Decision Making Process and Behavioral Biases: Evidence from Pakistan Stock Exchange

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Abstract

As the number of financial products is increasing in financial industry in Pakistan due to financial innovations, investors are being involved more and more in investing activities. So, financial advisors and managers are highly prioritized to explain behavioral biases. This paper examines the influence of rational decision-making process (identifying demand, searching information and evaluating alternatives), and demographic variables (age, gender, income and experience) on behavioral biases (overconfidence, herding, disposition, self-attribution and illusion of control) in Pakistan. Questionnaire technique is used to collect data from the sample of 150 investors in Lahore and Islamabad offices of Pakistan Stock Exchange. Structural equation modeling technique is used to investigate the relationship. It is found that irrational behaviors arise in searching information and evaluating alternatives. Age and experience have negative and significant relationship with herding and illusion of control biases.

Introduction

Decision making is a vital activity in our daily life. An individual has to make lots of decisions in his daily life. Valid and research-based information related to decision issue will lead to more accurate and more rational decision. Raffia (1968) established three approaches of decision analysis that give the accurate picture of real person's thought process. These three approaches are prescriptive, normative and descriptive analysis. A rational decision model is normative one where the decision maker is fully informed and able to compute with accuracy and applies to improve the real-world decision making over present practices.

Rational decision making can be explained as "one that follow the reason of consequences "(March, 1994). If we think that decision making is based on the insight of consequences of alternatives and logics of choosing the alternative that is expected to achieve one's objectives and goals, the decision is considered more rational. A rational model involves a series of logical steps, beginning with identification of goal, followed by identification of alternatives and their consequences and then selection of the best alternative. The majority of the economics models find that humans are rational in decision making. On the basis of these assumptions, Fama (1965) developed efficient market hypothesis in finance theory. In efficient market hypothesis, it is assumed that no one can earn more profit than market because market reflects all the information related to share prices and only rational investors independently and immediately react to market information to maximize their profits.

On the other side, behavioral finance clarified the overreaction, under reaction and herding behavior as the cause of market anomalies. Malkiel (1973) explained that markets are irrational and investors follow their emotions, not logics, when investing in financial markets. Investors have self-insight of rationality and they think that they choose rational process in trading and making decision but the question is if they follow the rational decision-making process then why majority of investors show behavioral biases?

Experiential researchers found that decision making process does not follow the rational practice, even in the cases where effort is put up to ensure rationality. But in real life, person has to face the difficulty of bounded rationality, where individual has limited resources,

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mental capacity and time. Decision maker do not have complete knowledge about resulted consequences upon which to decide the most suitable alternative. As a result, there is risk and uncertainty about the effect of decision taken which means that rational decision may finally leads to worst results.

Kahneman and Tverskey (1979) presented the prospect theory in which they explained the behavior of investors while making decisions under various unstable situations. Theory states that investor's actual decisions are affected by their psychological reasons of investors which divert them from rational decision making. Thus, investors usually simplify their decisions which lead them to their self-satisfaction but it does not rationalize their decisions.

There is a lot of work done on relationship between behavioral biases and decision making but there is lack of literature in the context of Pakistan, so this paper is aimed to do so. Further, we have also focused the relationship between demographics and these behavioral biases.

Literature Review

Decision making process, is not a recent subject of study. This discipline has been developing from almost 300 years with the contributions of other disciplines. Decision making phenomena has two core characteristics i.e. decision and behavior. Decision and behavior include thoughts and reactions of humans about the external world. These thoughts and reactions may include the past and future events and results of these events of decision maker. The spirit of decision making is that it integrates the beliefs and reactions of people about some specific event. For example, decisions include three aspects as it is a response to a situation. Number one is that there are multiple ways of solving a problem. Second is that decision makers make some expectations about the results of the future event which is under consideration in terms of degree of confidence or probabilities or chance of occurrence of that event. Last, results related to possible outcomes can be judged in terms of reflection of current goals and personal values.

Normative and descriptive both theorists have elaborated the process of decision making but both have different set of assumptions. How individuals make decisions have been the focus of descriptive theory, and how individuals should choose among alternative choices have been the focus of normative theorists. Psychologists have revealed the crucial principles individuals use while making decisions. Rational methods elucidate how individuals examine different unusual results occurring from different alternatives in order to select a final choice (Goodwin & Wright, 1998; Gunther et al. 2001). Being ration is explained as being compatible among value and choice. Rationality tries to find an optimal value of consequences stressing on the process of selecting among alternatives.

Rational individuals examine a large number of feasible choices from many situations before making a final decision. The situations are weighed by chance of their occurrence, and individuals can anticipate the situation for every option. The ultimate selected option explains the best estimated situation with maximum likelihood of outcome. Normative processes elucidate how individuals utilize multiple options in order to resolve specific problems (Goodwin & Wright, 1998; Gunter et al. 2001).

When individuals sell healthy securities and do not sell losing positions, this situation is termed as disposition effect. The term was used by Shefrin and Statman (1979), they explained it logically on the basis of prospect theory (Kahneman and Tversky, 1979). The theory states, gains make investors risk averse and they become risk seeker after experiencing loss and hold the losing position because they are willing to bear more risk. They evaluate the outcome of an investment in term of profit and loss compared with the purchase price. They make the separate mental account for each new stock and evaluate the outcomes of individual security rather than portfolio return. Regret aversion leads the investors to hold the losing

stock to avoid the regret of making wrong decision and sell winning stock to experience the feelings of pride of making correct decision. Self-control bias lead the investor to sell the losing stock to get the tax benefit.

Odean (1998) found the disposition effect by taking the larger data of investors' accounts from 1987 to 1993 and compared the proportion of realized gain with realized loss. He found that larger portion of winning stock sold than losing stocks. He also found that investor can earn higher returns by holding winning and selling losers. Explanation for the disposition effect is higher transaction cost with low prices, mean reversion, liquidity demands and portfolio rebalancing.

Chang (2013) studied the relationship between disposition and herding bias on Taiwan technology stocks and found that investors having similar stocks tend to sell the winning ones and tend to hold the losing ones, thus indicating the presence of disposition effect, which contributes towards the herding behavior.

When investors miscalculate their skills and accuracy of their information, this leads towards overconfidence (Bandari and Deaves, 2006), the term overconfidence was used by Albert and Raffia. Bazerman and Moore (2009) described two phenomenons; investors relying excessively on their personal abilities, and the miscalculation of accuracy of information, this makes investors extra optimistic about expected outcomes (Vautier et al. 2011).

Odean (1998) found investors having overconfidence bias miscalculate the accuracy of the information and trade excessively which leads to lower expected utilities. On the other hand, rational investor trade periodically for rebalancing and to minimize the taxes.

Braha (2012) explained that if individuals in a group react together in a certain situation, alike and this reaction is not planned this is herding behavior. Modern economic research and modern psychology has indicated the herding behavior in humans and explains it as when many people act alike at the same time.

Blasco et al. (2010) explained the herding bias they stated that it is the imitation which investors performed in financial markets when investing in certain security they imitate the others investors which they think that to be better informed about securities instead of making their own research-based decisions. This is very dangerous behavior for investors and financial markets in large stock markets often trends established which results in creating bubbles or crash of stock market. This irrational behavior which is driven by emotion of greed results in fear of crashes. Investors choose the imitation for the entry and for exit in stock market (Markus 2001).

Another bias is the tendency of investors to think that they can influence the returns when they actually cannot; it is termed as illusion of control bias. It is defined as the extra probability of the success of personally anticipated outcomes compared with the objective probability. Individuals perceive inappropriately confidence in their abilities to predict the future outcomes or skills in given circumstances. It has been observed in financial decision making and stock market behavior (Shefrin, 2000; Shiller, 2000), risky lottery investments (Charness & Gneezy, 2010) and portfolio diversification strategies (Fellner, 2009).

Heider (1958) explained the self-serving bias as investor's potential to attribute positive actions to themselves but attribute negative actions to some external factors. It is a general kind of cognitive bias that has been widely studied in social psychology (Heider, 1958). According to Hastorf et al. (1970) people have tendency to attribute success to their own abilities and attribute all the evils to uncontrollable factors. Most people are likely to take a great deal of credit for our own success. In behavioral finance one method by which people becomes overconfident is due to the self-serving bias, which states that investors take credit for favorable results but criticize situation failed results (Daniel et al.1998, Gervais and Odean, 2001).

Kunda (1990) found that individuals often do not search for all the possible alternatives of an outcome instead they are more likely to choose the first alternative that comes in mind and use the searching strategy which is needs less effort and more simplify. Noisier information is less likely to be explored properly, self-attribution bias could be a case of noisier information. Tehrani (2012) found inverse relationship between disposition bias and education which means as the level of education increases, it lowers the disposition effect. Similarly, higher income level and more experience also lower the disposition effect (Goetzmann and Massa, 2002). It is psychologically proved that males reveal overconfidence bias more than females. Barber and Odean (2001) also found that males trade aggressively show the overconfident behavior. Korniotis and Kumar (2007) and Barber and Odean (2001) found that aged individuals are more informed and hold more diversified portfolios. This shows an inverse relationship between age and overconfidence. They also found that this negative relation is less obvious among the group of people who has higher level of education and income. Eagly and Carli (1981) indicate that women are more likely to be involved in herding bias. Menkhoff et al. (2001) suggested the inverse relationship between herding effect and education and found that people who do not have the college degree and have greater tendency to engage in herding bias but this is not common in gender.

Methodology

The objective of this study is to find out the relationship between rational decision making model and behavioral biases. Relationship between demographic variable and behavioral biases is also measured. Structure equation modeling is used to examine the series of equations that are used to express the structure of interrelationships. SPSS 16 and STATISTICA 7 are used for analysis of data. Kolmogorov Smirnov Test is applied to test the normality of data. Data is collected from Lahore stock exchange, Islamabad stock exchange and finance teachers and students. Convenient sampling is used for this study.

Questionnaire is used to collect the data. The main scale which I utilize in my study is given by Lin (2012). My major emphasis on this scale and we adopted some parts of other standardized scale relevant to my study, for instance, Self attribution and illusion of control bias by Hyam and Outsuka (2003), rational decision making model by Syagga (2012), herding and disposition bias by Snir et al. (2012).

150 questionnaires were collected from the investors of Lahore stock exchange, Islamabad stock exchange, and finance teachers in university of gujrat.Questionnaire consists of 3 sections. First section of questionnaire includes the demographic information (age, gender, income, and experience), second section consists of rational decision making model, demand identification, searching information and evaluating various choices and third section includes the questions of behavioral biases.

Results and Discussion

To check the reliability of questionnaire, Cronbach α is used. If the value of α is greater than 1, its mean questionnaire is more reliable to measure the phenomenon (see Table 1).

The demographic profile sample of this study is that it includes 78 males (53.4%) and 68 females (46.6%) with 84.2% are under the age of 25, 14.4% are between the 25 to 35 years old, 1.4% is between the 36 to 45 years old. Educational backgrounds of respondent are matriculation, intermediate, graduation and master. 7% respondents have the education background of matriculation back, 19.9% have intermediate, 44.5 % have graduation and 34.9 % have master. 28.1% people have lower income (less than or 15000), 40.4% respondent have middle income (3000) and 37.8% respondent have higher income level. 80.8% respondent has less than 2-year experience, 14.4% have between the 2 to 4 years

experience, 4.1% have between 5 to 7 years experience and 7% respondent have between 11 to 13 years experience.

Table 1: Reliability of Data

S.No.	Variables	Cronbach α
1	Demand Identification	.782
2	Searching information	.669
3	Evaluating Alternatives	.703
4	Disposition	.650
5	Herding	.604
6	Overconfidence	.710
7	Self-attribution	.721
8	Illusion of control	.716

In this study we find out the relationship between rational investments decisions and behavioral biases. Rational investment decisions are measured by rational decision making process, which involves three stages. These stages are identifying demand, searching information and evaluating alternatives. We take five behavioral biases (overconfidence, herding, self-attribution, illusion of control and disposition effect). In this study structural equation modeling technique is used to examine the relationship between latent variables and their dimension. SEM combines factor analysis and regression weights in one model. Regression weight between the factors of rational decision-making process (independent variable) and behavioral biases factors (dependent variable) Stages of rational decision making model influence the behavioral biases. According to the structural component represented by path between latent variables in table 2, all the three stages of decision making process are not significantly related to behavioral biases. According to parameter estimate of demand identification and searching information that is 0.26 and 2.537 where $p < 0.05$, if the demand identification increase by one standard deviation, searching information increase by .26 standard deviation and evaluating alternatives increase by 2.537 standard deviation if the searching information increase by one standard deviation .This finding shows that demand identification stage of decision making influence searching information and indirectly evaluating alternatives second and third stage of decision making model. This shows that investors follow the decision-making process and their decisions are based on rationality.

The first stage of rational decision-making model does not have significant relationship with behavioral biases. Searching information, second stage of decision making model has significant relationship with overconfidence and illusion of control bias. Searching information has positive and statistically significant relationship with illusion of control bias because an active search process causes investors or entrepreneur to become more involved and make more choices that leads to illusion of control (Jackson & Dutton, 1988; Langer, 1975) while overconfidence has statistically significant and negative relationship with searching information. When the individual has more data and information, he become unable to filter the information and understand the complex relationship due to limited capacity of understanding that is bounded rationality. More information leads the individuals to become more doubted that weak the decision-making power and confidence level.

Evaluating alternatives, third stage of rational decision-making model can predict the overconfidence bias, disposition bias and self-attribution bias. Evaluating alternatives has positive and significant relationship with overconfidence bias, self-attribution bias and statistically negative relationship with disposition bias. When the individuals evaluate alternatives based on previous information, overconfident investor overestimates their private

information, ignores the publicly available information and alternative perspective or new evidence (Chuang & Lee, 2006, p.2490). They relate gains to their competences and trade aggressively without considering the value or loss in asset and has consistent attitude toward risk. Herding bias has negative and significant relationship with evaluating alternatives. Overconfident investor has more confident on his knowledge and information; he thinks that he has more accurate information and he can make better decision than others. He ignores the publicly available information and does not blindly follow the others. (Barber and Odean, 2001).

Self-attribution bias has positive and significant relationship with overconfidence bias and illusion of control bias. When the individuals tend to attribute the success to their own skills and abilities, drive individuals to be overconfident and think that they can control the things or outcomes when they cannot. (Barber and Odean, 2001). Overconfident has negative and significant relationship with disposition bias and herding bias.
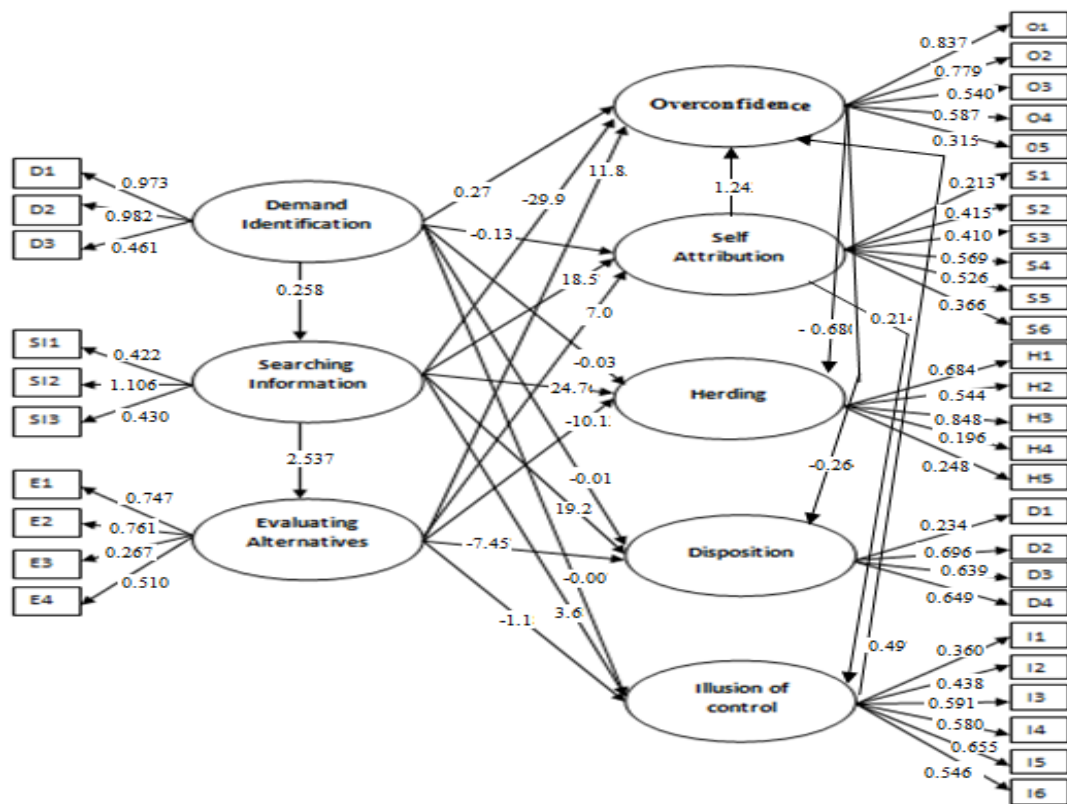

Figure 1. The relationship of rational decision-making process and behavioral biases.

Table 2: Measure of Goodness of Fit of SEM Model

Factor	χ2	d.f	p-value	χ2 / d.f	GFI	AGFI	RMSEA
Model	1187.296	508.000	0.0000	2.337	0.691	0.638	0.062

Table-2 shows the goodness fit measure of SEM. P-value of chi square is significant so our model is fit. The value of GFI (0.691) and the value of AGFI (0.638), both support the estimated model. Further, the value of RMSEA (0.062) is also in the favor of model. All the stages of decision making model influence the behavioral biases except the first stage, identifying demand.

Table 3 shows the confirmatory factor analysis. Confirmatory factor analysis is fundamental part of SEM that helps in confirming which factors are suitable. In other words, it confirms that a set of variables are part of this construct called latent variable. Here rational decision

making process has three factors. First factor is identifying demand which are tested by 3 items (D1 to D3) for confirmation. All the 3 items are confirmed. P values of these 3 items are significant. Second factor of RDM process is searching information, which are also tested for 3 items (SI1 to SI3) for confirmation. P values of these 3 items are significant. Evaluating alternatives, third stage of RDM process is tested for 4 items (EA1 to EA4) and all the items are significant. Disposition effect is tested for 4 items (DB1 to DB4) for confirmation. P values of all the items are significant. Herding bias is tested for 5 items (HB1 to HB5). One item (HB4) is not confirmed for this factor and other 4 items are confirmed for this factor and has significant p value. Overconfidence are tested for 5 items (OB1 to OB5) for confirmation and all the items has significant p values. Self-attribution bias are tested for 6 item (SEB1 to SEB6) for confirmation .one item (SEB1) are not confirmed for this factor and all confirmed factor has significant p values. Illusion of control are tested for 6 item (IL1 to IL6) for confirmation and all the items has significant p values.

Table 3: Correlation between demographic variables and behavioral biases

	overconfidence	Herding	Self-attribution	Illusion of control	Disposition effect
Gender	.039 .639	-.056 .501	.062 .458	-.080 .340	.027 .750
Age	-.065 .432	-.167* .045	.090 .279	-.014 .869	-.054 .514
Income	.021 .798	.041 .626	.000 .994	-.050 .549	-.042 .611
Experience	-.147 .077	.001 .988	-.064 .446	-.283** .001	-.058 .484
Qualification	.130 .117	-.063 .449	-.047 .574	.073 .379	.059 .482

Table 3 shows that correlation between demographic variables and behavioral biases. Gender does not have significant relationship with behavioral biases. Age has negative and significant relationship with herding bias that is consistent with the finding of (Lin, 2011) which means that younger investor are more blindly follows the other than alders. Experience also has negative and significant relationship with the illusion of control because when the investor get more experience, he become more aware about his skills and abilities that decrease his overconfidence and indirectly his perception to control the things when it is uncontrollable. Qualification and income are not correlated with behavioral biases.

Conclusion and Recommendations
There are many studies which shows the relationship between rational decision making and behavioral biases but this study differs in this way that it shows how rational decision making process effect the behavioral biases. This study is unique in this way that it simultaneously finds the effect of rational decision making on five behavioral biases and on demographic factors.
The hypothesized model shows that investors are following the rational decision-making process for investment. The first stage of process is demand identification which has positive significant relationship with second stage searching information and second stage has significant positive relationship with third stage evaluating alternatives. This shows that Investors are following rational decision-making process for investing in financial products.

The first stage of rational decision-making process i.e. demands identification has no significant relationship with any behavioral bias. This shows that people do not become biased when they want to increase their wealth by investing in financial products. Instead they search for information. The searching information has positive significant relationship with illusion of control bias which shows that when investors get information they become involved and they feel that they know the situation and they can handle it (Jackson & Dutton, 1988; Langer, 1975). Searching information has negative significant relationship with overconfidence bias which shows that with more information investor become less confident as they start understanding the complexities and risk in investment. Third stage i.e. evaluation alternatives has significantly positive relationship with overconfidence bias and self-attribution bias and negative significant relationship with disposition bias. When the individuals evaluate alternatives based on previous information, overconfident investor overestimates their private information, ignores the publicly available information and alternative perspective or new evidence (Chuang & Lee, 2006). They relate gains to their competences and trade aggressively without considering the profit or loss in wealth and has consistent attitude toward risk. Herding bias has negative significant relationship between with evaluating alternatives. Investors with herding bias follows the trend, as they start searching information and evaluate alternative they become rational and rely on their own decisions and information beside of following others.

This research concludes that decision making process is important for investment in financial products but psychological biases are involved in decision making process. This is what we call bounded rationality. If investor is following the rational decision-making process still he has behavioral biases which leads to irrational and uncertain decision making.

The second part of our research is to find out the relationship between demographic variables (Age, qualification, gender, income and experience). The study shows that there is no significant relationship between gender, income and qualification. Age has significant negative relationship with herding bias. Experience also has negative and significant relationship with the illusion of control because when the investor get more experience, he become more aware about his skills and abilities that decrease his overconfidence and indirectly his perception to control the things when it is uncontrollable.

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