THE CONCEPTUAL ANALYSIS AS A METHODOLOGICAL BASIS FOR THE CREATION OF A BEHAVIOURAL THEORY OF THE FINANCIAL DECISION-MAKING UNDER UNCERTAINTY

Nina P. Grishina
Saratov State University,
Saratov, Russia
grishinaninapavlovna@gmail.com

Tatyana V.Belykh
Saratov State University,
Saratov, Russia
tvbelih@mail.ru

Sergey P. Sidorov
Saratov State University,
Saratov, Russia
sidorovsp@info.sgu.ru

Abstract

The different approaches to determining the concepts of risk, uncertainty, choice and decision-making id presented in the paper. These approaches, generally, based on two points of view: financial and psychological. On the one hand side, it is important to know how change financial choice depending on conditions of risk and uncertainty (financial aspect). On the other hand side, the deterministic of the decision-making depending on personal factors is significant for the research (psychological aspect). Also the comparative analysis and relationship of making financial and neutral decisions in order to clarify model parameters for further empirical research are presented in the paper. The detailed definitions of risk, uncertainty, decision-making and choice in terms of aim and goals of our research are made.

Key words: risk, uncertainty, decision-making, choice.

Introduction

Modern world is changing fast and this was particularly apparent in the last decades. The agrarian revolution has replaced the industrial one then technical and informational revolutions has come. It has been noticed that the level of uncertainty in the world is growing proportionally to the development of new technologies [1]. This development is impossible without changing the world outlook and the way how people think, without expanding the scope of our ideas about systems and processes which govern our life.

The one of the key processes is decision-making. It is connected with human mental activity, on the one hand side, and with development of modern approaches and skills, on the other hand side. The impact of the environment in which human make his choice is significant. The main feature of this environment is uncertainty condition in which the individual is placed.

The aim of this paper is formulation of main concepts of financial decision-making process under uncertainty for further modelling and research in laboratory experiments. The main focus is made on concepts of risk, uncertainty, decision making and choice.

According to the aim the following goals are set:

(1) The analysis of evolution of ideas about risk and uncertainty: the main theories, modern look and variability;

(2) The determination of ratio of choice and decision-making: the main similarities and differences, hierarchy and semantic content;

(3) Comparative analysis of financial and neutral (not related with finance) decision-making.

Risk and uncertainty

Modern researchers in the area of finance and economics taking into account the latest global crises make a conclusion that all of us live in the conditions of risk and uncertainty [2]. However, since 1980s the paradigm of risk management based on hypothesis of rational expectations which not includes the category of uncertainty in the system of decision making is dominate. This paradigm creates the danger illusion of total control of risks [3].

The question of ratio of uncertainty and risk became especially important nowadays because of acceleration of global crises and different types of catastrophes (technogenic, ecological, environmental). The paradox is in the fact that the level of applied qualitative and quantitative risk management has never been so high as it is presently. The thing is that concentrating on evaluation of risks we neglect uncertainty when planning and implement the financial operations and, in fact, making a financial decisions.

In our research we consider uncertainty as necessary condition for studying financial decision-making. That is why it is important to define what we are going to assume as uncertainty from the financial (as the choice includes financial component) and psychological (as psychological aspects of decision maker are involved in the process of decision-making) point of view.

The key questions of studying uncertainty are it's principal difference from risk and their similarities. Nowadays the researchers agree that they are different. The basis of such difference creates Frank Knight and John Maynard Keynes in 1920s. Their fundamental researches [4, 5] became a theoretical basement of this field of science.

The uncertainty is something that can not be captured by probabilistic calculation [5].

“The outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. . . . [Our] existing knowledge does not provide a sufficient basis for a calculated mathematical expectation” [4]. Keynes and Knight created the significant difference between measurable risk and unmeasurable uncertainty.

Conceptually, risk is an events of class A obeying the known probabilistic distributions which are characterised by fixed mean and dispersion. Therefore, it can be assumed that such events used to happen in the past. In the risk condition the individual has an opportunity to use rational tools of decision-making.

The uncertainty is characterised by the fact that the past does not provide information about future. This means that there is no such type of distribution (and its parameters) which describes this category of the events of class B. The individual has limited opportunity to use rational approaches to the decision-making under uncertainty.

In summary, on the one hand side, the risk is the sequences of the events which can be measured precise; the uncertainty can not be measured precisely. On the other hand side, the risk is always connected with specific factor; the uncertainty has no relation with factor and normally reflect the complex structural changes.

In applied aspect there are several approaches to the approximate measurement of economic uncertainty. The first proxy measure macro economic uncertainty is conditional variance of state productional growth and conditional variance of national activity index. Also it is possible to measure the uncertainty using the downside loss of the financial institutions which appear on the left tail of the return distribution obtained from cross-sectoral time series. Another proxy measure of uncertainty which connected with state of financial sector is credit default swap (CDS) index [6].

The researchers found that variance of risk premium has strong positive correlation with all measures of economical uncertainty considered above. In this case we can accept the variation of risk premium as a proxy measure of financial and economic uncertainty [6]. This fact allow us to propose similarity of risk and uncertainty as well as some ratio of this concepts. However, generally, pure uncertainty (as condition of different systems functioning) can not be measured.

Skidelsky distinguishes epistemological uncertainty where relevant probabilities are known (namely measurable risk) and ontological uncertainty where probabilities logically unknowable (pure uncertainty). Financial cresses of latest decades indicate underestimation of the first type of uncertainty and total ignorance of the second one [7].

Skidelsky also defines uncertainty by sources: asymmetric information and symmetric ignorance. Asymmetric information reflect the fact that some people have more information about specific assets, processes and trends on the market than others. This asymmetry originates imperfection of the market and, therefore, its speculative character (behaviour). Symmetric ignorance is mutual neglection of events with low probability but which has potential destructive impact (the “Black Swan” type events [8]). That ignorance is what according to researcher is the cause of global system crisis in finance [9].

In this case the second type of uncertainty reflect pure uncertainty and the first one can be called measurable risk. This separation especially important when we research the market in the framework of Efficient Market Hypothesis. This theory do not imply informational asymmetry, even opposite, assume that all existing information related to asset prices is available for each market participant. This questionable statement do not reflect the reality where market is imperfect and where the risk which, however, can be measured is appear. The second type - namely symmetric ignorance - is the pure uncertainty which face each participant of market relationships [7].

The case when information is too vague and imprecise, therefore, can not be generalized by single additive probabilistic measure the agent face more likely Knightian uncertainty and ambiguity than risk. It is proved empirically that the agent’s attitude to uncertainty play the key role in the pricing and portfolio selection. That attitude is what gives the alternative explanation of many financial fails, underestimation of the assets, high level of volatility etc. [2] However, nowadays most researches devoted to the decision-making under risk but not under uncertainty. Our research aims to fill this gap.

There are two basic approaches to the risk and uncertainty: rationalistic and sociological. In the first case the market participants deal with risk described and calculated in the economic and financial models based on the subjective probabilities. These models imitate the real financial and economic system. The second case more focused on the empirical evidences of the fact that many important financial decisions making under uncertainty. The significant consequence of sociological approach is that the models not only analyse the markets but adjust them to the specific formed and changing socio-economic systems as well by social conventions [2].

Social conventions are implicit agreements and informal institutes. This is some guidelines and templates of the way how to act in the condition when some repeating situations are appear and these rules shared by the society and are common for the society [10]. The financial decision-making under uncertainty can be the example for applying social convention. However there are explicit forms of the social conventions, for example the risk management techniques [2].

Taking into account different points of view on uncertainty and risk in finance and economics we can conclude that:

- Uncertainty is characterised by obscurity of changing the situation or state and of outcomes' probabilities.
- Risk is defined by opportunity to forecast and evaluate the events and outcomes' probabilities while the opportunity to reach the goal is uncertain.

It is correct to consider risk as a special case of uncertainty.

The formation of understanding of uncertainty in psychology is closely related to the transformation of scientific paradigms of rationality in philosophy as well as with development of new psychological models where uncertainty and openness in the concept of psychological regulation has been taken into account [11].

Conceptually, there are two ways to define uncertainty:

- Uncertainty of the outcome when the alternatives of choice and probability of outcomes are known;
- Uncertainty caused by lack of confidence in the occurrence of the event when subject know the probability of outcomes [12].

Different theories and models of decision-making consider different sources of uncertainty. However, mostly they include descriptions of conditions and methods (procedures) of illumination of objective sources of uncertainty. Objective deficiency or excess of information; deficiency of inflow and update of information in time; objective and subjective lack of time for recognition, analysis and evaluation of information; subjective uncertainty which defined semantic or pragmatic features of information can serve as a sources of uncertainty which has informational nature [13].

According to Kornilova uncertainty is outcomes or circumstances of choice of the alternative. Also uncertainty can play the role of some criteria defining the preferences of the alternatives [14]. According to the researcher uncertainty is perceived and recognised by human. However, not all parts of the situation of uncertainty and parts of his criteria are recognised by the human. Individual also can inuent uncertainty, namely, change it by his decisions. In this case distinguish situation of intellectual decisions and personal choice from chance or lottery [14].

It should be noted that in psychology also there is a paradox of choice connected with necessary and sufficient information in decision-making. It reflects in fact that uncertainty is increasing due to lack of knowledge (information) or its redundancy as well.

The solution of this problem or even tool of finding the solution is awareness. It is significant different from other criteria characterised human's informed or literacy. Awareness reflect that "subject has an information conjugate with the value characteristics and purposes of choice which focus on explanation of trends and patters as well as on activation of decision-making" [14].

According to Tikhomirov uncertainty is “absence of information about hierarchy of processes which focus on dynamic regulatory system” [15].

Studying of uncertainty in psychology is connected, firstly, with human behaviour in the moment of decision-making under uncertainty and risk. From the psychological point of view it can be noted at list two aspects of this process:

- human's cognitive errors (cognitive psychology);
- building a social image of the world (social psychology).

Nowadays cognitive errors in the financial decision-making process are actively registered and researched [16], [17]. There is a trend that investor make a suboptimal decisions under uncertainty and wherein he declines part of responsibility and also justify his irrationality by the high level of uncertainty condition.

The principle of uncertainty impact the way how individual sees the world. Projecting the features of uncertainty he gets the subjective image of the world which characterised by unpredictability, eventuality and variability.

There are three features of uncertainty as subjective essence of social transformations:

(1) Plurality – as a variety of opportunities, as an admitting of variability of choices, as set of decisions and interpretations;

(2) Unpredictability – as subjective inability to forecast the evolution of situation, as unknown probability of this or that events, as perceived lack of causal laws;

(3) Uncontrollability – as subjective inability to resist the suddenness and to predict them [18].

We propose that studying decision-making under uncertainty should involve both, human's behavioral errors and self identification in the social systems via his choice, considered together with formal choice and the personal reasons of this or that decision.

Choice and decision making

In the domestic researches devoted to the decision-making process the importance of personal factors is underlined. These factors influent not only on effectiveness of decision but they define it's individual features which uncover the relationship of “rational” and “irrational” components in the decision-making.

According to Gurova the theories which rationalise the decisions focus on the normative logic structure of decisions and not sufficiently address those cognitive mechanisms which characterise the thinking as a manifestation of the free activities of the individual. The life reality in which decision-making is a manifestation of the individual and collective often does not contain complete criteria for evaluating the optimality of the solution. Any decision can have long-term effects and besides positive effects may be replaced by negative one and vice versa. Focusing on the regulatory model of building activity does not provide the forming of the ability to make decisions which require long-term forecasting and dynamic interaction with the changing situation.

In her studies Gurova found that under uncertainty and ambiguity of objective criterion of selection the personal sense of estimated data leads to the forming of sufficiently reliable subjectively significant criteria which allow to achieve the unity within the semantic features of complex situations (semantic mounting technique used). Each person highlights “his” leading sign in complex which does not play the role of a logical argument of choice but it allows to find later considerable logical argument and realise the choice. The researcher named the quality of personality that characterises this mode of action as intellectual organisation.

The main mechanism of the decision-making here is the dynamic development of the evaluation criteria in the direction of their generalisation and essential differentiation. This cognitive mechanism is different from setting the scale of values of individual chracteristics and from decision-making through “weighting” them what is the basics of regulatory decisions.

In our research we propose to study subjective reasons of financial and neutral decision-making using actualisation of personal constructs (J. Kelly) in the experimentally simulated conditions of decision-making. “Studying the decision-making it is important not only to figure out in which cases the subjective choice deviates from logically computable expected value and is it useful or harmful but to disclose of that cognitive structures in their relationships with the emotional and volitional sphere, in the unity of knowledge and action, on which it is based. Only the knowledge of these structures and sources of their forming may contribute to the identification of psychological standards of cognitive self-identity and development of appropriate practical recommendations for decisions optimisation made by people” [19].

In this respect it is interesting to consider the concept of functionally-level regulation of decision-making by Kornilova. In this concept the understanding of psychological regulation of choice is established. This choice is determined not only by set conditions of uncertainty but also by cognitive efforts of subject which actualised along with personal-motivational components of the procedural regulation and combined term of intellectual and personal potential [14].

The researches of foreign scientists prove that such personal and deterministic features as logical competence and subjective confidence impact on the process of the decision-making [20, 21, 22].

In the analysis of the studies in the decision-making area according to Morosanova and Indina [23] many researchers highlight the necessary of studying the decision-making in the condition of uncertainty, incomplete knowledge and changing environment [15, 21].

For our research it is necessary to define what is the difference between the decision-making and the choice. Kornilova defines the decision-making as a choice of individual (group of individuals) between the alternatives, given subjects, ideas and actions under uncertainty. She also consider a choice as a resolving of the situation of uncertainty which involve paternity and responsibility since there are no impersonal decisions. According to the researcher there are four stages of the choice:

(1) Creation of subjective understanding of the problem;

(2) Evaluation of the choice of each options;

(3) Forecast of condition which de_nes e_ects;

(4) The choice itself between alternatives [14].

In our opinion, the decision-making as a category is more wide than the choice and all stages above can be referred to the decision-making process. The choice is included in the decision-making as one of the stages probably the most important and productive.

Generally, the decision making can be presented as an algorithm which is consist of following steps:

(1) Goal formulation;

(2) Collecting and sorting of information (mental evaluation of relevant experience, existing knowledge and information, preliminary calculations);

(3) Choice of the alternative;

(4) Realisation of the choice (willful factor, actions);

(5) Evaluation of the effects.

Financial and neutral decision making

The fundamental for this research is the question of existence of specific features of decision-making connected with finance (gains/losses) compare to situation of making a neutral decision.

The main gaol of financial decision-making normally is profit maximisation (return, gain) or loss minimisation (expenses). From the rationalistic point of view any positive change relative to the nil is a gain and negative one is a loss. In terms of behavioural finance we are dealing with utility which changing relative to some referent point set individually by each investor [16, 17]. Obviously, the unified goal of financial decision-making is maximal utility (gain, return).

As for the situation of making a neutral decision there are plenty of gaols which depends on the situation itself (question, problem) as well as on the specific individual who make decision.

The basis of financial decision-making is knowledge, skills, information, calculations, experience etc. Making a decision relative to neutral choice individual relies on the same sources of information.

In the stage of the choice of the alternative itself it can be noted that the dominant role plays preferences (or patterns) in both cases (especially, if the use of rational approach is limited, for example, under uncertainty).

The realisation of the choice in both cases depends only on will of individual who make a decision and, preliminary, present or absence of financial component does not influent on it.

In the result of financial decision-making human gets certain outcome characterised by gain/loss and by relative (but not equivalent) utility. This utility reflect the level of individual's satisfaction with chosen outcome. On the last step of suggested decision-making algorithm human evaluates himself via his decision: does he feels regret or pleasure. Taking into account the specific of patterns appear in the financial decision-making (loss aversion, risk aversion/risk seeking) we can propose that in the last step of decision-making algorithm there is a difference between two types of decision-making situations. This difference became especially important when there is a sequence of financial decision-making situations. Personal sentiments relative to the previous choice more likely will impact on the next choice in the situation of financial decision-making [16, 17]

Finally the comparative analysis above can be presented as follows:

(1) Financial decision making sufficiently strong depends on unified goal in the form of maximal utility (return, gain). Conditionally let it be a difference;

(2) The stage of deliberation of the decision (collecting and sorting of information) is essentially similar in both cases of decision making (financial and neutral). Conditionally let it be a similarity;

(3) In the stage of the choice between the alternatives the important role plays preferences of individual who make a decision (especially under uncertainty) for both situations. Conditionally let it be a similarity;

(4) The realisation of chosen decision presumably do not depends on type of the situation (presence or absence of the financial component). Conditionally let it be a similarity;

(5) The evaluation of the results of made financial decision most likely is more emotional compare to the situation of neutral choice because of governed patterns which related with financial gains and losses. This difference became especially important when there is a sequence of financial decision-making situations. Conditionally let it be a difference.

Conclusion

Taking into account approaches to understanding of risk and uncertainty as well as decision-making and choice described above the definitions of these concepts can be formulated in the purposes of this cross disciplinary research.

Risk – is an event which human can forecasts, predicts and defines it's source (or risk factor) as well as probability of this event which can be measured.

Uncertainty – is the state of the system or environment which causes events and its effects (outcomes) which can not be predicted based on human's rational expectations and probability of these events unknown and can not be modeled with existing mathematical tools.

Choice – is resolution of uncertainty in the condition of at least two alternatives (make a decision or escape from decision-making).

Decision-making – is sequence of actions (algorithm of actions) caused by defined goal and connected with choice and which provide a specified result.

Taking into account basic definition it is possible to formulate the problems connected with modelling of financial decision making in the form of questions:

(1) How to incorporate the components of uncertainty into one of the alternative (alternatives) of financial decision-making?

(2) How to provide realisation of algorithm of decision-making in the imitational model?

(3) How to define the degree of influence of risk component and uncertainty component on the results of financial (neutral) decision-making?

References

[1] Brooks, I., Weatherston, J., & Wilkinson, G. (2004). *The international business environment*. Harlow: Person Education.

[2] Nelson, S.C., & Katzenstein, P.J. (2014). Uncertainty, Risk, and the Financial Crisis of 2008. *International Organization*, 68, 361 – 392.

[3] Bronk, R. (2011). Uncertainty, modelling monocultures and the financial crisis. *The business economist*, 42, 5 – 18.

[4] Knight, F. (1921). *Risk, Uncertainty, and Profit*. New York: Houghton Mifflin.

[5] Keynes, J.M. (1948 [1921]). *Treatise on Probability*. New York: MacMillan & Co.

[6] Bali, T.G., & Zhou, H. (2011). Risk, Uncertainty, and Expected Returns. In *Proceedings of the Divisions of Research & Statistics and Monetary Affairs*. Finance and Economics Discussion Series, Federal Reserve Board, Washington, D.C.

[7] Skidelsky, R. (2009). *Keynes: The Return of the Master*. New York: PublicA_airs.

[8] Taleb, N. (2007). *The Black Swan: the impact of the highly improbable*. New York: Random House.

[9] Skidelsky, R. (2010). Why markeret need governments. OECD *Observer*.

[10] Wagner, P. (1994). Dispute, Uncertainty, and Institution in Recent French Debates. *Journal of Political Philosophy*, 170 – 189.

[11] Kornilova, T.V. (2011). Printsip neopredelennosti v psikhologii : osnovaniya i problemy [The uncertainty principle in psychology: foundations and challenges]. *Psihologicheskie*

issledovaniya [Psychological research], № 3(11). Retrieved from http://psystudy.ru. 0421000116/0030.

[12] Tyagunov, A.A. (1999). Risk, neopredelennost i sluchainost [Risk, uncertainty, eventuality]. *Metodologicheskie voprosy strahovoi deyatelnosti [Methodological questions of insurance*]. Moscow: Ethiket.

[13] Tzigichko, V.N. (1996). *Rukovoditelyu – o prinyatii reshenii* [*To the director about decision making]*, Moscow: INFRA-M.

[14] Kornilova, T.V. (2015). *Risk i prinyatie resheniya: psihologiya neopredelennosti* [*Risk and decision making: the psychology of uncertainty]*.

[15] Tikhomirov, O.K. (1969). *Struktura myslitel'noj dejatel'nosti cheloveka* [*The stucture of human`s mental activity]*. Moscow: Moscow State University.

[16] Kahneman, D., & Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica*, 47, 263-291.

[17] Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5, 297-323.

[18] Belinskaya, E.P. (2014). Neopredelennost kak kategoriya sovremennoi socialnoi psihologii lichnosti [Uncertainty as a category of modern social psychology of personality]. *Psihologicheskie issledovaniya* [*Psychological research]*, 7(36), 3.

[19] Gurova, L.L. (1984). Prinyatie reshenii kak problema psihologii poznaniya [Decision-making as a problem of cognitive psychology]. Voprosy psihologii [*Questions of Psychology]*, 1. 125 – 132.

[20] Politzer, G. & Gorge, K. (1996). The thinking in the context. Foreign psychology, 6.

[21] Darner, D. (1997). *The logic of failure*. Moscow: Smisl.

[22] Cohen, L.J. (1991). Twice told tales: a reply to Schlesinger. *Psychological Studies*, 197 – 200.

[23] Morosanova, V.I. & Indina, T.A. (2011). *Regulyatornie i lichnostnie aspekty ratsional'nosti prinyatiya reshenij* [*Regulatory and personal basics of the decision-making]*. St. Perersburg: Nestor-Istoriya.