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The Effect Of Investors' Cognitive Bias On Stock Decision Making[1]

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Abstract
There have been many differences in the evolving process from the traditional economy to the behavioral economy. Conventional finance has made progress within the framework of rational choice and expected benefit asumptions. Behavioral finanse is based on expectation theory. In fact, it is based on the argument that individuals are not fully rational. Within the scope of irrational act of individuals, the ability to select stocks has been illusory. The point is that different ways of thinking occur. It is seen that buyer and seller perspectives are opposite to each other with a complex thinking. In other words, when buyers buy stocks, they think that the price is low and this may increase, and sellers think that the price is too high and may fall. In fact, it is a complex structure of how buyers and sellers in the markets are convinced that a certain price is uncertain. The aim of this study is to investigate the effect of decision-making process on investor emotional prejudices, whether the decision mechanisms are more effective when buying stocks in the market or the idea that people are competent to know more than the market.

Keywords: Behavioral Finance, Decision Mechanisms, Investor Behavior

1. Introduction

In traditional finance modeling, investors' decision-making is based on expected utility maximization. As for behavioral finance, this is based on expectation theory. In fact, it is believed that individuals have feelings. There has been a shift from rationality to limited rationality or irrationality.

It is seen that different thinking structures are transformed into individual phenomena in buying and selling of stocks; that is, in decision process more than one outcome is accepted instead of a single outcome.

The main purpose of this study is to reveal the following points: Are decision-making mechanisms more effective when buying stocks in the market? Is the idea of people thinking about they are more competent than the market when making a choice effective? What is the impact of cognitive and emotional biases on investor behavior in decision-making process? Basically, the case studies that are prominent in the literature are mentioned, and additionally, the important topics in the conceptual framework arediscussed. Finally, conclusion part is established with the consolidation of application that explain this purpose.

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2. Review of Literature

Kahneman and Tversky (1974) found that investors under uncertainty misbehave by taking irrational decisions as a result of mental shortcuts and cognitive biases. In their study, DeLong et al. (1990) supported the argument that noise traders who make additional risk by buying and selling random stocks may make inaccurate pricing. They concluded that this additional risk was priced by the market, and that the noisetraders could gain more from the rational shareholders in taking additional risks. According to the study of Lee, Shleifer and Thaler (1991), there is a positive and significant link between stock market and investor sensitivity.

According to Odean (1998), when individuals decide whether or not investors are reluctant to realize their losses, they tend to hold their losing stocks in the long-run, whereas they tend to sell winning stocks directly. Statman (1999) stated in his/her study that traditional finance theory is subject to loss of interest and confidence due to market anomalies. In traditional finance, individuals are considered rational investors. On the contrary, behavioral finance assumes that individuals are normal not rational investors. They can benefit from understanding that behavioral finance's " normal investor" has the needs and preferences that go beyond the utilitarian needs of traditional finance's "rational investor. Therefore, individuals make irrational decisions with bias and emotion rather than rational behavior. From this point of view, the researcher sought answers to the question of how human behaviors show attitude in line with financial decisions within this discipline.

Chen et al. (2009) concluded that these effects of investor sentiment on stock price performance are stronger for small, young, and high market to book ratio firms.

Kahyaoğlu (2011) examined the role of gender on the level of exposure to many emotional and psychological factors that affect investment decision-making. Nguyen and Schuessler (2012) conducted a study to determine whether psychological factors cause errors in the financial decision process of the investor and concluded that it is common among individual investors to make mistakes in Germany due to their socio-demographic characteristics.

In their study, Küçüksille and Usul (2012) examined the effects of cognitive biases on investor decisions. Kahyaoglu and Ülkü (2012) examined the impact of the risk they have undertaken, as a result of the status of representative individual investors of heuristicrisk level. Hayta (2014) addressed the factors that affect the financial risk perception of individual investors and their reflections on the investment decision process.

Aydın and Ağan (2016) considered the effects of irrational decisions on financial deposit choices. In their study, Angı et al. (2016) determined whether there is a relationship between the investment decision process of individual stock investors and demographic factors and cognitive biases.

Bektur and Atasaygın (2017) assessed the financial behavior of investors' decisions on trading stocks within the context of "overconfidence" and "representative agent" arising from cognitive error and bias. Asoy and Saldanlı (2017) defined the irrational behavior of the 423 investors , and described the demographic determinants which affect the cognitive biases of investors.

Tekin (2018) examined behavioral finance with the context of cognitive biases and heuristics within literature review.

DeVault et al. (2019) stated that sentiment metrics capture institutional rather than individual investors' demand shocks. Investigating the underlying economic mechanisms, risk management and momentum trade explain a significant portion of the relation between institutions and sentiment.

3. Conceptual Framework

3.1. Behavioral Finance

When the historical process of behavioral finance is examined, it is first encountered in the study of Adam Smith. Smith's work on thesis of rationality constitutes the foundations of economic theories with the books "Wealth of Nations" and "Invisible Hand". Another important work of him, "The Theory of Moral Sentiments" which is less known than his first work, emphasizes different subjects. In this work, he explains the psychological characteristics of personal behaviors unlike rationality. The work is related to situations that emphasize human psychology and express current developments related to behavioral finance in our age (Camerer & Lowenstein, 2003: 5). In his work, Adam Smith made the first description of "loss or risk aversion" situations that is explained by behavioral finance with emphasizing individuals feeling pain and regret when they change from good behavior to bad behavior, and then they were happy when they rised to a good behavior again. (Cornicello (2004) cited by Tekin, 2016: 97-98). Behavioral finance theory is based on two approaches: limited arbitrage opportunities and other investor behavior patterns. From the perspective of the first approach, it is advocated that the bond cannot be found without risk as the arbitrage opportunities are limited by the fact that most securities do not have any real substitutes, nor are there any good

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counterparts. This is an explanation of the rapid price formation in a situation where the price flow does not move properly and as fast as necessary when encountering new information, or the explanation of the rapid price formation where there new information is not the case. The second approach mainly investigates how a cognitive process follows the generation of investors' desire for securities (Turguttopbaş, 2008: 44).

3.2. Cognitive Biases Affecting Investment Decision Process

In classical investment theories, individuals are the investors who take one type and rational decisions. However, this is the exact opposite in reality for investors that trade in the market. In other words, investors behave irrationally and seem to contradict the rationality assumption. This issue, which the classical finance view cannot answer, constitutes the fact that the psychological, mental and emotional issues of the individuals should be taken into consideration. According to behavioral finance, individuals behave according to cognitive bias at the decision process (Otto 2010 cited by Aksoy, 2016: 40). The concept of cognitive bias can be explained as deterioration in the way individuals perceive reality (Tekin, 2018: 44).In another definition; the tendency of individuals to show irrational behaviors describe as “cognitive biases” in investment decision process. All segments of society are consistently and constantly influenced by cognitive biases. There are cognitive prejudices that influence investment decisions (Hanser and Kyser, 1999 cited by Hayta, 2014: 335). Some of these concepts are discussed below:

3.2.1. Law of Small Numbers

According to the theory, a sample taken from the population represents the whole population. Individuals ramdomly confirm that the sample drawn from apopulation has the ability to effectively symbolize all the features of the population (Tversky and Kahneman, 1971: 105).

3.2.2. Herd Behaviour

It is the case that investors imitate others, instead of depending their own information flow. This behavior forces investors to imitate each other instead of having information on market fundamentals. The prerequisite for herd behavior is to behave according to the decision of other investors (Decamps and Lovo, 2002: 17).

Table 1. Basic Psychological Tendencies

	TENDENCY	DEFINITION
COGNITIVE	Framing	Give different reactions depending on how the events are presented.
	Mental Accounting	Grouping by ignoring the characteristics of assets
	Avoidance of Uncertainty	Risk aversion in case of uncertainity
	Conservatism	Inadequate evaluation of new information
	Representation	Evaluating new information using historical information
	Accessibility	Using easily accessible information when valuing assets
	Overconfidence	Overconfidence in the accuracy of own information
	Verification	Focusing on information confirming own beliefs
	Cognitive Dissonance	Inability to associate behaviors with beliefs
EMOTIONAL	Optimism	Over-focusing on scenarios with good results
	Predisposition	Holding the assest whose value is falling, selling the asset whose value is rising
	Domination	Over sensing the ability to control the situations
	Ownership	Overestimating the value of asset in hand
	Status quo	Resistance to change

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3.2.3. Sunk Cost Fallacy

They are irreversible investments in forecasting the future. It can be interpreted as the desire of investors, participated in effective investments, to continue the investment although it has been realized that the investment profitability will be very low in a certain period of the investment. Even though most investors have been aware of Buffet's "if you wish to get out of a pit, the best thing you can do is to stop digging" word and found it possible, this issue is not taken into consideration in real life. (Hayta, 2014: 339).

3.2.4. Framing Tendency

The framing tendency is called the cognitive tendency, which expresses that investors react differently according to how they make different expressions by being influenced by the presentation of events during the decision process (Sefil and Çilingiroğlu, 2011: 255).

3.2.5. Mental Accounting

It is defined as the set of cognitive activities used by individuals and households to perform, evaluate and monitor their financial activities (Thaler, 1999: 183).To sum up, the basic cognitive and emotional tendencies are summarized below (Sefil & Çilingiroğlu, 2011: 255):

4. Research Design

4.1. Method of Research and Hypotheses

The aim of this study is to determine the effect of investors' cognitive bias on stock decision making process. For this purpose, a questionnaire was prepared to measure the cognitive status in the decision-making process of behavioral finance.
The study consisted of 100 male and 100 female investors with a portfolio of 100.000 TL or more. In this study, four intermediary institutions operating in Ankara, İstanbul and İzmir that do not want to be disclosed, constitute the study.
Since the full examination of cognitive characteristics would take a long time and asking all questions would take the time of respondents which would increase the reluctance of participants. Hence, accurate information under main titles were tried to obtain with small number of questions. In the questionnaire which asked 23 questions except demography, cognitive questioning was conducted directly without mentioning the private life and the privacy of the investment. The following questions were meticulously asked. 23 of the questions prepared in the questionnaire include 5-point Likert Scale participation questions. The points emphasized in the questions prepared; "Herd psychology, accessibility of easy information, ignorant courage, focused area, deviation from confirmed information, if I say it is absolutely wrong syndrome, reaction to ego, acceptance of loss status, focus on constant".

Survey data were analyzed with SPSS 23 package program and then interpreted and evaluted.

H_1: Gender from demographic characteristics is affected by cognitive bias.

H_2: Age from demographic characteristics influences cognitive biases.

4.2. Research Findings

In light of the demographic characteristics which are shown in Table 1 the data were obtained from the participants' answers. Regression analysis is performed based on the answers given to the questions prepared within the scope of 5-point Likert Scale, and it is tried to be determined whether the investors behave with cognitive biases at the decision process.

According to Table 2, 49.5% of the total (200) investors included in the research are women and 50.5% are men. When Table 2 is analyzed, the majority (59.5%) of the participants are between the ages of 31-40.

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Table 2. Demographic Characteristics of Participants

	Characteristic	Number	(%)		Characteristic	Number	(%)
Gender	Female	99	49,5	**Age**	20-30	18	9
	Male	101	50,5		31-40	119	59,5
	Total	**200**	**100**		41-50	63	31,5
					Total	**200**	**100**
Marital Status	Married	154	77	**Province**			
					Ankara	40	20
	Single	46	23		İstanbul	130	65
	Total	**200**	**100**		İzmir	30	15
					Total	**200**	**100**

Subsequently, the majority (77%) of the participants were married. When the province of residence was analyzed, the location of participants are determined as 20% Ankara, 65% Istanbul and 15% İzmir. In the second part of the questionnaire, cognitive bias assessment is conducted under the important topics presented in the infrastructure in order to determine whether the investors have cognitive bias at the decision process. With the help of the 5-point Likert Scale, the questions were conveyed to the participants who participated in the questionnaire and the propositions of the resulting data were evaluated accordingly. Propositions are rated as; strongly disagree (1), disagree (2), neither agree nor disagree (3), agree (4), strongly agree (5). Table 3 shows the distribution of responses to the questions asked to investors to determine cognitive bias.

Table 3. Cognitive Bias

Cognitive Bias	Frequency	Percent	Cumulative Percent
Herd Psychology	101	50,5	100,0
	99	49,5	49,5
Easy Accessibility of Information	40	20,0	20,0
Ignorant Courage	112	56,0	100,0
	10	5,0	44,0
Focused Area	173	86,5	100,0
	2	1,0	13,5
Deviation from Correct Information	147	73,5	100,0
	20	10,0	26,5
“If I say, it is absolutely wrong” Sendrom	180	90,0	90,0
Reaction to Ego	5	2,5	100,0
	2	1,0	97,5
Acceptance of Loss Status	140	70,0	70,0
	14	7.0	87,0

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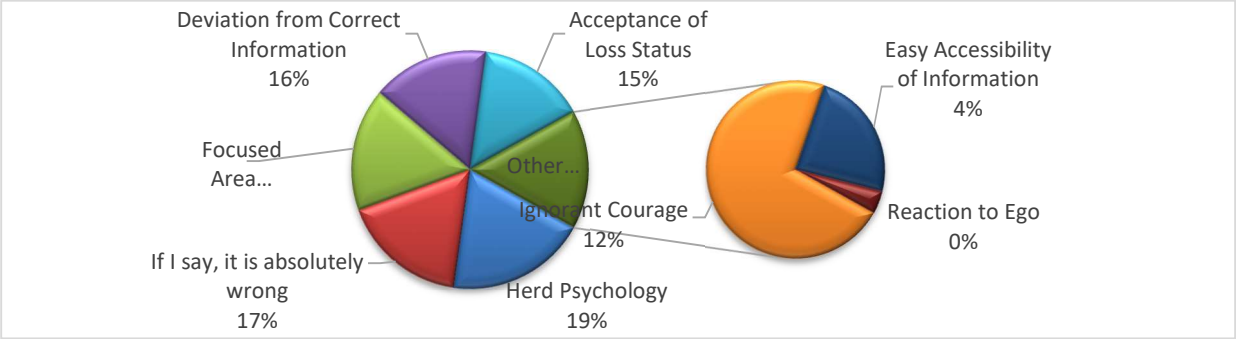
For the herd psychology, "The extent to which the comments of the crowd influence investor psychology" are measured. Here, in the part where the participants are most distributed, 101 of the investors answered "agree" and 99 of them answered "strongly agree". In order to measure the accessibility of easy information, the distribution of the response to the statement of "While I can bear the risk of loss from an investment instrument that I know will be in a negative trend, I tend to move away from a less risky and less likely to lose but less known investment decision" is demonstrated. 40 of the surveyed investors answered 'strongly agree'. In order to measure the ignorant courage, the distribution of the most responses to the statement "I exhibit an approach that places more emphasis on my own abilities when making individual investments" is demonstrated. 112 of the investors who participated in the survey answered 'strongly agree' and 10 of them answered 'agree'. For the focused area, 173 of the investors answered 'strongly agree' and 2 of them answered 'agree' for the statement "I think my perception is more in the foreground under clear language and visuality". For the deviation from the verified information, 147 of the investors answered 'strongly agree' and 20 of them answered 'agree' for the statement "There have been many times that I have decided first and then verified the information". Regarding if I say, it is certainly wrong statement, the question of "I am oftenly possessed by syndrome of 'if I say, it is certainly wrong'" is answered as 'strongly agree' by 180 of the participants. In response to the ego, 171 of the investors answered 'strongly disagree' for the statement "My investment decision is affected by my ego". 140 of the investors answered 'strongly agree' and 14 of them anwered 'agree' for the statement "I find it difficult to accept the idea of being in loss" which was directed to the investors about accepting the situation of loss.

As a result of the answers given by the 200 participants in the survey, evaluations were made and frequency distribution of the related data was shown. Based on these frequencies, the cognitive bias-investment decisions graph is formed as follows:

Figure 1. Cognitive bias and distribution of investment decisions



In Chart 1, the distribution of investors affected by cognitive biases at the decision process is shown from the most to the least. Table 4 presents multiple regression analysis of cognitive bias.

Table 4. Anova Test Results

Model		Sum of Squares	df	Average Square	F
1	Regression	2,517	2	1,258	10,740
	Residual	23,083	197	,117	
	Total	25,599	199		

*p<0.05 significant; Dependent variable: Cognitive biases; Independent variables: Gender,Age

As seen in Table 4, when we consider the whole, the results of the anova test are used to measure whether the test is meaningful or not. The model seems to be significant at p<0.05. Table 5 also includes the B and β coefficients, t values, significance levels, the rate of explanation of the dependent variable by independent variables (R2) and Durbin-Watson value.

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Table 5. Table of Coefficients

Model	B	β Coefficient	T-Value	R	R^2	Corrected R^2	Durbin-Watson
(Constant Value)	2,501		25,667	,314	,276	,167	1,451
Gender	,078	,110	1,344				
Age	,144	,239	2,926				

The fixed value given in Table 4 was found to be 2,501. When the β coefficient is examined, it is seen that gender and age affect the cognitive bias in the decision-making process. Especially age seems to be more effective. There is a positive relationship in the model. Generally, it is stated that between 1.5-2.5 there is no auto-correlation (Kalayci, 2010: 267). Durbin Watson coefficient was 1,451 in the study. As a result, it is understood that hypotheses are supported.

5. Conclusions and Recommendations

It has been investigated whether the individuals act irrationally in the decision mechanisms when buying stocks. In this respect, examinations were conducted with the use of cognitive decision methods. The study was conducted by using survey technique with 100 male and 100 female investors who have portfolio advisory agreements with four brokerage center/branche operating in Ankara, İstanbul and İzmir that do not want to be disclosed. In the study , research questions were prepared by meticulously according to topics of "herd psychology, accessibility of easy information, ignorant courage, focus area, deviation from correct information, if I say it is absolutely wrong syndrome, reaction to the ego, acceptance of loss status".

When the whole study is evaluated, it is seen that investors are affected by cognitive biases. They act with complex mindset in stock purchases. In traditional finance, the market is in a certain state, whereas in behavioral finance, this has become uncertain. In other words, when we think of those who know the market and those who do not, it is seen that those who know the market show professional behaviors to a certain extent.

Figure 2. Investors' cognitive bias pyramid

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For the purpose of this study, whether the decision mechanisms are more effective when buying stocks in the market or the idea that people are competent to know more than the market when making preferences and the effect of cognitive and emotional biases on the decision-making process is investigated. In fact, this complex structure can be simplified if this awareness can be increased for all groups. Investors can be oriented to awareness more quickly using the impulse method through professionals.

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