THEORETICAL ASPECTS OF THE ROLE OF INFORMATION IN THE PROCESS OF DECISIONS/RISKS MODELING

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Abstract

Access to information is a key element in the decision-making process. Intuitively, it can be assumed that the decision will be more substantiated and based more on rational than on subjective ones as long as the decision maker has more information. In this article, we analyzed some theoretical aspects of the correlation between information level and modeling of decisional risk. They address the importance of information in decision-making (information is power), the determination of the degree of uncertainty and the outcome of the decision, as well as the main objective of modeling, maximizing benefits. Different aspects of access to information have also been taken into account, cases known as asymmetric information, where some participants have access to more information than the main effects. We have also analyzed the cost implications of information by which some agents buy information to be in a competitive position, or invest heavily in IT systems for collecting, storing, processing data. Last but not least, we have considered some aspects of the impact of information in the development of macroeconomic forecasts.

Keywords: *decision, information, modeling, simulation, probability, utility*

JEL Classification: G14, G17, G31

Introduction

In economic and financial life, risk is a component of any commercial activity, which is why company managers attach greater importance to it. In fact, the nature of financial decisions implies uncertainty that can affect financial results, or even lead to bankruptcy of the company. The risk, and the treatment of implications in decision-making, has become an inherent component of daily business leadership. The modeling process is a more complicated process and is based on an increasing amount of information, influence factors, complex algorithms, historical data, etc. Technological

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evolution has allowed the collection, storage and processing of basic data as well as their structuring into information-bearing elements - so that they become a tool of support in the decision-making process. Sir Francis Bacon has been attributed to the statement that "information is power", "the science of potestas est" ("knowledge itself is power") described in Meditationes Sacrae (1597). Starting from the tactics of war, since ancient times, the knowledge of the opponent (numerically, strategically) gave the party holding this information a potential advantage, so he could optimize his resources to obtain maximum results (victory). In fact, any decision aims to obtain "victories" that, depending on the domain in which it is operated, can take on an extremely varied form (but essentially they aim at maximizing benefits). The role of information in decision-making is crucial, although in many cases decision-makers ignore "clues" and make decisions arbitrarily. We can assume that having as much information as possible can lead to optimal decision making, but simply holding information without being structured and correlated is an amorphous volume that does not directly help the person holding it. In the following, we will briefly review the role information plays in the decision-making process, especially in the case of decisions taken in risk situations.

Literature review

Aspects of the correlation between the level of information and the modeling of decisional risk have been the subject of many specialized researches. Hirshleifer and Riley (1992) and Schelle (2001) studied various aspects of information value, uncertainty and risk assessment, and on the other hand Treich (1997) describes the relationship between information value and risk tolerance. Among the first to give scientific attention to information asymmetry are Akerlof (1970), Spence (1973), Rothschild and Stiglitz (1976), and later certain aspects specific to this element in market evolution were developed by Ross (1973), Holmström (1979), Grossman and Hart (1983) and Mirrlees (1999). Chiappori and Salanie (2000) have perfected the model and tested viability in the field of insurance. In the literature there are three VaR models: one based on historical simulation: Variance-covariance and Monte Carlo simulation, each having advantages and disadvantages as shown by Lambadiaris et al. (2003), Sollis (2009) and Davis et al. (2004). The main tools and concepts used by macroeconomic statistics were synthesized in Anghelache and Anghel (2016), Anghelache, Mitrut and Voineagu (2013), Anghelache and Capanu (2004), and Anghelache, Panait, Marinescu and Niță (2017) A set of indicators and instruments and models that can be used in the macroeconomic forecast. In other words, Anghelache, Anghel and Manole

(2015) study theoretical aspects of risk modeling and present practical aspects of the use of information systems, and Eckela, Philip and Grossman (2008) address risk behavior in the forecasting process.

Methodology research and data

Access to information

Access to information is, in fact, the central element of the decisionmaking process and the level / amount of information, and their degree of relevance are key factors in making "good" decisions, and in making riskbased decision models. In the table below we synthesized the range of decisions based on the level of knowledge (information available / relevant for decision-making).

		Table no. 1
A - Complete ignorance	B - Risky situation	C - Full knowledge
Factors of influence ("indices") are not taken into account	Correlations between input variables and results can be established (based on historical observations)	100% predictable result has the same probability
Pure uncertainty model	Probabilistic model	deterministic model
Random Hazard Decisions	Analysis Based Decisions	Mathematical functions / formulas / engineering systems
A C		

Key Factors in Decision Making

In the extreme case [A] - no modeling, simulation is needed, since the deicis factor has no knowledge about the situation, nor is the probability, nor does it take it into account in the decision-making process. For example. Choosing / Extracting Lottery Numbers At the other end is the extrama [C] - everything is determinable and described by exact mathematical formulas where the uncertainty factor does not exist. For example. Distance = speed * time, will give the same result whether it is done by car or bicycle. The middle situation [B] is the one in which the notion of risk appears and the probabilistic modeling. Probability measures the degree In fact, the decision is based on where calculations and probability models are based - based on simulations and risk analysis. Although the processes are random queues, where neither the number of variables nor the effect of each of the variables are known, certain interdependencies between the input and the output variables can be determined. Economic decisions are almost always associated with a certain level of uncertainty. A certain expected outcome is always associated with a certain probability, and the more we have more information the outcome can be estimated with greater probability. If a piece of information is relevant or is available to all participants, it will have a constant propability, so there is no interest in being included in decision models (high predictability). The diagram above gives a suggestive picture of the area where modeling of the decision-making process Is important and can bring significant value plus positive outcomes to extreme cases. The probabilistic approach is actually the measurement of uncertainty, and their role is to push the result to the predictability of the outcome.

Risk management

Given the consequences that inappropriate decisions can be made in a company's business, which can cause losses even to bankruptcy, risk monitoring and follow-up has become a current activity. Studies have shown that a company's profitability is significantly influenced by the level of risk that the economic agent assumes. In the literature, the concept of risk management appears to be a necessity for modern firms, and it is intended to minimize the losses due to mistaken decisions. Managerial decisions can be considered strategic - by which decision-making is decided for a future time, or by crisis, - by which a quick correction is made in response to an unforeseen event. Risk management is a complex, multidirectional activity and involves, as a rule, passing through stages that can be grouped into the following major categories of activities: identification, evaluation, control and financing. In fact, gathering information is a first step in modeling decisions and risk processes. The collection can be done by own means or by acquiring sets of information (raw or processed) from specialized firms. Risk management models can also be obtained from software vendors or consultants. Thus, information becomes a commodity that sells / buys according to the demand and supply principle.

• The value of the information and the cost of obtaining it

"Information is power," and the more information we have to tell is that more effective decisions will be made. Thus, in order to improve the decision-making framework, some participants are willing to spend a sum of money to gain access to additional information. Thus, information becomes a matter of bargaining, and of transactions, and those who allow themselves to buy them theoretically will be in a more advantageous situation. The greater the impact, in other words, the higher the success rate is, the higher the amount of information. Another example relates to the current case where banks will want to pay to obtain information about the applicant - To the Credit Bureau - where they can find historical customer information on which to make a fair assessment of the applicant's ability to repay. Also in the financial-banking field, data collected on its own behalf, some large banks can buy statistical data collections to shape the behavior of different customer segments and thus reduce potential loss. This information is rather expensive and some smaller banks can not afford to make such an expense - which is what the big banks have to offer. It all comes down to the fact that the benefits are greater than the effort and total to gain,

Δ Benefits > Δ Effort (cost)

If we take into account the cost of the risk (the amount of the potential loss) under certain circumstances, buying information would become profitable if the value of the gain (reducing the cost of risk) is greater than the amount we invested in the purchase. For example. When we enter into an insurance policy, we expect that compared to the uninsured situation, with insurance the potential loss to be lower than the total amount spent on the insurance policy. Apart from information acquisition, a significant cost to companies is the (direct and indirect) cost of capturing information, storing it and processing it. Developing modeling algorithms is a significant effort, and these processes are extremely well guarded by those who have invested in them. In fact, the entire risk management system is an additional cost that companies use to improve their decisions, hoping to reduce their losses due to decisional errors and maximize benefits.

• Information asymmetry

Almost in any situation where more than one party enters into negotiation, the level of awareness that each of them holds is different. There will always be information that is not known by other participants, and those who hold them will not want to divulge to others on the principle that "information is power". Having information that others do not know can be a competitive advantage that generates additional benefits, and this is true not only in economic processes. For example, in the war, knowing the movements of the opponent is a major advantage in reducing the risk of losing the fight. Knowing routes by sea or through mountains / passers-by helped connoisseurs cross those dangerous areas without incurring considerable losses. Returning to the economic field, the possession of manufacturing secrets that other competitors do not have to provide the one who has a commercial advantage on the market. On the other hand, asymmetry of information can also be manifested in the negotiation or development of bilateral relations between the parties. For example, when negotiating the terms of a bank loan, the applicant attempts to outline the advantages of the bank, and silences those that would serve him. All this is done to get higher benefits (higher amount, lower interest rate, etc.) for as long as possible. On the other hand, the bank will make every effort to find as much information as possible on the applicant in order to minimize the risk of default. Asymmetry of information refers to three basic situations (as deplored by Akerlof (1970), Spence (1973), Rothschild and Stiglitz (1976), namely: adverse selection, moral hazard and principal-agent. In view of having "secret" information that their owners want to capitalize on in order to maximize the benefits of having this information - in econometric terms to maximize utility function. However, in the process of modeling, to simplify some situations Is the ideal case in which access is free to information for all participants and everyone has access to the same set of information, what is called the perfect information. After the main assumptions have been established and verified in the equation model Re-introduces differential access to information and studies its effects.

• VaR Model vs. Risk-Metrix

The level of risk to be measured and managed by an economic entity is the overall risk level for the entire institution. Initially, firms focus on the risk of specific activities and specific types of risk, and only later they focus increasingly on aggregate risk at the firm level. In spite of all the measures taken into account, but without taking into account the macroeconomic and temporal conjuncture, it can not be considered a perfect model. Perception of risk is a complex and subjective process, which is why the analysis pertains to global, aggregated perception - global or consolidated risk. In reality, this approach is extremely difficult. The VaR model (Value at Risk) measures the risk at different levels, starting with the level of a risk element up to the level of a complex portfolio. The VaR envisages the use of a one-digit calculation using the rapid calculation of the consolidated risk information for the entire activity. VaR is the most widely used risk estimation method, which calculates the maximum loss value caused by certain risk factors within a predefined horizon. It is based on historical observations of internal factors and the influences of the firm's external conditions, on the basis of which it will estimate the maximum potential loss in a timeframe (confidence interval). The notion Value at Risk (VaR) was adopted by major American banks in the development of derivatives markets. The emergence of capital markets required a new type of risk that the classical instruments / models up to that time did not address. According to the Basel agreement, a bank will use a 99% confidence interval for a VaR calculation, a maximum of 10 days and will take

into account a minimum of 1 year of historical observations. At the moment, VaR models are widely used in all types of institutions, especially those that are actively traded on the stock market. Models are an important part of internal control systems, and are designed to optimize the level of risk assumed. They are used for portfolio risk assessment, internal capital allocation and evaluation of alternative investment strategies designed to detect excessive risk in trading processes. Although it is based on the storage and processing of a significant volume of data, the model has limitations on the predictability of some rather subjective influential factors - such as those related to political risk, regulatory risk, personnel risk, etc. Also, it is not a unitary measurement method, each entity may have distinct approaches, although overall it pursues the same objectives. On the other hand, there are three distinct approaches, each involving different ways of collecting and processing information: one based on historical simulation, variance-covariance, and Monte Carlo simulation, but as Lambadiaris et al. (2003), Sollis (2009) and Davis et al. (2004) we can not determine which one is better. The RiskMetrics model was developed by the risk management department at J.P. Morgana, who in 1994 decided to make public the results of the research and made available to those interested their model of risk modeling and historical data about 20 major financial markets. Subsequently, the model has been continuously expanded, and at the moment it is taken as a benchmark for measuring financial risks.

• Predictability of impact

Risk management refers to the development of a well-structured methodological framework, in which the applied methods, techniques and models should lead to the establishment of a perspective with a high probability of being met over a specified period of time (short, medium or long term). One of the main expectations that demand from decision-making models is to make accurate predictions of the future situation based on historical data and certain conjunctural factors. In fact, any decision will produce effects in the future, and a model is all the more reliable as more of the predictions predicted in the past are true. In order to achieve a forecast, a complex methodology, studies and methods are needed to capture essential or detailed aspects of economic activity. Predictive methods should quantify economic developments in conditions of geopolitical tensions, political uncertainties, financial market disturbances, etc., and the results of their application are decisive for decisions on legislative changes, social impact or political movements. It is preferable to take the approach in a differentiated way, by category, by branch, territory or social framework. Predictive methods give us warning signals in order to achieve an improved and predictable economic framework based on

retrospective analysis of strengths or previous vulnerabilities. Following evaluations made by the forecasting methods, priorities and directions of action can be defined both at micro- and macroeconomic level.

Macroeconomic forecasts

The holding and processing / structuring of information also has effects in conducting forward-looking studies, especially those related to macroeconomic forecasts. The level of economic development at the macro level is represented by a series of correlations and quantitative ratios between the economic, technical and social factors, each having an evolution over time. Thus, by analyzing economic data in the long run, and following their variations, we can determine the trends / trends of some indicators that characterize the economic state of a country (eg GDP growth, economic growth, unemployment rate.) There were numerous economic and mathematical methods Which attempts to accurately exaggerate the economic phenomena that occur at a given moment, and to try to explain by analyzing the historical data (to find correlations) the evolution reached in the current stage. As an economic-mathematical method, the simulation is one of the More efficient analysis / modeling tools used to design complex systems for their planning / forecasting and control. Simulation creates the possibility to test a large number of variants by modifying some decision parameters (optional) until the solution is obtained The most plausible and convenient (near d Simulation based modeling consists in building mathematical structures that reflect by analogy the essential characteristics of the phenomenon or the economic process under study. The model is based on a series of input (exogenous) input variables, and choice of optional (decision) parameters as well as random factors (for predictive work under risk and uncertainty). From combining and linking these results a series of chain equations, from which output variables (endogenous, endogenous) are obtained, which can become elements of calculation of new conditions. By increasing the number of input and optional variables, simulation models can be made from saying the word. Thus, ITC's modern methods allow faster data collection, storage (the "big data" trend) and data processing as soon as possible. Thus, the decision maker will have timely information to provide. Thus, the role of information in increasing the accuracy of forecasts can be said to be essential. It is very important for children to come from trustworthy sources (such as INS or BNR) and have been collected as close as possible to the source - in order to eliminate as much as possible the possibility of altering the information, including the inclusion of false information.

• Risks associated with the possession of information

Until now, we have considered aspects where possession of information is an asset to those who possess them. We can say that lack of information is a risk, but possession of information is another risk for those who own it. But I have not considered some aspects of the nature of the information, or how it is handled by those who hold it, such as relevance; credibility; handling; secret; subjective; Risk denial, myopia of risk, exaggerated optimism; Ethics and information; Reaction time. The above listed risks (and the list can be long-held) involve additional costs for managing information that companies need to consider and quantify in the risk management process.

Conclusion

Finally, the role of modeling is to maximize the benefit (utility function), which in economic terms actually means that the model helps the decision maker to properly scale the investment, compared to the benefits obtained, within a certain time horizon. The information helps to improve decisionmaking patterns, and the dynamics of information and the emergence of more and more aspects make the modeling processus a continuous process, constantly expanding and adapting. In modeling an important aspect refers to the cost of information, representing the effort made to obtain and store information that increases the likelihood of reaching a favorable state. Another aspect relates to the time horizon available for decision-making, that is to say, the operability of the right decisions over time is an advantage, companies tend to gather more and more information that policy makers can use to maximize benefits . Recent developments in ITC systems, with the collection and processing of more and more information, have led to the "big data" phenomenon by which some companies are investing huge amounts to look for correlations between the different social behaviors of individuals that they can rely on Future actions. These include, in particular, decisions on developing new products, as well as addressing future marketing campaigns that rely on the power of information.

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