

[DOI: 10.20472/IAC.2019.052.010](https://doi.org/10.20472/IAC.2019.052.010)

MONIKA BOLEK

Faculty of Economics and Sociology, University of Lodz, Poland

RAFAL WOLSKI

Faculty of Economics and Sociology, University of Lodz, Poland

RATIONALITY OF MORE AND LESS EXPERIENCED GROUPS OF FINANCE PROFESSIONALS. EXAMPLE OF POLAND

Abstract:

The goal of this paper is to discuss the rationality of market professionals and analyze the behavioral biases they are subject to. It is assumed that less biased decisions are representing more rational behavior. Analyzing the groups of finance professionals: investment fund managers and finance students it has been proven, that managers are more rational than students and their decisions are less biased. The homo oeconomicus idea in relation to the professionals operating on a capital market is analyzed in the light of economic theories evolution together with the behavioral finance findings.

Keywords:

rationality, professionals, financial market, behavioral finance

JEL Classification: E03, G02

1 Introduction

This paper covers the problem of rationality that is a subject of various social disciplines. Rational behaviour is assumed to be better for the individual human being and the society. The science of economics is generally based on the assumption of homo oeconomicus but recently it is proven that irrationality related to heuristics and biases are influencing the decisions that are made by market participants. Behavioural approach, that is emphasised in this paper, enables to enrich the understanding of the decision making process and the market behaviour of investment professionals.

The 70's of the twentieth century was the period when one of the dominant concepts in finance was introduced by Fama - the Effective Market Hypothesis. Its basic concept was the belief that financial markets are effective, so at a given moment, the prices of the assets are fully reflecting all information related to the future profits of the enterprise. Economists have managed to carry out numerous studies and analyses that have confirmed truthfulness of the Effective Market Hypothesis. However, many various deviations occurring on financial markets were observed over time that were in conflict with the concept of Fama. They were presented by Shiller and described as "anomalies" undermining the assumption that investors are an example the so-called homo oeconomicus, that is, they act rationally in maximizing their own usefulness and processing incoming information in accordance with the Bayesian law. The fundamental works of Kahneman and Tversky help to understand the behavior of the market and professionals making the decisions.

In the following paper the rationality of professionals operating on the Polish capital market will be analysed basing on two surveyed groups: certified investment fund managers and finance students about to graduate the master courses and start their professional career. Investment fund managers on a Polish capital market are certified professionals, characterized by the specific and large knowledge and experience. They have to pass a very demanding exam proving their knowledge and the experience in financial institutions is required, too. Investment fund managers can be compared with finance students characterized by a theoretical knowledge and lacking the experience.

Man's activity is attributed to the rationality, that is considered reasonable when the person chooses to implement the preferred solution based on his knowledge and by the most effective means. In this research paper the thesis is verified that investment fund managers are more rational than less experienced market professionals. Rationality is defined by the lower number of mental traps that may be affected by experience, knowledge and the cognitive decision making processes.

2 Problem analysis

There are several issues to be analyzed in this section of a paper related to the rationality of market professionals in the field of finance, characterized by the experience, knowledge and the differences between their behavior according to the heuristics and biases their decisions are subject to.

Rationality is the habit of acting by reason, in accordance with the facts about reality. There are many types of rationality. Analytical rationality includes every action based on the analysis of elements of a given situation. Holistic rationality is based on a holistic view of the problem. The limited rationality corresponds to the available information and the actual human abilities. When analyzing decisions, one needs to be aware of what type of rationality he is dealing with (Szapiro 1993). Weber, from the other hand, distinguished between four different types of rationality. Purposive or instrumental rationality is related to the expectations about the behaviour of other human beings or objects in the environment. In the value or belief oriented rationality, the action is undertaken for what one might call reasons intrinsic to the actor: some ethical, aesthetic, religious or other motive, independent of whether it will lead to success. The affectual rationality is determined by a man's specific affect, feeling, or emotion. The traditional or conventional rationality is determined by ingrained habituation. Weber emphasized that it is very unusual to find only one of these orientations and combinations are the norm (Weber, 2013).

Rational behavior of managers on the market may be accompanied by negative externalities, described by microeconomics as market weaknesses (Fornalczyk 2007). By observing and describing the real behavior of people in organizations, the researchers try to find out what makes real decision-makers behave differently than the models of perfect rationality recommend them. There are many reasons, that can be divided into two groups:

- psychological reasons, i.e. disturbances of rationality resulting from cognitive and emotional distortions that man's common thinking is subjected to;
- organizational reasons resulting from the nature of the organization that managers manage (Bolesta-Kukulka 2003).

A rational decision is considered when managers act on the basis of complete data, processing precise goals and logical information. In fact, managers often do not have full information, knowledge or competence or the ability to process a huge amount of available information (Rokita 2009). A universal form of an efficient operation, concerning not only the mode of action or its effect (product), but the whole action is rationality in a factual and methodological sense. The action is rational in a factual sense, when it is in accordance with the objectively existing state of affairs, and rational methodologically, when it is consistent with the knowledge of the reality possessed by acting. For this reason, the rationality of action concerns both the objectives of the action and the way of operation (Olszewska 2004). The two analyzed groups of professionals differ in the action area and the way of developing the knowledge. Students use to obtain the knowledge in a static way by studying, while managers develop their knowledge through the process of acting on the market but based on the theory they acquire during the education.

Economic rationality - correctly understood - is always the resultant rationality and as such remains available for criticism, requires legitimacy and cannot be dogmatized (Steinmann 1992). Rationality can be considered from different points of view. From the economic point of view a rational economic activity is one in which entity: prefers a specific state of affairs characterized by either the quantity or the global value of the goods remaining in its control and performs activities that according to the knowledge lead to either implementation of this state (if this state does not exist) or to maintain it (if this condition exists) (Balicki, 2002).

The financial markets results achieve rational aggregated effects, despite irrational behaviours of some participants (Patel et al 1991). Analyzing the rationality on the macro and micro levels can lead to different conclusions.

The goal related to the material motivations of human behavior, opposite to the earlier formulated sense of life that was a virtue, was first formulated in XVII century. According to mercantilist viewpoint, profit is the goal of human activity and therefore it can be concluded that the action leading to its maximization is rational. The idea of profit maximization results from human selfishness. Two characteristics of man: will and knowledge allow him to make and implement the best decisions. An important contribution of the classical school in the development of economics was the introduction of the homo oeconomicus model, which gave the entity the feature of rationality. Adam Smith believed that there is a separation of the economic sphere from the moral sphere. In economic activity man is guided by his own general interest striving to improve his existence. In contrast, in the field of morality, he is guided by altruistic feelings or sympathy (Szarzec 2002).

Finance professionals are agents working on the market and representing the capital cumulated in mutual funds. They focus on the rate of return and risk trade-off when managing the portfolio. Their goals are related both to the satisfaction and wealth but they are, from the other hand, equipped with the knowledge and experience that can allow them to make difficult decisions in a more rational way. The analysis of economic theories is provided below to show how the concept of homo oeconomicus has been changing and how it influences the understanding of rationality.

The homo oeconomicus model was introduced by J.S. Mill with the hedonistic and utilitarian values stressed. The economic decisions go along with the moral ones and such a person as homo oeconomicus, making the economic decisions without the moral ones cannot exist. The homo oeconomicus model was developed in the two areas: the motives and forms of performance on the market. Classical ideas mentioned the egoism as a main goal of existence in the economic activity but also the knowledge was taken into consideration. Knowledge according to Mill can help to achieve the goal and to increase the wealth. While making decisions the homo oeconomicus is using its experience and morality, too. Social science, according to Mill is based on the variables that are changing, a man is changing too, due to his experience, knowledge and circumstances. K. Marks, from the other hand was against the egoistic motives related to the income maximization but believed that the rationality of a man is related to the social process that is holistic, not individual.

Weber represented the historic or institutional trend and claimed, that economy in its own cannot be a theoretical science as, for instance, the natural science is. Every epoch in economic history is distinguished by its own "spirit" constituting a mental complex attitudes of people who shape the character of a given era. This spirit influence the behavior of market participants. Entity in every epoch strives to satisfy his material needs, using for this the knowledge and taking into account the circumstances. Weber reconstructed the ideal feudal man and the ideal capitalist man, who follow the consistent rules with their spirit in a specific economic era. In any historical epoch one can find homo oeconomicus, which in the specific socio-economic conditions would behave rationally according to the worldview that prevailed at the time. In other ages its actions may not be considered rational.

A. Marshall was representing the neoclassical approach and returned to the definition of the subject of economics formulated by A. Smith by specifying economics as a science that studies single activity entity and the whole community of such entities, the only one to obtain material goods to meet their needs. Representatives of the marginalism have modified the homo oeconomicus model, giving it a subjective character, claiming that individuals are rational, but their goal is not to maximize wealth, but utility. The evolution of the goal can be realized and it is changing from the objective to the subjective category. Subjectivism put forward the notion of usefulness in place of such categories as: profit and maximization of wealth. The subject of the neoclassical approach is the way to achieve a given goal, not the goal in itself. It should be emphasized that in the homo oeconomicus model in the version both objective and subjective, knowledge in particular was not considered as a subject, assuming that rational agent has full and adequate knowledge about choosing the means to achieve the preferred goal. Subject of economics has therefore been described as a science of how to use resources ensuring the maximum degree of implementation of the chosen business objective by a rational man.

T. Veblen representing the institutional school criticized the classical economy and neoclassical hedonistic and individualistic conception of human nature, presented by the theory of consumer behavior. T. Veblen called for the inclusion of social and psychology which proved that human attitudes are not always rational, not always based on the calculation of losses and benefits and maximization of well-being. The activities of the business entity are also determined by certain mental habits and conventional behaviors. The subject of economics is supposed to study the social customs. In institutionalism, the homo oeconomicus model is rejected in the subjective version.

J. M. Keynes stated that the level of consumption depends on the size of income, objective factors and from subjective needs, psychological tendencies and customs of single entity and the rules according to which income is shared between entities. A man does not seem to be guided by his choices and criterion of maximum utility. In classical economics, the assumption about the rationality of the operation of a single entity was postponed on the effectiveness of the economy on a macroeconomic scale. J. M. Keynes stated that the unemployment is a fact, which is a proof of lack of efficiency of the functioning economy. In the Keynesian analysis two levels of understanding rationality can be distinguished, i.e. micro- and macroeconomic. These two issues remain in such a dependence that, if at the microeconomic level a rational entity is assumed, this analysis does not determine optimal allocation on a macroeconomic scale. J. M. Keynes drew attention to other important decision-making problems by economic entities related to their operating conditions through the process of formulating expectations. He assumed that the entity applies short-term and long-term strategies when undertaking a given activity predictions, for which he does not use only a probability calculation, but the degree of confidence in the accuracy of the forecast, various psychosocial factors, among which the most important place play various inclinations of the man and "animal instincts". The concept of J.M. Keynes was reconstructed by representatives of the new Keynesian school that applied the homo oeconomicus model, indicating the limitations of the rationality.

The school of monetarism in the explanation of economic phenomena follows the methodological individualism and the subjective version of the homo economicus model. According to M. Friedman, the basic motive of rational agents is to meet their own needs, however, when

analyzing the goals of the individual's actions, in his later writings Friedman adds the need for the individual freedom. The inefficiency of the entire economy (inflation) is caused by insufficient knowledge of entities together with excessive and erroneous interference in the economy.

The program of the new classical economy refers to the neoclassical paradigm and remains in opposition to the Keynesian theory. Central place in the program of the new classical economy is occupied by a rational expectations hypothesis. The rationality of entities in the economy is associated with the goal and knowledge used for its implementation. It is knowledge about the right choice of means to realization of the goal, but also knowledge, on the basis of which rational expectations of entities regarding future economic phenomena are formulated. This knowledge includes information about past values of economic variables and current available information. Furthermore, it is assumed that entities learn from previous mistakes. The level of knowledge of entities about the economy determines the achievement efficiency in the scale of the entire economy. The hypothesis of rational expectations exists in two main versions: weak and strong, which differ in the degree of information used by economic entities. Entities acting rationally use a certain model of the economy they consider to be correct and based on it and all available relevant information, as well as mistakes that they made earlier, formulate their expectations. Limitations of the rationality result from its inadequate knowledge.

During the development of economics schools in which the model of homo oeconomicus plays the role of assumption, understanding the rationality was subject to further changes, which went in two directions: precision and subjectifying the purpose of action and concentration on attributed knowledge and selection of optimal means to achieve the given objective (Szarzec).

H. Simon (1955) was one of the first critics of the assumption that people have unlimited abilities to information processing. To describe a more realistic human concept and the ability to solve problems he proposed the term of "bounded rationality". People have limited mental abilities and the amount of time to make decision, therefore it cannot be expected that they will be able to optimally solve difficult problems. It is highly rational to assume that human thinking is characterized by heuristics that can be considered as an economic management of cognitive functions. Deviations from rationality are revealed in both judgments (convictions) and in the elections. Simon, additionally replaced the utility in the economic models with satisfaction.

The results showing that judgments differ from rationality are very diverse (see Kahneman et al., 1982). Some examples illustrating this issue include excessive self-confidence, optimism and extrapolation. Kahneman and Tversky, from the other hand started their interdisciplinary research by building a map of bounded rationality by exploring the systematic biases that separate the beliefs that people have and the choices they make from the optimal beliefs and choices assumed in the rational agent models. The starting point in their research was related to the assessment of various problems and choices and dividing them between rational and non-rational. They are the authors of several discussion of the problems: heuristics and biases in the decision fields under uncertainty (Kahneman and Tversky 1973, Tversky and Kahneman 1974, Kahneman et. Al. 1982), prospect theory – the model of choice under the risk (Kahneman and Tnersky (1979), Tversky and Kahneman 1992) and the risk averssion in the riskless choices (Kahneman et al 1990, 1991, Tversky and Kahneman 1991), the framing effects (Tversky and Kahneman 1981, 1986).

Rational models as Kahneman stated (2003) are psychologically unrealistic, but there can be proposed a model between preferences and attitudes (Kahneman et al. 1999). The architecture of cognition and two systems of thinking and deciding were proposed by Kahneman (2003). They correspond to reasoning and intuition. The first system is fast, automatic, effortless and difficult to modify, the second system is slower, effortful, serial and rule-governed. Accessibility is another issue that can be defined as ease with which mental contents come to mind (Higgins 1996). The acquisition of skills gradually increase the accessibility of useful responses to the effortless level (Kahneman 2003). Previous areas are extended by unified treatment of intuitive judgements and choice based on the previous study of the relationship between preferences and attitudes (Kahneman et al 1999) and extends the model of judgement heuristics proposed by Kahneman and Frederic (2002). Kahneman (2003) claims that the most choices and judgments are made intuitively, rules that govern intuition are generally similar to the rules of perception. Cognitive approach and distinguishing the reasoning and intuition is one step toward understanding the decision process. In case of investment fund managers, who are professional and certified advisors, hard thinking may be the common behaviour that can affect the cognitive process of decision making. Intuition and reasoning can be joined in the systems of decision making in the cognitive process and one can be fast and intuitive, while the second is slower and effortful. Effort is the main difference and in case of investment fund managers it is more likely to respond to another task by blurting out whatever comes to mind. Intuitive decisions show that experienced decision makers working under pressure rarely need to choose between options because only one answer comes to their minds. Rational agent makes his choices in a comprehensively inclusive context with all relevant details of the present situation and expectations about all future opportunities and risks. People are characterized by narrow framing, mental accounting, decision bracketing but it can help in case of investment fund managers to make fast decision basing on hard thinking.

Rational decisions can influence the market efficiency. The lack of heuristics can be considered as a rational behavior that does not cause anomalies on the market There are a large number of participants in operations on financial markets with different time horizons, the information is interpreted differently by different participants, and the time of reaction of different participants to the information is not the same (Frączek 2006). As it was presented by Keynes, rational agents may create the irrational market, but are they fully rational what influences their rationality will be analyzed in the following points.

3 Data and Methods

The survey was conducted in 2017 and 2018 on a group of Polish investment fund managers and finance students from the Economic and Sociology Faculty at University of Lodz, Poland. The sample consist of 23 questionnaires in both groups.

The questions that were asked to recognize the biases and heuristics are based on described in the literature experiments and are provided below:

Task 1 measures the effect of certainty, or tendency to reevaluate certain events in relation to highly probable events. This task measures whether a person will choose a certain profit, but with

a lower expected value (Option B - vulnerability) or choose an option more rational, potentially higher expected value (A) (Kahneman 2003).

Task 2 measures the reverse effect, which means that most people are characterized by risk aversion in the area of profits and risk in the area of losses. Selecting option A the tested person is susceptible to the reversal effect, especially when he chose answer B in Task 1 (Kahneman 2003).

Task 3 is a task for the effect of isolation (framing), that is related to different forms of presenting the same decision problem that may affect other decisions of the respondents (Kahneman 2003).

Task 4 is a task for the disposition effect measuring the tendency of investors to sell assets that have increased in value, while keeping assets that have dropped in value with the only rational option A, while others mean the effect of disposition. It may also examine the degree of "severity" of this disposition effect (Jegadeesh, Titman 1993, Szyszka 2009).

Task 5 is a task for overconfidence, the so-called the effect of being better than average. Here, it is analyzed whether the respondents in various spheres will consistently indicate that they are above-average better in a given field (Kent et al. 1998).

Task 6 is a task measuring the manifestation of overconfidence called "the illusion of control" which is based on the illusory conviction of many people that they can affect the course of future events of a random nature (Heath, Tversky 1991).

Task 7 is measuring the paradox of Ellsberg, analyzing the phenomenon of aversion to ambiguity (Segal 1987).

Task 8 is a modified version of the Linda problem assessing the representativeness heuristics (Tversky, Kahneman 1983).

Task 9 is a task for the sunk costs, managers often face (Kahneman, Lovallo, 1993, Szyszka 2009).

Task 10 is a task for fast and short thinking affecting the decisions (Kahneman, Egai 2011).

The following hypothesis is verified in this paper: investment fund managers are more rational than students. It is assumed, that higher rationality is related to the answers that do not represent heuristics and biases. To verify the hypothesis the Wilcoxon Rank Sum Test and ANOVA analysis will be provided.

4 Results

Below the results of the survey are presented. First answers for questions are compared in both groups of managers and students. In the Table 1 the answers to the questions in two surveyed groups are provided.

Table 1. Answers to the questions in two surveyed groups – comparison

Task	Effect	Managers				Students			
		Effect exist	Effect does not exist	Effect exist	No effect	Effect exist	Effect does not exist	Effect exist	No effect
Task 1	the effect of certainty	8	15	33,33%	66,67%	14	9	60,87%	39,13%
Task 2	the reversal effect	8	15	34,78%	65,22%	16	7	69,57%	30,43%
Task 1&2	the reversal effect	6	17	26,09%	73,91%	11	12	47,83%	52,17%
Task 3	the effect of isolation (framing)	15	7	68,18%	31,82%	14	9	60,87%	39,13%
Task 3	the effect of isolation (framing)	6	17	26,09%	73,91%	15	8	65,22%	34,78%
Task 4	the disposition effect	15	5	75,00%	25,00%	19	4	82,61%	17,39%
Task 5	The overconfidence effect	72	64	52,94%	47,06%	54	84	39,13%	60,87%
Task 6	the illusion of control	8	13	38,10%	61,90%	14	9	60,87%	39,13%
Task 7	ambiguity aversion	16	7	69,57%	30,43%	17	6	73,91%	26,09%
Task 8	the representativeness heuristics	15	8	65,22%	34,78%	15	8	65,22%	34,78%
Task 9	Sunk costs bias	7	16	30,43%	69,57%	19	4	82,61%	17,39%
Task 10	Fast thinking effect	2	21	8,70%	91,30%	6	16	27,27%	72,73%

Source: Own study

Analyzing the number of answers that represent heuristics or biases it can be concluded, that generally in most cases managers are more rational than students because they are characterized by fewer number of answers affected by heuristics and biases in their answers. They are more overconfident and it can be discussed if overconfidence support the process of making decisions or not, In case of investment fund managers the ambiguity aversion is representing the dominating heuristic. The results show that there are more heuristics and biases in the answers of students.

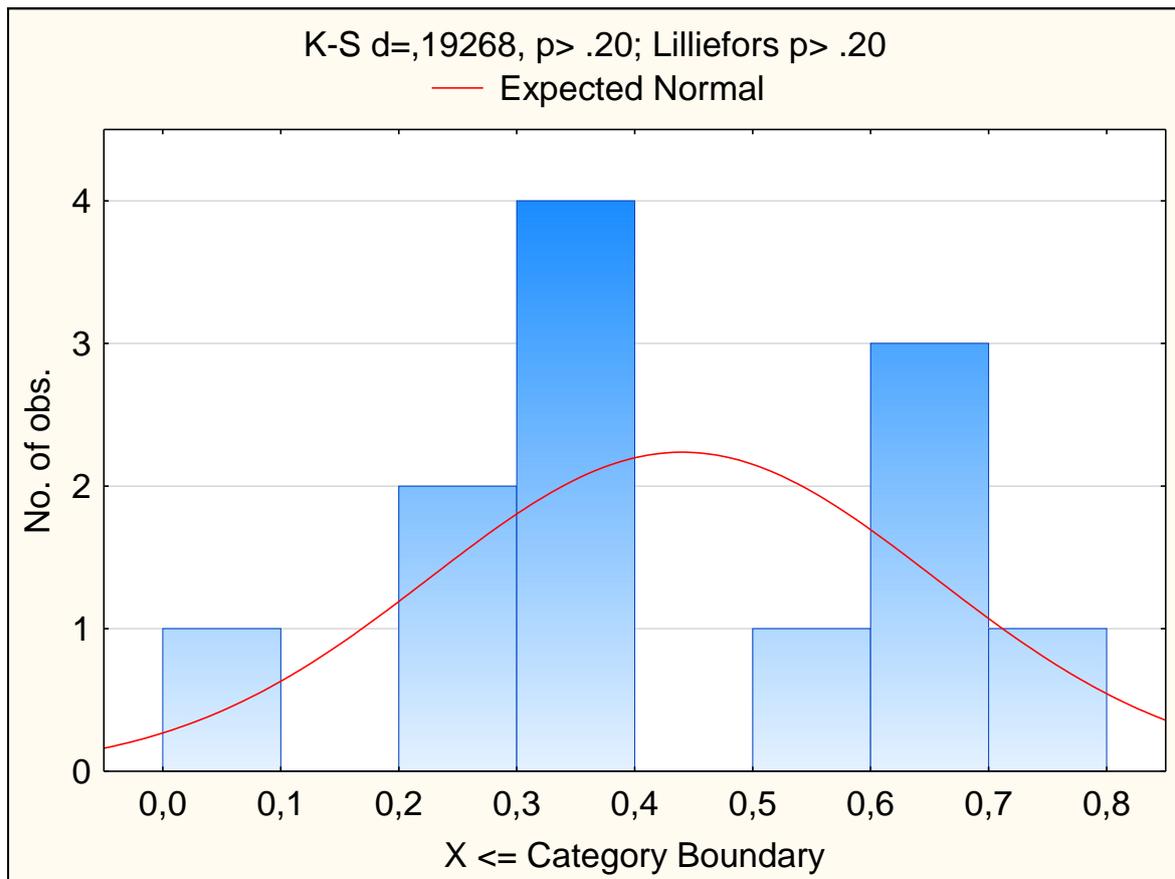
Analyzing the number of biased effects existing in both groups the correlation coefficient for the variables indicating the higher number of heuristics in surveyed groups is calculated. The Spearman's rank correlation coefficient (ρ) = 0.62142857, significant at the 5% level (two-tailed). There is a correlation between heuristics of managers and students on the level of 62%.

To investigate the statement that investment fund managers are more rational than students basing on the effect recognition in each group the Wilcoxon Rank Sum Test in Gretl was provided to see the statistical difference between their answers. Null hypothesis that is tested: the two medians are equal for $n_1 = 12$, $n_2 = 12$ and parameters $w = 113.5$, $z = (113.5 - 150) / 17.3205 = -2.10733$, $P(Z < -2.10733) = 0.0175446$. Two-tailed p-value = 0.0350891. The p-value is less than 0.05. Based on this result it may be concluded that the medians of these two distributions differ and the distribution of one population is shifted to the left or right of the other which implies

different medians. Basing on this statement it can be concluded, that the rationality in the surveyed groups statistically differ from each other.

Using the ANOVA method of comparing the averages, it was checked whether the average occurrence of specific effects and anomalies is similar in the group of students and managers. The distribution of responses confirming the existence of behavioral effects are analyzed. In both cases, there was a lack of normal distributions and plots of flats (platykurtic), left skewness for students and right skewness for managers. The study of the distribution is presented in Graphs 1 and 2. Descriptive statistics are presented in Tables 2 and 3.

Graph 1. The distribution of answers confirming the existence of an heuristic effect for managers



Source: developed by the authors with Statistica

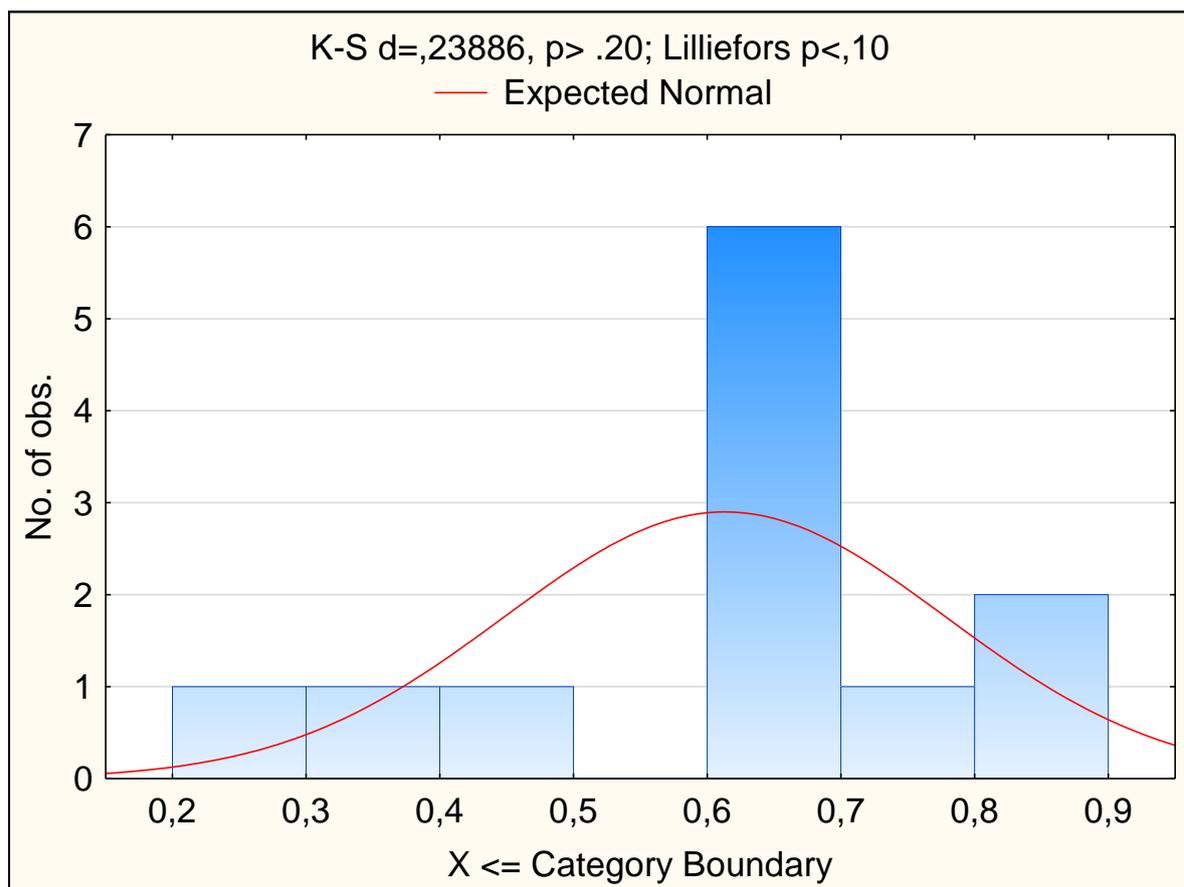
Chart representing the response of managers and its distribution is in line with expectations. Two tests for the normal distribution (Kolmogorow-Smirnow and Lilliefors) did not allow the adoption of an alternative hypothesis with no normal distribution (p-value in both cases is larger than 0.2). As the data from Table 2 shows, the graph is poradoscopic (skewness 0.113), which confirmed the dominance of responses that negate the existence of behavioral biases and platokurtic effects (kurtosis 1.240), and thus the percentage of responses to subsequent tasks did not differ significantly.

Table 2. Summary statistics for managers

N=12			
Mean	0.440	Range	0.663
Confidence -95%	0.304	Quartile Range	0.384
Confidence 95%	0.576	Variance	0.046
Median	0.364	Std.Dev.	0.214
Minimum	0.087	Confidence SD -95%	0.152
Maximum	0.750	Confidence SD +95%	0.363
Lower Quartile	0.283	Coef.Var.	48.586
Upper Quartile	0.667	Standard Error	0.062
Percentile 10	0.261	Skewness	0.113
Percentile 90	0.696	Kurtosis	1.240

Source: developed by the authors with Statistica

Graph 2. The distribution of answers confirming the existence of an heuristic effect for students



Source: developed by the authors with Statistica

The tests for the normality of the Kolmogorov-Smirnov distribution for students' answers did not allow the rejection of the null hypothesis about the existence of a normal distribution (p -value = 0.2), however the Lilliefors test, at the significance level of 0.1, allowed the adoption of an alternative hypothesis about the lack of normal distribution. As the data from Table 3 shows, the graph is left-skew (skewness -0.751), which means that the answers confirm the existence of behavioral biases and platokurtic effects dominated. Also in the case of students, the percentage of responses to subsequent tasks did not differ significantly. Detailed descriptive statistics are presented in table 3.

Table 3. Summary statistics for students

N=12			
Mean	0.613	Range	0.553
Confidence -95%	0.508	Quartile Range	0.174
Confidence 95%	0.718	Variance	0.027
Median	0.630	Std.Dev.	0.165
Minimum	0.273	Confidence SD -95%	0.117
Maximum	0.826	Confidence SD +95%	0.280
Lower Quartile	0.544	Coef.Var.	26.916
Upper Quartile	0.717	Standard Error	0.048
Percentile 10	0.391	Skewness	-0.751
Percentile 90	0.826	Kurtosis	0.341

Source: developed by the authors with Statistica

The next stage of the study is to conduct Levene tests to check whether the variances are statistically significantly equal in both groups. The null hypothesis about the homogeneity of variance in both groups against the alternative hypothesis of nonhomogeneity of variance is stated. In the absence of the possibility to reject the hypothesis of the equality of variance, it should be considered that the condition for performing the one-way ANOVA procedure has been met. Thus, the Welch test and the less rigorous Brown-Forsythe test are not needed. However, the authors decided to present the results of this study. In the one-way ANOVA, as well as on the occasion of Welch and Brown-Forsythe tests, the null hypothesis on equality of averages is verified against the alternative hypothesis about the lack of this equality.

Table 4. Variance homogeneity test for managers and students

	Levene's test	df1	df2	Significance
Based on Mean	2.544	1	22	0.125
Based on Median	1.216	1	22	0.282
Based on Median and with adjusted df	1.216	1	21.058	0.283
Based on trimmed mean	2.588	1	22	0.122

Source: developed by the authors with SPSS

Table 4 presents the results of the ANOVA test. The one-way ANOVA test results show the homogeneity of the variance of the tested samples. In order to analyze the homogeneity of the variance, the Levene test presented in Table 4 is performed. The results obtained led to the lack of reason for rejecting the null hypothesis about the equality of variances in all cases in favor of the alternative hypothesis. Basing on that results ANOVA can be performed without the need for rigorous equality tests: Welch and Brown - Forsythe. Table 5 presents the results of a one-way ANOVA.

Table 5. One-way ANOVA for managers and students responds

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	0.179	1	0.179	4.916*	0.037
Inside group	0.803	22	0.037		
Total	0.983	23			

* significant at 0,05.

Source: developed by the authors with SPSS

The one-way ANOVA procedure allowed the rejection of the null hypothesis on the equality of means in the case of the structure of responses given by managers and students. It means that statistically significant equations were found in these averages. The one-way ANOVA was confirmed by further tests.

Table 6. Robust Tests of Equality of Means

	Statistic ^a	df1	df2	Sig.
Welch	4,916*	1	20,67	0,038
Brown-Forsythe	4,916*	1	20,67	0,038

a Asymptotically F distributed.

* significant at 0,05.

Source: developed by the authors with SPSS

One-way ANOVA results were confirmed by rigorous medium equality tests. The results of the analysis are presented in Table 6. The null hypothesis on equality of averages is rejected in favor of an alternative hypothesis on the lack of equality of averages, which allows to positively verify the research hypothesis that managers make their decisions avoiding behavioral biases to a greater extent than students.

5 Conclusions

Basing on the findings and analysis provided in this paper, it can be concluded that experienced and certified professionals represented by a group of investment fund managers in Poland are more rational than the second group of professionals, not experienced finance students. The rationality in the survey is assessed basing on the heuristics and biases the research groups are subject to. The reason for such a result may be the knowledge, that in the group of investment fund managers is enlarged in comparison to the courses at universities, and experience that affects the way of thinking influencing the cognitive decision process.

Moreover it can be concluded, that professionals representing the group of investment fund managers are not pure rational. They are subject to heuristic and biases on a lower level than students but their decisions are not free from biases and sometimes may be irrational. It can influence the market and cause its efficiency deviation. It is better for a market to be influenced by experienced professionals decisions but it's hardly possible that all decisions on the market will be rational.

Further research should be focused on the survey of the factors that influence the rationality of market participants.

6 Literature

Balicki W.(2002). Wykłady z metodologii nauk ekonomicznych, Wydawnictwo Wyższej Szkoły Bankowej, Poznań.

Bolesta-Kukułka K. (2003). Decyzje menedżerskie. , Polskie Wydawnictwo Ekonomiczne, Warszawa.

Fornalczyk A. (2007)., Biznes a ochrona konkurencji. Oficyna a Wolters Kluwer business, Kraków.

Frączek B. (2006) Anomalie na rynkach finansowych, w: H. Mamcarz (red.): Rynki Finansowe, Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej, Lublin.

Higgins, E. T. (1996). Knowledge Activation: Accessibility, Applicability, and Saliency, in E. Tory Higgins and Arie W. Kruglanski, eds., *Social psychology: Handbook of basic principles*. New York: Guilford Press.

Heath, C., Tversky, A. (1991). Preference and Belief: Ambiguity and Competence in Choice Under Uncertainty. *Journal of Risk and Uncertainty*, 4(1), 5-28.

Jegadeesh, N., Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of finance*, 48(1), 65-91.

Kahneman D., Slovic P., Tversky A., (1982). *Judgement Under Uncertainty: Heuristics and Biases*, Cambridge University Press, Cambridge. Kahneman, D. (2003). Maps of Bounded Rationality: Psychology for Behavioral Economics. *American Economic Review*, 93:5, 1449-75.

Kahneman, D., Egan, P. (2011). *Thinking, Fast and Slow* (Vol. 1). New York: Farrar, Straus and Giroux.

- Kahneman, D., Tversky, A. (1973). On the psychology of prediction. *Psychological review*, 80(4), 237.
- Kahneman, D. Tversky A. (1979). Prospect Theory: An Analysis of Decisions Under Risk. *Econometrica*, 47, 278.
- Kahneman, D., Tversky, A. (1986). Rational choice and the framing of decisions. *Journal of business*, 59(4), 251-278.
- Kahneman, D., Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. *Heuristics and biases: The psychology of intuitive judgment*, 49, 81.
- Kahneman, D., Lovallo, D. (1993). Timid choices and bold forecasts: A cognitive perspective on risk taking. *Management science*, 39(1), 17-31.
- Kahneman, D., Knetsch, J. L., Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of political Economy*, 98(6), 1325-1348.
- Kahneman, D., Knetsch, J. L., Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic perspectives*, 5(1), 193-206.
- Kahneman, D., Diener, E., Schwarz, N. (Eds.). (1999). *Well-being: Foundations of hedonic psychology*. Russell Sage Foundation.
- Kent D., Hirshleifer D. Subrahmanyam A. (2001). Overconfidence, arbitrage, and equilibrium asset pricing. *The Journal of Finance* 56.3 921-965.
- Mill J. S. (1864). *Essays on Some Unsettled Questions of Political Economy*, Londyn.
- Olszewska B. (red.), (2004). *Podstawy Zarządzania. Przedsiębiorstwo na progu XXI wieku*, Wydawnictwo Akademii Ekonomicznej, Wrocław.
- Patel J., R. Zeckhauser, D. Hendricks. (1991). The Rationality Struggle: Illustrations from Financial Markets, *The American Economic Review*, Vol. 81, No. 2.
- Rokita J. (red.), (2009). *Ku nowym paradygmatom nauk o zarządzaniu.* , Górnośląska Wyższa Szkoła Handlowa im. W.Korfantego, Katowice.
- Segal, U. (1987). "The Ellsberg Paradox and Risk Aversion: An Anticipated Utility Approach". *International Economic Review*, 175-202.
- Simon H. A. (1955). A Behavioral Model of Rational Choice, *Quarterly Journal of Economics* 69, 99–118. Smith, A. (2019). *The wealth of nations*. Courier Dover Publications.
- Snowdon B., H. Vane, P. Wynarczyk, (1998). *Współczesne nurty teorii makroekonomii*, PWN, Warszawa.
- Steinmann, H. (1992). *Zarządzanie. Podstawy kierowania przedsiębiorstwem. Koncepcje, funkcje, przykłady.*, Wydawnictwo Politechniki Wrocławskiej, Wrocław.
- Stankiewicz W. (1998), *Historia myśli ekonomicznej*, PWE, Warszawa 1998.
- Szapiro T. (1993). *Co decyduje o decyzji*. Wydawnictwo Naukowe PWN, Warszawa.

Szyszka, A. (2009). *Finanse behawioralne: nowe podejście do inwestowania na rynku kapitałowym* (Behavioral Finance: A New Approach to Investing in The Capital Market). Wydawnictwo Uniwersytetu Ekonomicznego.

Szarzec, K. (2002). *Koncepcje racjonalności działania gospodarczego w teorii ekonomii. Ruch prawniczy, ekonomiczny i socjologiczny, LXIV, zeszyt 3.*

Topolski J. (1970) , *Założenia metodologiczne „Kapitału” Marksa*, w: *Założenia metodologiczne „Kapitału” Marksa*, Książka i Wiedza, Warszawa 1970.

Tversky, A., Kahneman, D. (1983). *Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment. Psychological Review, 90(4), 293.*

Tversky, A., Kahneman, D. (1974). *Judgment under uncertainty: Heuristics and biases. science, 185(4157), 1124-1131.*

Tversky, A., Kahneman, D. (1992). *Advances in prospect theory: Cumulative representation of uncertainty. Journal of Risk and uncertainty, 5(4), 297-323.*

Tversky, A., Kahneman, D. (1991). *Loss aversion in riskless choice: A reference-dependent model. The quarterly journal of economics, 106(4), 1039-1061.*

Tversky, A., Kahneman, D. (1981). *The framing of decisions and the psychology of choice. Science, 211(4481), 453-458.*

Weber, M. (2013). *From Max Weber: essays in sociology.* Routledge.