In this article we started from the definition of the notion of operational risk, we presented its defining elements and then we sought to express the process by which we can identify this risk, we can foreshadow the effects it has and impose a range of measures consisting in banking supervision so that

the operational risk is known in advance, to calculate some parameters on the basis of which to determine the possible losses with which the national economy is registered.

This operational risk is associated with others, such as internal risk, control risk, management risk, ie elements that must contribute to the knowledge, early identification and taking measures to eliminate or at least reduce the effects of operational risk.

Certainly, in this article we discuss operational risk, but it must be taken into account, and in the study we mentioned that, in fact, the system of risks, all together, must be considered together because they have interference, possibilities of association as an effect and, in this way, quite significant losses.

In the article, some gradual approaches were made, starting from the market risk, reaching the credit risk and, finally, the operational risk. After all, the other risks, credit, bank risk, liquidity risk and others are also risks that may arise due to operational risk, caused by deficiencies that manifest themselves in ensuring macroeconomic management.

In the article we presented a series of cases such as bankruptcy risk assessment, determination of discriminatory function by econometric models, specification of models such as Altman, Canon – Holder model, which are usually used in interpreting and analysing operational risk combined with the other associated risks in order to determine the effects it may have on macroeconomic outcomes.

Literature review

Operational risk is frequently encountered in economic and financial activity. The conditions under which the risks may occur are specific to each field of activity. These aspects, theoretical and practical, are carefully researched by many researchers. Anghelache, C. and others in the Macroeconomic Analysis published in (2007) address issues related to the essence of operational risk, and Anghelache, C. and Capanu, I. published in 2003 a study on macroeconomic indicators in which they address elements of calculation, analysis and evaluation of indicators, including risks. Benjamin, C. et al. Published a study on the use of models for making economic forecasts, including risks, and Eagle, R.F. and others (1987) conducted a study on the testing of representativeness errors in estimating indicators. Haavelmo, T. (1944) published a paper dealing with how probabilities should be interpreted in statistical-econometric studies, and Jansen, ES and others addressed in the published paper aspects of testing parameter constancy and superexogeneity in constructing economic equations . Levin, L.R. In 1987 he addressed in the published paper a series of aspects regarding the use of statistical-econometric

models in macroeconomic management. Orazil, P.A., and Low, H. (2000) conducted and published a study on the estimation of Euler equations to determine risks, including operational ones.

Methodology, data, results and discussions

From the perspective of macroeconomic risk, we will analyse two major risks, namely operational risk and financial risk.

Avoiding an unexpected loss is one of the reasons to invest in operational risk management, and the appropriate policy is to quantify the possibility of a loss. The difficulty is to quantify the magnitude and probability of a variety of such events.

This led to the investigation by some financial and financial-banking institutions of the quantitative aspects of operational risk management.

Documents related to Operational Risk and Internal Control belonging to the Basel Committee on Banking Supervision are useful, and this refocusing on operational risk has led to the emergence of regulatory practices with new enforcement rules.

The Basel Committee drafted the first agreement, Basel I, in 1988 and considered that operational risk was a significant risk for financial and banking institutions and that they must have their own funds to protect themselves against possible losses.

Basel II, adopted in 2004, defines operational risk as a risk of loss resulting from shortcomings or deficiencies in procedures, personnel, internal systems or external events. In this area, the Committee has developed a new approach to the calculation of appropriate own funds. As for credit risk, the Committee considers the internal valuation techniques developed by banks at a rapid pace; it seeks to encourage financial-banking institutions to refine these techniques and to improve their operational risk management. This is the case with complex measurement approaches (CMAs) on operational risk.

The Committee provides them with flexibility in drawing up a study to calculate the minimum level of own funds for the operational risk corresponding to their activity profile and subsequent risks.

The Basel Committee intends to constantly monitor the evolution of operational risk approaches. In this sense, the progress of financial-banking institutions that have developed methods of operational risk management according to the CMA is well received. The management of these banks has come to the conclusion that it is possible to develop a flexible and comprehensive view of the quantification of operational risk in the own funds procedures. Financial-banking institutions with an international dimension or

exposed to a significant operational risk are obliged to adopt on time the more risk-sensitive AMC methodology.

The Basel II agreement involves two simpler approaches to operational risk (basic and standardized indicator) for banks less exposed to operational risk.

Globally, the two approaches require banks to hold their own funds for operational risk, calculated as a fixed percentage of the determined risk measure.

The economic crisis has forced the elaboration of a new agreement, namely BASEL III, which since 2010 has led to the adoption of a new wave of reforms and new rules in the field of financial-banking. The Basel Committee imposes stricter on prudential constraints and financial performance, building up additional capital reserves in the hope that this will increase the capacity to absorb much higher shocks.

The issue of defining operational risk concerns financial institutions. Many banks have adopted as a practice a listing of risk categories, analysing each of them and deciding whether they should be reported and controlled separately in market and credit risk management.

It is important to note that operational risk is not limited to financial or financial banking institutions. Useful examples of how to define and measure this risk can be found in other sectors.

Operational risk has already been managed at the local level, within each department with the support of functions such as legal and internal audit. The components of operational risk are: control risk, process risk, reputation risk, personnel risk, legal risk, takeover risk, marketing risk, gaps in information and communication systems, technological risk, changes in the tax system, changes in regulations in the field, business size, project risk, security, additional risk management.

• *Other economic and financial risks associated with operational risk*
Control risk is the risk of an unexpected loss due to a lack of adequate control or the lack of effectiveness of this control and can be divided into two broad categories:
- inherent risk is the risk of a certain activity within the bank regardless of the type of internal control exercised, complex business areas, understood only by a few key people, involve a high inherent risk (transactions with exotic derivatives)
- control risk, respectively the risk in which a financial loss is not prevented, detected and corrected in time by the internal control.

Process risk is the risk that inefficient activity produces unexpected losses. Process risk is closely linked to internal control, as the latter must be seen as a process. It differs from internal control when a process is seen as a continuous activity of the risk management type, but internal control within the risk management process is presented as a control point.

Reputation risk is the risk of an unexpected loss in asset prices due to the impact on the institution's reputation. Loss of reputation can occur from the sale of new financial products.

Personnel risk does not only refer to the activities of the human resources department, although they contribute to risk control. There are specific conditions in the control activity that the operational risk manager must take into account when carrying out an assessment. The human resources department must cover these risks by setting standards and by establishing an infrastructure containing databases on knowledge management as well as by adequate training and professional promotion.

Legal risk can be divided into the following categories, respectively: the risk of legal claims as a result of an activity or action of employees; the risk that a legal opinion on a matter related to the law proves to be incorrect in court, the latter risk being applicable to clearing or new financial products; the possibility of enforcing the decision from one jurisdiction to another.

The takeover risk consists in the possibility to modify the capital structure of the institution following the successive acquisitions of shares through stock exchanges.

Marketing risk is the risk that can occur when new products are poorly valued in the marketing strategy.

Technological risk, in a broad definition, includes all system risks including external pressure related to technological progress. Technological risk is at the heart of investment banking.

Changes in the tax system - if there are changes in the level of taxes in retrospect this can make the business immediately unprofitable. An example of this is changes in the deductibility of expenses.

Normally, the business should consider the possibility of changes in the level of taxes, causing the customer to pay.

Changes in regulations in the field - requires constant monitoring. The effect on the business can be significant and the risk of high profitability volatility can be extremely high. An example of this is changes in the average risk weights of assets.

Business size - if the mechanisms, staff and IT infrastructure cannot support the development of the business, the risk of bankruptcy is high.

Project risk - is an important concern for many companies, especially the impact of several current projects. Security - banks' assets must be secured against both internal and external theft. Such assets include not only company money or other securities / loans, but also customer assets and company intellectual property.

The risk of natural disasters - natural disasters are one of the main causes of financial loss. Another definition given to operational risk is that of an unexpected loss due to deficiencies in internal control or information systems caused by a human error, system crashes and its control.

In conclusion, operational risk is defined as follows: operational risk is the bank's exposure to potential financial losses.

Such losses may be caused by internal or external events, trends and changes that have not been captured and prevented by corporate governance and internal control, systems, policies, organization, ethical standards or other elements of control and company standards.

Such losses exclude those already incurred by other risk categories, such as market risk, credit risk or strategic / business risk.

The steps to be followed by any method of quantification are as follows:

a. identification of a method that clearly describes exposure to operational risk, risk factors and potential losses;
b. establishing a relationship between risk exposure, risk factors and potential losses;
c. tempering events with a low impact but high frequency and those with a high impact but low frequency and including the final model and reports in the business and management processes.

When analyzing the market or credit risk, the institutions resort to a gradual approach, successively clarifying the following aspects:

a. risk definition;
b. identification of risk factors;
c. measuring exposure to these factors;
d. risk calculation (depending on a number of assumptions such as: the specific application of risk factors to exposure and the time of exposure to these factors and the assumed confidence interval).

• *Gradual approaches in market, credit and operational risk analysis*
Next, I will perform a comparative analysis of some risks associated with the operational one.

	Market risk	Credit risk	Operational risk
Defining types of risk	Rate risk a interest Price risk of stock market Commodity risk Currency risk	Risk of loss of COUNTERPARTY Risk of concentration Risk of credit deterioration Country risk	Control risk Process risk Personnel risk
Identification risk factors	Basic values and volatility curve in a range of time	Migration matrix credit rating, loss rates and gain rates	Incorrect details of trading Messages received incorrectly Aged technology Fraud / conspiracy Staff sickness / turnover Moral Culture
MEASURING factor exposure of risk	Net cash flows over a period of time	Market share, potential exposure	Volume of transactions Capacity utilization information Level of failed confirmations Unreconciled things Failed settlements Degree of division of LOADS
Risk calculation	Value at Risk Method (Parametric VaR) Exposures, factors of risk and the correlation between them	VaR method for credit risk, multiplied exposure with the loss unrecovered and their correlation	VaR method for operational risk: exposures multiplied by probability. Distribution generation loss and for a confidence interval specified, measurement unexpected loss
Calculation profit and loss and explanation of sources	Changes to risk factors / exposures of transactions in time of day explains daily variation of profit and loss	modifications risk factors explains the variation monthly value credit portfolios	Volatility of residual gains after removing the effect of market, credit and strategic business risk

compare risk with return	VaR method parameters Exposures, factors of risk and their correlation	VaR method for credit risk, multiplied exposure with the loss unrecovered and their correlation	Calculating the effect incremental

Most approaches to operational risk and internal control were in order qualitatively, so that the identification of operational risk was measured in words rather than numbers.

A common approach is to conduct a review of how the bank manages operational risk and then conduct a risk assessment based on the objective opinion of an experienced person. Much of this work has been done in the past by internal audit. In most banks, until recently there were no other departments involved in operational risk assessment other than internal audit.

In the USA, in September 1992, a framework document on internal control was created for all companies, not just financial institutions. All key concepts in this document have been incorporated into the American Standards on Auditing (SAA). SAA 55 stipulates that internal control is a process carried out by the company's board of directors, management and others, intended to provide assurance regarding the fulfilment of the following objectives: the veracity of the financial statements; efficiency of operations and compliance with applicable laws and regulations.

Internal control is a process and therefore a series of actions target the activities of a company. The components of internal control actions are the following:

- Control of activities - provides the framework in which activities and control are conducted. Includes the integrity and ethical values of the company.
- Risk assessment - the bank must monitor the risks it faces, including operational risk. Must set business objectives, along with sales, production, marketing, financial and other activities, so as to operate efficiently in different departments. The bank must establish mechanisms to identify analyse and manage the related risks.
- Control actions - control actions and procedures must be established and executed to ensure that the identified management measures are necessary in relation to the risks, and are effectively carried out.
- Information and communication - around these activities are the information and communication systems, which allow the reception and exchange of information necessary to lead, manage and control operations.

• Monitoring - the whole process must be monitored and, if necessary, changes made. In this way the system can react dynamically, changing if conditions require.

The five components strengthen the three mentioned objectives: financial reporting; application and operations.

Risks (or weaknesses in internal control) can be sorted according to their priorities and resources. The ordering takes into account the magnitude and probability of the loss. The method is subjective and depends on the experience of the auditor, company manager or operational risk manager. A better approach is to quantify operational risk.

• *Analysis of the effects of financial risk*

Indicators used in financial risk analysis are:

a. The overall break-even point can be determined as follows:

$$CA_{PR} = \frac{CF + DOB}{Rmvj}$$

where:

CF = fixed expenses;

DOB = interest rate for the financial resource attracted by the agent;

R_{mvj} = variable expense margin rate.

The financial risk assessment could be obtained by determining the position indicators in relative or absolute value.

The magnitude of the influence of the financial policy of the financial structure The company's data generated a simple modelling known as the financial leverage effect.

The financial leverage expresses the influence of the company's debt on equity.

The effect of financial leverage is based on the following chart:

Total assets (A1)	Own capital (Cpr)
	Liabilities (L)

When assets involve an economic profitability Re, we have as a result:

$$Re = \frac{REX*}{AT}$$

where:

REX[*] = the result for the year, unaffected by interest expenses and income tax;

AT = Total assets of the company

We have the following:

$$REX^* = R_e * AT$$

Based on these elements we can obtain the net result of the financial year.

It can be calculated as the difference between the result for the year, unaffected by interest expenses and corporate tax and the amount of interest that the company must pay for the capital attracted, adding the amount of corporate income tax due.:

$$p_r^n = (REX^* - C_d) * (1 - K)$$

$$p_r^n = (R_e * AT - C_d) * (1 - K)$$

Where:

K= profit tax coefficient

$$C_d = R_d * D$$

$$p_r^n = (R_e * AT - R_d D) * (1 - K)$$

As a basic relation of the calculation of the financial profitability rate R_f is:

$$R_f = \frac{p_r^n}{K_{pr}}$$

Where:

P_r^n - net profit exercise;

K_{pr} - own capital.

Using the elements presented above, this relationship becomes:

$$R_f = \frac{p_r^n}{K_{pr}} = \frac{(R_e * AT - R_d * D)*(1-K)}{K_{pr}} =$$

$$= \frac{[R_e * (K_{pr} + D) - R_d * D]*(1-K)}{K_{pr}} =$$

$$= [R_e * (1 + \frac{D}{K_{pr}}) - R_d * \frac{D}{K_{pr}}] * (1 - K) =$$

$$= [R_e + (R_e - R_d) * \frac{D}{K_{pr}}] * (1 - K) =$$

Where:

$AT = K_{pr} + D$ – is an indicator that shows that the total assets of the company have equity and the amount of the company's debts as financing sources.

The efficiency of debt on financial profile depends on the size of the ratio between economic profitability and interest rate.

If $R_e > R_{dob}$, the situation is favourable to shareholders, using loans are considered as an improvement in their own profitability of capital

In this case, financial profitability is an increasing function of the company's debt.

If Re <Rdob, the cost of debt is higher than the economic reality, and in this case, the professional functionality is a decreasing function of the debt grade of the company.

To determine the leverage effect, we start from the relationship of financial profitability:

$$R_f = R_e + (R_e + R_{dob}) * \frac{D}{K_{pr}}$$

Under these conditions, the leverage effect is determined as a result of:

$$\text{Leverage effect} = (R_e - R_{dob}) * \frac{D}{K_{pr}}$$

• ***Assessing the risk of bankruptcy by using the scoring method***

The methods of risk analysis of bankruptcy, previously mentioned exclusively, allow the evaluation of the previous performances of the economic agent, information on the reduction of their next evolution. Hence the need to obtain certain data on the risk of bankruptcy of the analysed economic agent.

This need led to the development of the scoring method, as a prediction of bankruptcy risk, a method that has undergone significant development due to the use of statistical study methods for financial statements, starting from a series of rates.

The most common statistical method used in bankruptcy studies is a discriminant analysis. It is a method of setting certain provisional variables to which we attach certain weights, so that in the end, their sum is equivalent to that of the global Z-score indicator.

The objective of the scoring method is to provide predictive patterns for assessing the risk of bankruptcy at the micro or macroeconomic level.

By applying discriminant analysis, we obtain the Z score for each company, the equivalent of a linear function based on a set of reports. The distribution of different scores allows the separation of viable companies from those with problems.

Based on existing financial data, we consider a difference between the rate of return on assets (ROA) and the debt indicator for companies that go bankrupt in one year and for other companies.

The informational potential of the scoring method should not be underestimated, as discriminatory analysis reduces the basic information by selecting the most important rates, which are considered constant over time, and the company is an economic and social system operating in a complex environment, with many other variables that influence his health.

Bankrupt companies have a low ROA. On the contrary, viable companies have opposite characteristics: a low debt indicator and high ROA.

The scoring method is recommended in parallel with the classical diagnostic method that allows the analysis of financial balance, profitability analysis, analysis of financial flows, etc. and, finally, the global risk assessment of the company.

- ***Determining the discriminatory function through econometric models***

The estimated discriminatory function is the right that separates companies that go bankrupt on the one hand from companies that do not, on the other. In fact, the scoring method evolved in two ways, one consisting in the use of the Z function and one based on the granting of indicators that characterize the activity of the analysed company.

The second approach is similar to the risk assessment model presented in the previous chapter. Among the banking methods of analysis, the Z function is considered part of the overall assessment, the analysis being supported by the following elements:

- Management activity
- Financial administration
- Reports of accounting experts
- Relations with creditors
- Press Releases
- Conditions of activity
- Degree of recognition of employees

Starting from the scoring method, models were developed such as: ALTMAN model, CONAN HOLDER model, HOLDER model, LOEB and PARTIER model, BANK FRANCE model, etc..

- ***ALTMAN model***

This model was developed in 1968 and was the first method used in the study of the risk of bankruptcy. He used information obtained in the study of a large sample of companies, some of which went bankrupt, and some of them survived. Altman concluded that a multivariate analysis, performed using 5 indicators, was allowed to predict 75% of bankruptcy cases, 2 years before that.

The function used by Altman is:

$$Z = 1{,}2*X_1 + 1{,}4*X_2 + 3{,}3*X_3 + 0{,}6*X_4 + 0{,}999*X_5$$

The rates used in the previous formula are as follows:

$$X_1 = \frac{Net\ current\ asstes}{total\ assets}$$

$$X_2 = \frac{Reinvested\ profit}{total\ assets}$$

$$X_3 = \frac{Current\ result\ before\ taxation}{total\ assets}$$

$$X_4 = \frac{Stock\ exchange\ capitalization}{Short\ term\ debts}$$

$$X_5 = \frac{Turnover}{total\ assets}$$

The market capitalization represents an absolute value given by the product of the last stock market indices from the last financial year and the number of stock market shares.

Net current assets represent the difference between current, current assets and liabilities.

From the content of the indicators we come to the conclusion that their levels are better as long as they have a high value.

Therefore, the result Z can be interpreted:

· Z<1,8 bankruptcy is imminent

· Z>3 good financial situation; the company is reliable

· 1,8<Z<3 precarious financial situation, visibly diminished performance and close to bankruptcy.

Later, Altman developed the model by developing the Z function for private companies and for companies in the non-manufacturing sectors.

To classify private sector companies, Altman revised the initial score model and replaced the denominator in the X4 ratio (market value of equity) with the carrying amount.

This change is significant, as it has changed the coefficients of all rates:

$$Z = 0{,}717*X_1 + 0{,}874*X_2 + 3{,}107*X_3 + 0{,}42*X_4 + 0{,}998*X_5$$

Given the Z values, we can have the following situations:

• Below the value of 1.3 companies are in bankruptcy

• The area of uncertainty is 1,3-2,9

• Over 2.9 companies are in a position not to go bankrupt

He later modified the Z function by eliminating the X5 rate that he considered sensitive to the type of industry, so the model is applicable to all branches.

The new function of the result is like:

$$Z = 6{,}56*X_1 + 3{,}26*X_2 + 6{,}72*X_3 + 1{,}05*X_4$$

In this case, given the Z values, we may have the following situations:
- For values below 1.1 companies are in bankruptcy
- For values between 1.1 and 2.6, companies are in the uncertainty zone
- For values above 2.6, companies are in a position not to go bankrupt

- **CONAN-HOLDER model**

The Conan-Holder model belongs to statistically tested methods.

The model is based on the following function:

$$Z = 0{,}24_*X_1 + 0{,}22_*X_2 + 0{,}16_*X_3 - 0{,}87_*X_4 - 0{,}1_*X_5$$

His values X_1, X_2, X_3, X_4, X_5 are determined by relationships:

$$X_1 = \frac{Surplus\ from\ operating\ activities}{total\ debts}$$

$$X_2 = \frac{equity}{total\ liabilities}$$

$$X_3 = \frac{current\ assets - stocks}{total\ liabilities}$$

$$X_4 = \frac{Financial\ expenses}{turnover}$$

$$X_5 = \frac{Staff\ expenses}{gross\ added\ value}$$

In this model, the risk of bankruptcy is also given by the Z level, as in the following:

Score value	The company's situation	Bankruptcy probability
Z > 0.16	very good	Under 10%
0.1 < z < 0.16	good	10% - 30%
0.04 < z < 0.1	alert	30% - 65%
- 0.05 < z < 0.04	danger	65% - 90%
Z ≤ - 0.05	failure	Over 90%

It applies to industrial companies with between 10 and 500 employees. It is based on a sample of 95 small and medium-sized companies, half of which went bankrupt..

The analysed companies were statistically classified and the application of a scoring function to industrial companies, construction companies, wholesale companies and transport companies was determined.

Conclusions

The study of this article, which is based on a significant number of ideas and data, shows that operational risk will manifest itself regardless of the measures that can be taken, but nevertheless operational risk must be studied in advance, quantified and established the effect that it has on the results it has in each field of activity, but also on the total at macroeconomic level.

Another conclusion is that in the field of operational risk study we must take into account the growing number of risks that act in a correlated way and can influence each other in triggering. Therefore, the important cause for concern is that the study is complex and not limited to a single risk, as these risks act as a system.

Another very important conclusion is that the risks produce losses or diminish the results that will be obtained. This is a certain element, but more important than this certainty is the fact that this is why the operational risk and the other risks must be allocated a large space for analysis and interpretation of the results that will be obtained.

Finally, we can specify that in any plan (strategy) of complex, macroeconomic evolution there must be a chapter that refers to the identification of possible risks, to the perspective of their triggering and, especially, to the measures that must be taken so that the effects are as smaller. We say this because the effects of the risks are only negative, diminishing the results obtained.

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