Quantitative Methods of Research on Banking Risks

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Abstract. *Researching a wide range of domains by quantitative methods has a long history. Relying mainly on figures, the quantitative approach uses a variety of methods and techniques that support the researcher to conduct an objective investigation. Marillon (2007, p. 38) considers that "the figures allow a detachment from subjectivism and, undoubtedly, confer objectivity." Quantitative research methods provide descriptions of processes and events, comparing them based on collected data, identifying factors (favorable and unfavorable) and explaining the links between dependent and independent variables.*

Key words: risks, banks, methods, research, surveys, questionnaires.

JEL Classification: E47, E58.

1. Potential and limits of quantitative research methods

Quantitative research methods are useful for investigating processes and events, both under certainty and under predictable uncertainty. Grawitz (2001) appreciates the *questionnaire* as the most used tool of quantitative research methods. At the same time, he also considers two methods families - surveys and repetitive studies - to use the questionnaire.

Surveys aim to obtain information at a time, most often after a "representative sample". Surveys are subject to very precise rules, but their tools are supple and make it possible to adapt to very different goals.

Repetitive studies, called horizontal studies - are intended to track some indicators over time. These quantitative research tools impose methodological conditions necessary to achieve the compatibility of processes and events from one period to the next. To ensure comparability, methodological conditions state the same sample structure for the same issues.

"The quantitative approach conceived on a hypothetical-deductive approach reveals a quantitative paradigm" (Chevrier, 1992, p. 53). This reasoning differentiates the research based on quantitative qualitative research methods whose scientific approach is of empirical-inductive nature. The differentiation between quantitative methods and qualitative research methods is manifested on three levels: anthropological, epistemological and methodological.

"What produces the interest and the richness of quantitative research methods, Van Cuyck (2007, p. 67), is the putting into one paler of several variables (opinions, facts, places, equipment, etc.) and the ability to measure them." This consideration allows us to argue that a significant potential of quantitative research methods is defined by the precision of the research axes and the validation of the hypothesis results. The accuracy of research stems from the attachment of quantitative research methods to an empirical epistemology that refers to a certain objective conception of reality.

Habhab (2007); Baumard and Ibert (1999); Thiétart, et al. (1999); Charriere and Durieux (1999); Drucker-Godard, et al. (1999); Becker (1993); Miles and Huberman (1991) reveal the potentials and limits of quantitative research methods

through a three-plane analysis and related to qualitative research methods: the nature of the data; the type of reasoning; research orientation.

Baumard and Ibert (1999) argue that the distinction between quantity and quality passes through the nature of the same data. Miles and Huberman (1991) postulate that quantitative data is in the form of figures rather than words. Evidently, numerical data bring evidence, evidence of quantitative nature, expressing precision and objectivity. Habhab (2007) considers quantification a means of using techniques that enhance the power and sensitivity of individual judgment. Through power and sensitivity, the researcher tries to detect and describe a process, phenomenon through a series of observations. This means that quantitative studies lead to more precise results and more generalization power.

Thiétart, et al. (1999), without being a follower of qualitative research methods, signals that the main limit of quantitative methods lies in the difficulty of entering the details of measurements and figures. The desire to have a sample as wide as possible indicates the difficulty of a depth analysis. Then, just by figures, the complexity and contingency of social facts can not really be taken into account. Moreover, the need for large samples is often hit, especially in business studies, the diversity of reality. In such cases, studies based on qualitative research methods overcome the inherent abstraction of quantitative research methods and are more convincing through the wealth of descriptions and comparisons.

Therefore, highlighting the potentials and limits of a research method provides us with the idea not only to see the virtues of a single research method. From this perspective, figures, like words, are indispensable for understanding the surrounding world. Now, the problem is no longer to choose one method or another, but to know: "When it is useful to count" and "When it is difficult to count". By choosing the right moment, accepting the idea of complementarity and pluralism (Habhab, 2007, pp. 56-60), the researcher rejects the methodological opposition between quantity and quality and decides to capitalize on the potential of the two methods.

The distinction according to the type of reasoning guides the researcher appropriately to position quantitative methods or qualitative research methods. In close relation to the type of reasoning, we will refer to the studies of the researchers: Becker (1993); Drucker-Godard, et al. (1999); Charriere and Durieux (1999).

Becker (1993) appreciates that quantitative research methods offer greater assurance of objectivity. The imperatives of rigor and precision, characteristic of statistical techniques, advocate this. Thus, the quantitative method is anchored in the positivist paradigm. Indeed, the quantitative method guides the researcher to try one or more theoretical or methodological objectives. The objective of the researcher is to provide an explanation by assessing the pertinence of a hypothesis, model, or theory for an explanation. In order to achieve the goal, the researcher must take a “deductive” time.

The deductive approach is based on a deductive reasoning. A deductive reasoning is more realistic and supports the shift from general to particular. By deduction, the researcher can advance an explicit conclusion.

Charriere and Durieux (1999) argue that research has two orientations: test (test) and construction (exploration). When pointing to verification, the researcher has a clear and stable idea of what to investigate. In this position, the researcher chooses a quantitative method of investigation, chooses the test (test). Naturally, nothing prevents a researcher from rejecting, battling with solid arguments the quantitative method to resort to the qualitative method. This "abandonment" of the quantitative method takes place when the researcher finds that the method has insufficiencies, limits to explaining organizational phenomena.

2. Methodological framework for banking risk research based on a quantitative method

In risk management, the rationale for choosing a quantitative research method is supported by the need for numerical aggregate and detailed estimation calculations to identify, analyze, evaluate and address risks.

Risk identification begins with a general question: What events are likely to prevent the bank from achieving its objectives? To answer this question, the bank has to design a set of actions to fully identify the risks. The omission of a single risk may damage the bank simply because, omission, the risk was not retained and consequently will not be the subject of the actions preceding the identification.

An identified risk is immediately subject to analysis. By analysis, the risk will be qualified by two terms: acceptance or non-acceptance. An accepted risk is tolerable, easy to manage and costly. Unacceptable risk is a danger, a hindrance as it becomes a factor of diminishing the bank's opportunities. An unacceptable risk must, first of all, be reduced and, as far as possible, avoided.

Risks, once identified and analyzed, are subject to evaluation actions. Following the evaluation, the risks are “quoted” in order to be hierarchized according to their importance. To this end, the assessment must be based on a set of objective criteria. In general, the criteria repertoire includes: severity, probability, frequency, mastery, and combinations of the four criteria.

Risk management follows the hierarchy. The treatment process develops on two levels of risk: major and minor. Major risks must be regarded as unacceptable risks, and treatment actions will seek to reduce their severity and likelihood of occurrence. Minor risks, that is, those risks that do not affect the achievement of the bank's objectives, need to be treated to become accepted risks.

For the methodological framework of bank risk management, our choice concerns one of the most approached quantitative research methods, namely the risk assessment matrix (Maders and Masselin, 2009, Nguéna, 2008, Langevin, 2007).

Maders and Masselin (2009, pp. 76-78) propose a risk assessment matrix built on three levels, first expressed qualitatively and then quantitatively. The axes of the matrix are described by the "probability-criticality" tandem. This tandem takes into account three types of risks: negligible, tracked and treated.

Criticality (NC) is assessed by:

$$NC = P \times G \times D, \quad (1)$$

in which:

- P is the probability;
- G represents gravity;
- D represents the duration of exposure to risk.

The three types of risk, according to the quantitative evaluation based on the “probability-criticality” tandem, have the following characteristics:

• negligible risks (low probability and low criticality, low probability and medium criticality, medium probability and poor criticality);

• risks to be tracked (weak probability and strong criticism, strong probability and poor criticality, mean probability and mean criticality);

• risks to be treated (medium probability and strong criticality, strong probability and medium criticality, strong probability and strong criticism).

Following the rule of decomposition and assignment of notes, each parameter will have a certain meaning and will present several quantitative (digital) levels, as follows:

Following the rule of decomposition and assignment of notes, each parameter will have a certain meaning and will present several quantitative (digital) levels, as follows:

• poor probability indicates that risk is unlikely to occur; the probability level can be very small (0.000-0.199) and low (0.200-0.399); therefore, a poor probability can be estimated between 0.000 and 0.399;

• the mean probability indicates the existence of signals that the risk is to be realized; digitally this probability level will take values between 0.400 and 0.599;

• the strong probability indicates that risk is a certainty that is in the concretization phase; the numerical probability level may be indicated by a certainty of 0.600-0.799 or more of 0.800-0.999; therefore, the probability level of 0.600-0.999 reveals a strong probability.

Translating the idea of evaluating probability levels to the "gravity" parameter, quantitative (numerical) meanings and levels are:

• weak gravity is defined by not compromising the achievement of objectives in contractual and financial terms; the digital severity level is very low (0.000-0.199) and low (0.200-0.399); therefore, the figure between 0.000 and 0.399 means a poor severity;

• average severity may affect the perimeter of a credit project and possibly require a change in the contractual clauses (digitally, the average severity level is between 0.400-0.599);

• strong gravity can have important consequences: a financial loss, customer dissatisfaction and even a cessation of the credit project; for a financial loss or customer dissatisfaction, the severity level is 0.600-0.799 and for a cessation of the credit project of 0.800-0.999.

The three degrees of the 'exposure duration' parameter may indicate:

• the short term is a few days (0.000-0.199) or a few weeks (0.200-0.399);

• Average term is defined by several months (digit 0.400-0.599);

• Long term is a few years (digitally between 2-3 three, 0.600-0.799 and over 3 years, 0.800-0.999).

In summary, and taking into account the Maders and Masselin researchers approach (2009, pp. 76-78), we present in Figure 1, according to our processing, the risk assessment matrix for the "probability-gravity" tandem.

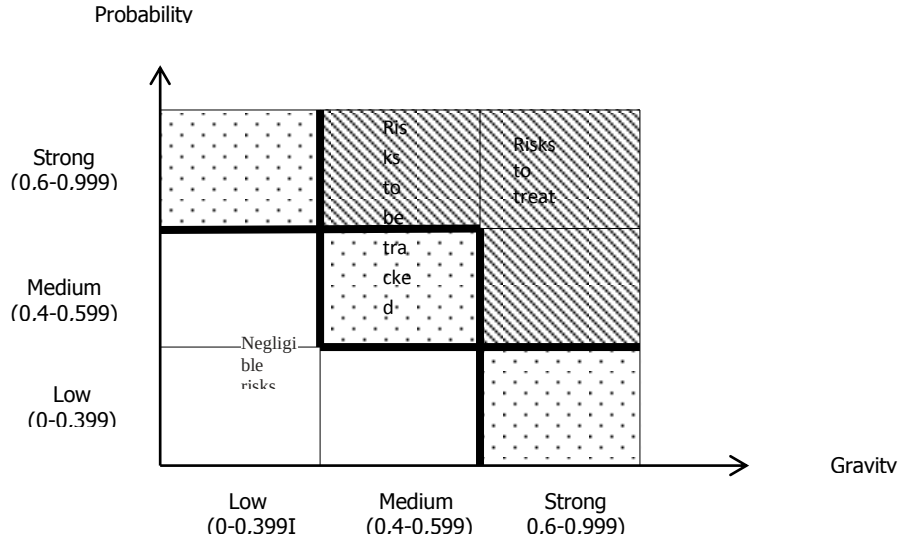

Chart 1 The risk assessment matrix by the tandem «probability- gravity»

Source: processing after H-PMaders and J. L. Masselin (2009)

Nguéna (2008, pp. 70-75) proposes a four-level risk assessment matrix and uses the "emergence-gravity" tandem. Nguéna (2008) pursues two objectives: to hierarchize risks and identify the risk acceptance limit.

Parameters "occurrence" and "gravity" are quantitatively characterized. The "occurrence" parameter is expressed in the states: unlikely, rare, occasional, and frequent. The parameter "gravity" is expressed by the states: negligible, marginal, critical and catastrophic. The ranking of risks is based on the value resulting from the valuation. Parameters "occurrence" and "gravity" are rated three degrees, as follows:

• the occurrence and severity are high and the risks are categorized as "major risks" (the figure, occurrence and severity are between 0.8-0.999); Major risks affect the bank's objectives;

• the occurrence and severity are low and the risks are classified as "minor risks" (digit, occurrence and severity are between 0-0,499); minor risks do not affect the bank's objectives;

• occurrence and gravity, of course viewed simultaneously, have high levels (between 0.5-0.999), low (0-0.499) and average (0-0.999); these risks are described as "intermediate risks" and are likely to affect the bank's objectives;

• intermediate risks can be grouped into three categories: frequency risks (occurrence and severity between 0.5-0.999 and located in the Northwest); (severity and severity between 0.5-0.999 and located in the SE) and average risks (occurrence and severity between 0-0.999 and localized, predominantly central).

In Chart 2 we synthesize the types of risks according to the "emergence-gravity" tandem, in the sense of Nguéna's hierarchy (2008, p. 73).

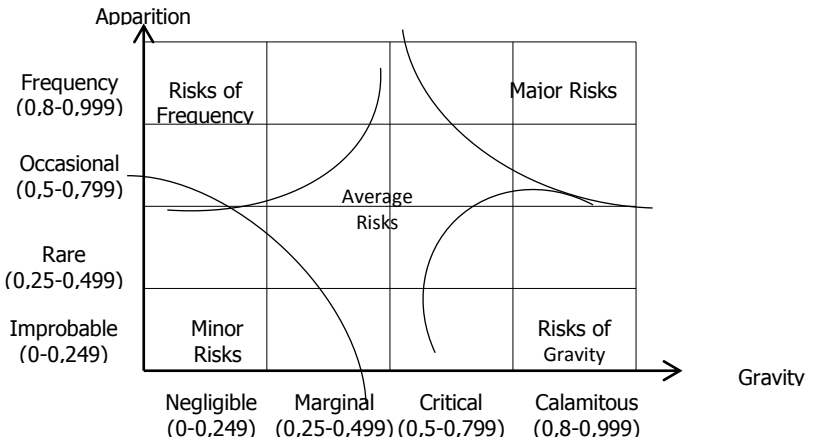

Chart 2 *Risk* assessment matrix in the tandem «probability- gravity»
Source: processing after O. J. Nguéna (2008)

Frequency risks are those that have a high incidence of occurrence, as the risks of gravity have an important degree of hazard. Average risks are also referred to as non-extreme risks, ie they are in the range of frequency and severity risks. The average risk characteristics are: mean frequency and severity.

In case of frequency risks, the bank will have to anticipate certain expenses in order to deal with cases of frequency risk. Anticipating frequency risk exposure is

predictable because the bank has sufficient historical data. As far as the risks of gravity are concerned, the bank must be circumspect, not to question their manifestation, as these risks are, if it is, generating losses. Therefore, these risks must be retained and, as far as possible, transferred. Average risks can be accepted because their manifestations are very similar to minor risk manifestations.

Nguéna's second goal (2008, pp. 73-76) is to identify the limit of risk acceptance. Acceptance of risks is subject to a limitation that allows distinguishing between unacceptable risks and acceptable risks. The risk acceptance limit requires a certain attitude towards risk, which must be understood in close connection with prevention and protection against risk.

The acceptability limit can be determined by a tandem of parameters. Based on the acceptability limit, the risks are grouped into two categories: unacceptable risks and acceptable risks. Considering the "emergence-gravity" tandem and the qualitative and quantitative assessments presented in Figure 2 in Figure 3, the risks are delimited according to the acceptability limit.

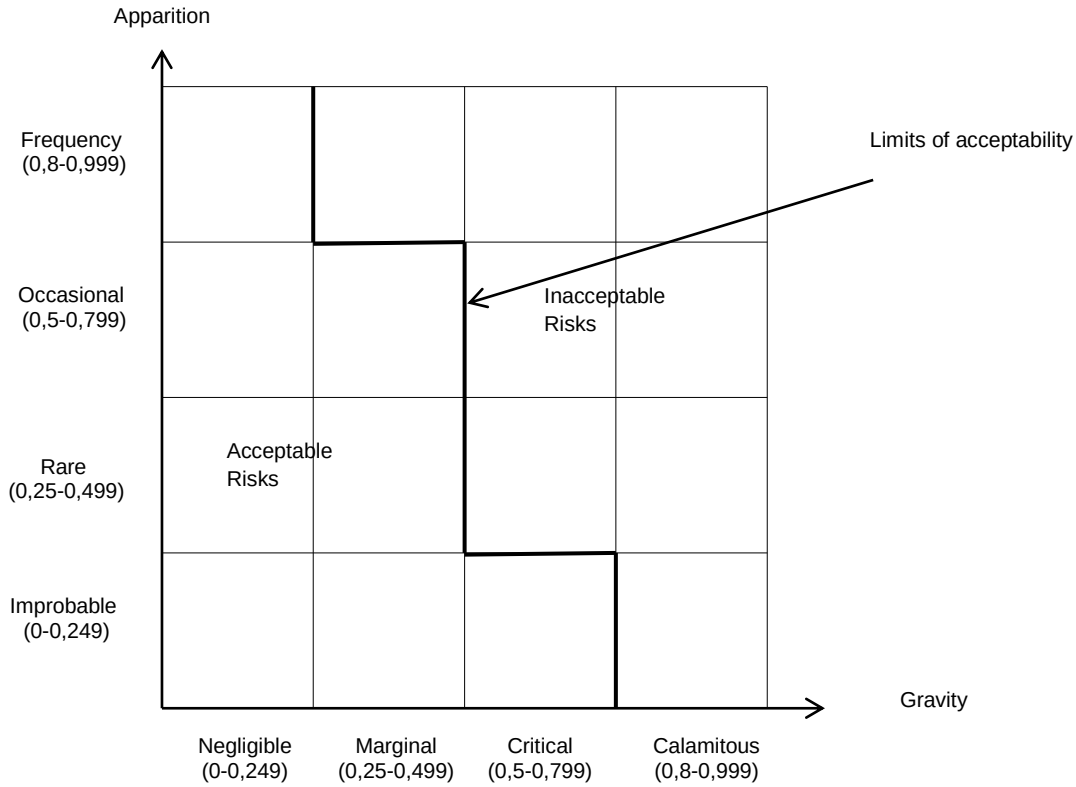

Chart 3. Risk assessment matrix by the tandem «probability- gravity», depending on the acceptability limit

Source: processing after O. J. Nguéna (2008)

With respect to unacceptable risks, the bank's management displays aversion because these risks, in case of materialization, affect the achievement of the bank's objectives. Regarding acceptable risks, the bank's management is cautious and moderate. Achieving acceptable risks does not seriously affect the bank's objectives. The bank, through combined risk prevention and risk prevention, agrees to consume resources to limit losses.

The overlapping of the risk assessment matrices shown in Chart 2 and in Chart 3 it results in another risk grouping. Unacceptable risks include: major risks, medium risks, frequency and severity risks. Acceptable risks consist of minor risks, average risks, frequency and severity risks. In Chart 4 we synthesize the types of risks according to the hierarchy and the limit of risk acceptability.

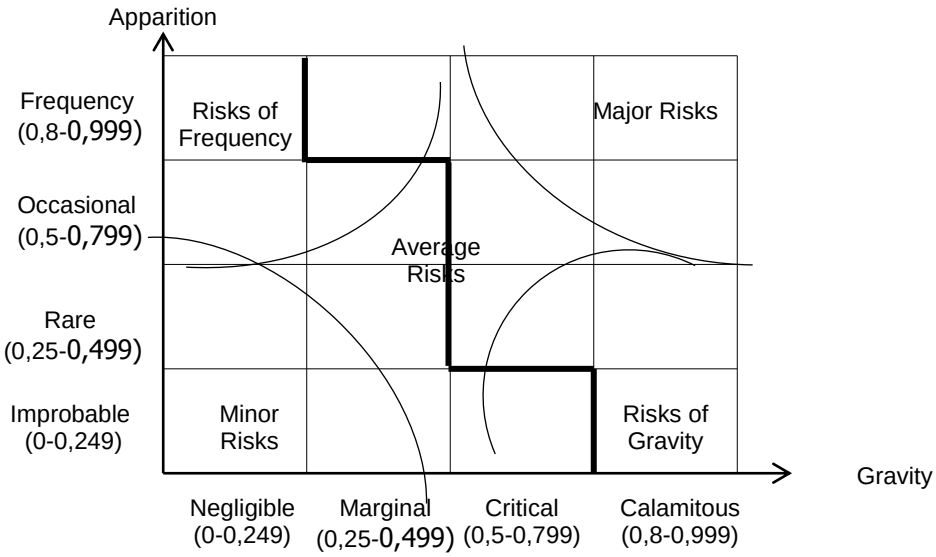

Chart 4. Combined risk assessment matrix "Hierarchy-acceptability limit"
Source: processing after O. J. Nguéna (2008)

Unacceptable risks, frequencies and environments should be tracked as they are highly likely to materialize and may produce marginal and critical severity. The unacceptable risks of gravity, even if they have a low probability of materialization, should be followed because, in the event of materialization, they produce critical and catastrophic effects.

By combined preventive and protective actions, unacceptable average risks (which account for a significant proportion of total unacceptable risks) can become acceptable risks. When unacceptable average risks are treated simultaneously through prevention and protection, conditions are created to move these risks to acceptable risk areas. Prevention takes place through risk-reduction actions, while protective actions are against the consequences.

Langevin (2007, pp. 228-229) proposes a *five-level risk assessment matrix*. Matrix axes are defined by the "probability-impact" tandem. It results in an evaluation matrix that measures gravity. Probability and impact are quantified using notes 1 to 5. Of course, a fractional fractional quote is also possible.

By the proposed example, Langevin (2007) is interested in achieving two objectives: identifying types of risks and assigning risk to a type of risk.

To identify the types of risks, determine the level of risk (NR) according to the relationship: NR = Impact * Probability. The maximum extreme values in the Northeast, ranging from 15 to 25, make up the *major risk area*. The maximum extreme values in

the south-east, ranging from 1 to 4, make up *the area of negligible risks*. Risks ranging from 5-12 are *moderate risk areas*.

In order to place a risk in a type of risk, consider that the situation of risk type evaluation: moral hazard (RM); market risk (RP); operational risk (RO); credit risk (RC); liquidity risk (RL) is characterized by the data in Table 1.

Table 1. Risk assessment situation

Risks	Symbol	Note	
		Probability	Impact
Moral Risk	RM	3	3
Market Risk	RP	4	4
Operational Risk	RO	5	3
Credit Risk	RC	4	5
Liquidity Risk	RL	1	5

The five-level risk assessment matrix according to the "probability-impact" tandem is shown in Chart 5.

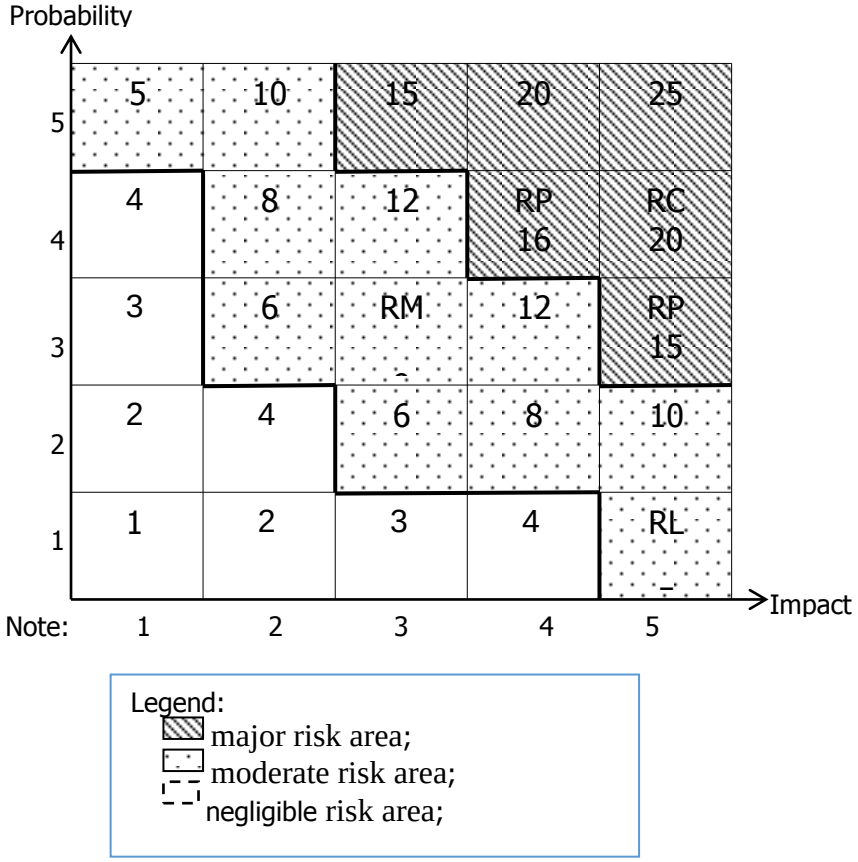

Chart 5. According to the "probability-impact" tandem, the five-level risk matrix.

Credit risks (CR), market (RP) and operational (RO) risks are major risks. These risks are characterized by high probability of materialization and moderate and

high impact. Major risks are unacceptable risks and there are normally risks to treatment. For this type of risk, the bank's management manifests aversion and will probably be the subject of the outsourcing strategy.

Moral (RM) and liquidity (RL) risks are moderate risks. These risks are characterized by moderate and very low probability, respectively. The impact of the moral hazard (RM) impact is moderate and the very low liquidity risk (RL). Liquidity risk (LL) is certainly an acceptable risk and will be subject to management by setting up a fund for eventualities and setting buffer periods. Moral risk (RM) is part of the category of unacceptable risks with moderate levels of probability and impact that determines the bank's management to undertake preventive and protective actions. The purpose of these actions is to reduce the impact of materializing the moral hazard and to consider it an acceptable risk.

3. Conclusions

Quantitative research methods, based on digital quantification, create the framework for a precise verification of the formulated hypotheses. The results of quantitative research are concretized in a digital material in the form of absolute and relative sizes. As a result, quantitative research methods favour the construction of a very direct and simple investigation process.

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