Kybernetes

Developing an instrument for measuring the effects of heuristics on investment decisions

Kadir C. Yalcin Ekrem Tatoglu Selim Zaim

Developing an instrument for measuring the effects of heuristics on investment decisions

Kadir C. Yalcin
Department of Banking and Finance, Fatih University, Istanbul, Turkey
Ekrem Tatoglu
Faculty of Economics, Administrative and Social Sciences – International Trade, Bahcesehir University, Istanbul, Turkey, and
Selim Zaim
Department of Industrial Engineering, Istanbul Technical University, Istanbul, Turkey

Abstract

Purpose – Based on a thorough review and synthesis of the literature in behavioral finance, the purpose of this paper is to develop three measures of heuristics that tend to influence investment decisions of individual investors.

Design/methodology/approach – Using perceptual data collected from a sample of 167 individual investors in the USA, the reliability and validity of heuristics measures are assessed by confirmatory factor analysis with structural equation modeling. Then, the second-order model is executed in order to indicate the paths among the study's constructs. Finally, a multiple-group analysis is conducted to analyze the moderating effects of demographic factors on the relationship between the perceived level of heuristics and their constituent dimensions.

Findings – Of the three groups of heuristics, salience is found to be the most important followed by mental accounting, while representativeness features as relatively less important. Regarding the moderating effects, only investment experience is noted to have a significant moderating impact.

Research limitations/implications – The data utilized for testing and validating this instrument was acquired from a relatively small sample of individual investors in the USA, which makes the generalization of findings somewhat limited.

Practical implications – Both researchers and practitioners in behavioral finance can use these measurement scales to better understand the impact of heuristics on individual investment decisions and also to develop models that relate the critical factors of heuristics to the performance of individual investment decisions.

Originality/value – To date, there has been no systematic attempt in the extant behavioral finance literature to develop a valid and reliable instrument on heuristics which would aid to improve the quality of decision making in investment analysis.

Keywords Decision making, Behaviour, Heuristics

Paper type Research paper

1. Introduction

Behavioral finance is an emerging field within the broader context of economics and finance, and has been in close interaction with both psychology and sociology (Shiller, 2003; Stracca, 2004; Elvin, 2004; Subrahmanyam, 2008; Puustinen *et al.*, 2013). Unlike standard (traditional) finance which assumes that human beings are rational, behavioral finance considers them as normal (Statman, 1999). There are two main premises of traditional finance theory. The first premise assumes that human behavior is rational during the decision-making process as described by the expected utility

Kybernetes
Vol. 45 No. 7, 2016
pp. 1052-1071

0368-492X
DOI 10.1108/K-05-2015-0130

theory while the second one suggests that financial markets are efficient in the sense to reflect the correct prices confirming the efficient market hypothesis.

The expected utility theory essentially presumes that individuals try to maximize their utilities by setting limits to their feelings and act only by using their minds as super calculator or emotionless robots. However, this kind of rationality is hypothetical and, in reality, individuals are subject to some cognitive limitations when they have to make decisions. Furthermore, many academicians provided counter evidence against the validity of this type of rationality (Allais, 1953; Simon, 1955; Ellsberg, 1961; Kahneman and Tversky, 1979).

The efficient market hypothesis assumes that markets are rational. However, a stream of researchers (e.g. DeBondt and Thaler, 1985; Black, 1986; De Long *et al.*, 1990; Shleifer and Vishny, 1995; Thaler, 1987, 1999a) exhibit many observed market movements so called anomalies that are not explained by the arguments of the efficient market hypothesis. Both standard and behavioral finance have different views in order to explain the causes of market anomalies. The proponents of standard finance pioneered by Fama and French (1988) claim that the anomalies are because of the asset pricing theories or they can be explained by chance. On the other hand, behavioral finance tries to explain these anomalies through behavioral biases (Kliger and Kudryavtsev, 2010; Sahi *et al.*, 2013). Biases are people's systematic errors of judgments when they make a decision on something (Kahneman and Riepe, 1998) and have become the subject of growing research attention. Several researchers have tried to explain how behavioral biases affect human decisions (Tversky and Kahneman, 1973, 1974, 1981, 1986; Kahneman and Tversky, 1973, 1979; Kahneman and Riepe, 1998; Hirshleifer, 2001; Montier, 2002; Nofsinger, 2005; Barber and Odean, 2001; Barberis *et al.*, 1998).

Even though the psychological and sociological phenomena that affect human behavior are widely discussed in behavioral sciences, their impact is relatively new in the area of finance and economics. Very frequently, human behavior is unclear and unpredictable in nature. Nevertheless, the researchers in behavioral finance have noted many biases that affect human behavior, relying on surveys and experiments (Bhandari and Deaves, 2006; Sahi *et al.*, 2013; Kadous *et al.*, 2014; Morales-Camargo *et al.*, 2015). However, it is extremely difficult to detect and classify the biases that cause erroneous investment decisions of investors. Hirshleifer's (2001) complex classification, later simplified by Montier (2002), is widely accepted as taxonomy of biases that affects the investment behavior which would include the following four sets of biases: heuristics, self-deception, emotions and social interaction.

Measurement is also an important issue for behavioral biases on investment decisions of individual investors. Many behavioral biases such as heuristics, overconfidence and herd behavior are difficult to be systematically measured in behavioral finance. The existing scales developed to measure behavioral biases were largely based on the cognitive psychologists' observations and experiments under controlled laboratory conditions. The purpose of this study is, then, to develop an instrument to measure and evaluate specifically the effects of heuristics on investment decisions of individual investors. To date, there has been no systematic attempt in the extant behavioral finance literature to develop a valid and reliable instrument on heuristics which would aid to improve the quality of decision making in investment analysis (Oran, 2008). To do this, operational measures of the underlying dimensions of heuristics are developed based on a thorough review and synthesis of the pertinent literature along with some qualitative data obtained from a selected number of academics, professional financial analysts and individual investors. These measures

are then tested for reliability and validity using perceptual data collected from a sample of 167 academics of a mid-size university in the USA who hold personal investment portfolio or have some prior investment experience.

The remainder of the study is organized as follows. The next section briefly reviews the heuristics that are related to investment decisions. Research methods are provided in Section 3 followed by results and discussion of findings in Section 4. Conclusions are set out in the final section.

2. Literature review on heuristics

Heuristics are the shortcuts and rule of thumb caused by data processing errors. They are quite functional to alleviate the cognitive efforts for making the decision process easier which may otherwise require too much time and mental resources. On the other hand, heuristics sometimes cause inevitable biases (Tversky and Kahneman., 1974; Hirshleifer, 2001; Montier, 2002). Cognitive psychology researchers ascertain that shortcuts are employed rather than cognitive capacity, since processing data is too hard when excessive information is installed. Furthermore, insufficient information and time for a careful evaluation also force investors to use the shortcuts (Aronson, 1999). While there exist various classifications of heuristics in cognitive psychology, researchers in behavioral finance mainly focus on the following biases caused by heuristics which include, namely, salience, availability and cue competition, representativeness, and mental accounting due to their relevance with investor's behavior (Oran, 2008). These biases are briefly explained in the ensuing subsections.

2.1 Salience, availability and cue competition

The concepts of salience, availability and cue competition are generally used interchangeably in the extant literature and may be subsumed under heuristics. Hereafter, we will use the notion of salience, which refers to inclination toward practicing more apparent and common data when reaching a decision. Salience is sometimes known as familiarity bias and is regarded as a key factor because it affects the availability, attention and the cue competition.

Fox and Tversky (1995) argue that when people are faced with two risky alternatives, they are more comfortable to choose the familiar (salient) one especially in the case of quick decision. According to Huberman (2001), the fear of making a mistake is the main reason when investors choose the unfamiliar option.

Availability refers to the remembering of the instances which is related to attention. Moreover, the salience of the objects affects the attention (Shiller, 1998). For example, the effect of actually witnessing a burning house is greater than reading news about a burned house (Tversky and Kahneman, 1973).

Cues are the salient information. Our brains recognize attractive images and colors, such as capital letters and bright lights as cues. People use these cues as cue competition for deciding even if this salient information is wrong or imperfect. People scan their memory and find these salient cues in their minds in order to decide without considering whether they are accurate or not. In fact, salient cues reduce the impact of less salient ones (Hirshleifer, 2001).

Salience also affects the investment decisions of investors. It is inevitable to experience such bias because investment decisions entail choosing the right option among many alternatives which needs a careful evaluation. Moreover, the evaluation process requires too much mental effort which many times push the limits of human capacity. Investors use salient information in order to overcome the difficulty of decision-making process.

For example, investors having such bias may tend to invest in company stocks with wider media attention or in those stocks which are highly recommended by brokerage houses (Oran, 2008). Their attention is bolstered by the company's reputation and cues being selected are kept somewhere in their minds by either the effect of the news, advertisements or analyst coverage. Attracted attention causes a familiarity which influences the risk perception of investors. As noted by Sirri and Tufano (1998), Jain and Wu (2000), Huberman (2001) and Barber *et al.* (2005), investors choose to invest in companies that they are rather more familiar with which tends to increase their level of confidence and optimism. For example, it is commonly observed that many people prefer to invest in local firms; employees invest in their own company's stocks; or fans tend to purchase their team's stocks irrationally (Nofsinger, 2005).

2.2 Representativeness

Representativeness is an extreme interest in the accuracy of the salient evidences (Tversky and Kahneman, 1974; Barberis *et al.*, 1998). The appearance of events is an important factor in individuals' judgments. People forecast the probable outcome that appears the most representative of the evidence without considering both statistics about them and whether they would really represent the universe (Kahneman and Tversky, 1973; Montier, 2002).

Investors are also biased from representativeness. For example, they take the recent years' stock value as a representative of the possible future path of the stock value (Tversky and Kahneman, 1974). Andreassen and Kraus (1990) exhibited that investors would prefer to be in buying side after two bullish periods and have a tendency to be in selling side after two bearish periods. In fact, investors are accustomed to high-equity returns and accept them very normal in bull market conditions by ignoring the long-term averages and giving too much credit to the current data and occurrences (Ritter, 2003).

Representativeness also affects investors' decisions by causing them to confuse good firm with good investment. The indicators such as strong earnings, high sales and quality management assist investors to label a company as good or bad. In contrast, good investment takes places only when the value of chosen stock increases more than the others (Nofsinger, 2005). Moreover, investors optimistically project the continuance of high-future growth for the firms that have managed consistently high growth rate in the previous five years. However, they are unable to realize that the high earnings growth in the past is not likely to repeat itself in the future (Barberis *et al.*, 1998).

Investors consider that the previous return performance of the stock is the major display of its future path. They label the stocks that indicated superb performance for the past three to five years as winners and expect a great performance from them in the future. On the other hand, the stocks with a poor performance in the past are labeled as losers. Investors do not think of a great performance from the loser stocks in the future (Nofsinger, 2005). However, DeBondt and Thaler (1985) note that loser stocks outperform the winners about 25 percent over the next three years. Moreover, Lakonishok *et al.* (1994) classify stocks as glamour (growth) or value by looking at the past growth rates of sales and the price/earnings (P/E) ratios. If the company's past sales growth rates are good or P/E ratios are high then the stock is labeled as glamour. If not, it is labeled as value stock. Value stocks outperform glamour stocks in both qone-year period and five-year period.

Despite all these evidences, investors rely on technical analysis which essentially involves forecasting the future path of stock prices through the study of past market

data, primarily price and volume. Moreover, investors frequently follow the highest winners and losers through the media and this trend chasing investment style leads to an overreaction (Barberis *et al.*, 1998; Hirshleifer, 2001; Shefrin, 2002).

2.3 Mental accounting

Mental (psychological) accounting is the set of cognitive operations used by individuals to organize, evaluate and keep track of financial activities (Thaler, 1999b). People assign different costs into different mental accounts and they evaluate these different accounts through examining the psychological effects of the costs. For instance, people avoid losses because their feelings are much more severe when they lose as compared to those when they win. They are reluctant to take risk when there is a huge chance of losing because it is hard to overcome the psychological burden of it (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992). This loss-averse behavior causes narrow framing that makes the investor myopic on losses, which is defined by the equity premium puzzle (see Barberis and Huang, 2006; Mehra and Prescott, 1985).

Disposition effect might be regarded as the most important impact of the mental accounting (Kahneman and Riepe, 1998; Thaler, 1999b; Grinblatt and Han, 2005). Shefrin and Statman (1985) claim that investors are more willing to sell the "winning stocks" too soon and to hold "losing stocks" too long. They call it as disposition effect. The reason for this is merely psychological, since investors seek pride and stay away from regret. Selling the losing stock means a realized loss. The emotional pain of realizing the loss is unbearable because a realized loss implies the announcement of futile investment. Investors avoid affirming the unsuccessful investment decision. They ignore their failures so as to protect their confidence and self-esteem. They also prefer waiting for the downward stock's price to increase no less than its purchase price. Many shareholders get the purchase price as a reference point and use it to evaluate the outcomes as gains or losses (Kahneman and Riepe, 1998). Thus, they would rather not to sell. In case they choose to sell, external factors are found responsible for disappointments. Moreover, they prefer to sell all losing stocks on the same day in order to mitigate the psychological impact of losing. On the other hand, they chose to sell winning stocks on different days in order to experience the feeling of triumph for a long time (Odean, 1999; Lim, 2004).

Mental accounting also causes naive diversification (Thaler, 1999b). To exemplify, when they face N alternatives from the probable investment options, they chose *1/N* rule to distribute their funds equally through possible choices (Benartzi and Thaler, 2001). Moreover, investors prefer putting each investment into separate mental accounts and taking no notice of the interaction between investments causing an assessment of each investment alone (Nofsinger, 2005).

2.4 Investor specific influences as moderators

We also argue that some investor specific influences could moderate the relationship between the perceived level of heuristics and their underlying dimensions. To this end, the following set of investor related variables is introduced: Age, gender, education level, income level, marital status, number of dependents, size of investment portfolio and investment experience. We do not offer specific predictions as to how these variables are likely to influence the perceived level of heuristics on investment decisions but rather propose that they may have a moderating effect on heuristics.

3. Research methods

3.1 Survey instrument and data collection

The general purpose of this survey is to develop a measurement tool to evaluate specifically the effects of heuristics on investment decisions of individual investors. Unavailability of secondary data about the survey topic has made imperative to collect primary data using a self-administered questionnaire.

The survey instrument is composed of questions relating to three underlying constructs of heuristic biases that include salience, representativeness and mental accounting. The measurement scales used in this study were largely drawn from Yalcin (2012), who initially developed multi-item scales to identify critical factors of behavioral biases affecting investment behavior for use in the behavioral finance context. Based on discussions with a number of academics in relevant area of expertise and professional financial analysts and also through semi-structured interviews with a selected number of individual investors, the questionnaire was tested several times to ensure that the wording, format and sequencing of questions were appropriate.

The research setting for this study comprised of a mid-size US university, the University of West Georgia, GA. A purposive sampling technique based on a single organization was chosen due to its convenience in terms of time and budgetary constraints as well as ease of securing permission from the management. An appropriate respondent for our survey is academic staff who has a personal investment portfolio or at least has some prior investment experience. The sampling frame for individual investors included the whole academic staff, which was composed of a total of 594 academics at the time of data collection. The survey questionnaire with a cover letter was sent to each member of the academic staff through e-mail attachment. The data collection was administered during the period of April-June 2014. After one reminder, a total of 193 questionnaires were returned, of which 167 were usable. The remaining 26 were excluded due to largely several missing data. An effective response rate of 28.9 percent was deemed satisfactory, given the nature of the questionnaire and also the fact that there might be relatively large number of staff who does not have personal investment portfolio or prior investment experience.

A test for non-response bias for the survey was also conducted by comparing the first wave of survey responses to the last wave of survey responses (Armstrong and Overton, 1977). The test results indicated no significant difference in the responses between early and late respondents ($p > 0.1$). Hence, no response bias was evident.

3.2 Sample characteristics

The sample of 167 individual investors has a comparable distribution in terms of most demographic categories. Regarding the size of investment portfolio, nearly 37.7 percent of the sample has a total investment portfolio of $50,000 or less, while 33.6 percent has more than $250,000 with the remainder having between $50,001 and $250,000. The distribution of the sample in terms of investment experience is as follows: five years and less, 29.3 percent; 6-15 years, 29.3 percent; and more than 15 years, 41.4 percent. The characteristics of the sample are shown in Table I.

3.3 Measurement of variables

The followings include brief descriptions of the study's main constructs and moderator variables.

Sample characteristics	Number	%
Gender		
Male	83	49.7
Female	84	50.3
Age (years)		
40 or less	52	31.1
41-55	58	34.7
More than 55	57	34.2
Education level		
Undergraduate or lower	70	41.9
Postgraduate	97	58.1
Income level ($)		
50,000 or less	57	34.2
50,001-100,000	58	34.7
More than 100,000	52	31.1
Marital status		
Single	44	26.3
Married	123	73.7
Number of dependents		
No dependency	64	38.3
Only 1	50	29.9
2 or more	53	31.8
Size of investment portfolio ($)		
50,000 or less	63	37.7
50,001-250,000	48	28.7
More than 250,000	56	33.6
Investment experience (years)		
5 or less	49	29.3
6-15	49	29.3
More than 15	69	41.4
n	167	100

Table I. Characteristics of the sample

3.3.1 Main constructs. As noted earlier, heuristics are composed of three main scales or constructs, namely, salience, representativeness and mental accounting. Relying on individual investors' perceptions, each of these scales were measured through five-point Likert-type scale items ranging from 1 = "strongly disagree" to 5 = "strongly agree." A total of 34 items comprising all three scales were identified, in which salience was measured through ten items, while representativeness and mental accounting were composed of 12 items each. All three constructs along with the exact wording of their constituent items are reproduced in Appendix.

3.3.2 Moderator variables. In order to measure the moderating impact of gender, the respondents were divided into two groups: male (49.7 percent of the sample) and female (50.3 percent).

The moderating impact of age was measured by the number of years. To do this, three broad age groups were created: 40 years or less (31 percent), 41-55 years (34.7 percent) and more than 55 years (34.2 percent).

Regarding the education level, the respondents were split into two groups: those who hold undergraduate or lower degrees (41.9 percent) and those who have postgraduate degrees (58.1 percent).

The respondents were categorized into three groups with respect to their income level: $50,000 or less (34.2 percent), $50,001-$100,000 (34,7 percent) and more than $100,000 (31.1 percent).

Marital status was measured by a dichotomous variable as single (26.3 percent) or married (73.7 percent).

In terms of number of dependents in the family, the sample was divided into three groups: no dependency (38.3 percent), only one (29.9 percent) and two or more (31.8 percent).

A total of three categories were created to measure the moderating effect of the size of investment portfolio: $50,000 or less (37.7 percent), $50,001-$250,000 and more than $250,000.

Regarding the level of investment experience, the respondents were grouped into three categories: five years or less (29.3 percent), 6-15 years (29.3 percent), and more than 15 years (41.4 percent).

3.4 Data analysis

The empirical validation of the study's constructs is undertaken with structural equation modeling (SEM) using AMOS. The data analysis is conducted in three stages. In the first stage, we follow the updated measure development paradigm proposed by Gerbing and Anderson (1988) as well as the traditional procedure suggested by Churchill (1979) to develop better measures of heuristics. To operationalize the constructs, the following properties of the measures are considered (Bagozzi and Phillips, 1982; Venkatraman, 1989): reliability (internal consistency of operationalization) and validity (content, construct, convergent and discriminant validity). Then, the second-order model is executed in order to indicate the paths among the study's constructs. In the third stage, a multiple-group analysis is conducted to analyze the moderating effects of investor specific influences on the relationship between the perceived level of heuristics and their constituent dimensions.

4. Results and discussion

4.1 Reliability and validity of the constructs

Reliability of the scales is related to the homogeneity of their items. It is a measure of producing same results on repeated trials. Cronbach's α is commonly used to measure internal consistency of the scales (Cronbach, 1951). It is based on the average correlation between items within a test. In order to initially assess the internal consistency of the scales, an item intercorrelation matrix is constructed for each scale. A content analysis is conducted to purify the scales since the items measuring the same scale or construct must have consistent meanings. Those items that have inconsistent meanings or that have relatively low correlation with the other items in their own scale are removed from further analysis. This purification process results in the elimination of the four items from the scale of representativeness (i.e. Q11, Q13, Q21 and Q22), and also removal of the two items from that of mental accounting (i.e. Q30 and Q33). Cronbach's α is then calculated for each scale. Although an α value of 0.70 and higher is often considered the criterion for internally consistent established scales (Hair *et al.*, 1998), Nunnally (1978) suggests the α value of 0.50 and 0.60 is acceptable in the early stages of research. Table II shows Cronbach's α values of the scales developed. All the

scale measures of heuristics are over 0.80 exhibiting satisfactory level of construct reliability. This establishes the internal consistency of the dimensions being studied and is reliable for this research. While we employ the Cronbach α coefficient as a measure of reliability, this coefficient is based on a restricted assumption assigning equal importance to all indicators.

Validity is defined as the extent to which the instrument measures what it intends to measure. In this survey, the validity of the instrument was assessed by investigating its content, construct, convergent and discriminant validity. Churchill (1987) notes that the validity of a measuring instrument can be assessed by seeking evidence of its pragmatic content and construct validity.

Content validity refers to the agreement among professionals that a scale logically appears to accurately reflect what it intends to measure (Zikmund, 1991), although its determination is subjective and judgmental (Emory, 1980). The content validity of the survey instrument was established in several steps. First, an extensive review of relevant literature on heuristics was undertaken to develop the questionnaire items. Next, an initial draft of the questionnaire items were discussed with a number of academicians and professional finance analysts, who were closely familiar with investor behavior. Finally, a pilot study based on a series of semi-structured interviews was conducted in order to give the final shape to the survey instrument.

Construct validity is performed to check whether there exist any subscales within the same construct. The construct validity can be assessed by factor analysis. The primary purpose of factor analysis is to produce a parsimonious set of new composite dimensions from a large number of variables with a minimum loss of information (Hair *et al.*, 1998). There are two forms of factor analysis, namely, explanatory factor analysis (EFA) and confirmatory factor analysis (CFA). To ensure validity of the measures (i.e. internal consistency and convergent-discriminant validity, respectively) as suggested by Gerbing and Anderson (1988) and Churchill (1979), the data were subjected to CFA within the SEM. This procedure is preferable to EFA in that it is a causal indicator model that requires a priori specifications of factor structure and allows for the specification of measurement errors (Venkatraman, 1989).

The first stage is also known as testing the measurement model where the underlying constructs of heuristics were tested using the first order CFA model to assess construct validity using maximum likelihood method. It provides the following model statistics for the assessment of goodness of fit: χ^2 statistics, its associated degrees of freedom (df), level of significance, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and Tucker-Lewis index (TLI). One can conclude that each of the three constructs comprising heuristics achieve unidimensionality and convergent validity using AMOS (Arbuckle and Wothke, 1999). The χ^2 statistic is 487.53 (df = 302; $p < 0.05$), with the χ^2/df ratio having a value of 1.61 that is less than 2.0 (it should be between 0 and 3 with lower values indicating a better fit). The values of GFI and AGFI are 0.87 and 0.79, respectively. These scores are very close to the respective threshold values of 0.9 and 0.8 for GFI and AGFI. The CFI is 0.94, while TLI is 0.89. The RMR is

Table II. Reliability tests

Constructs	Number of Indicators	Cronbach α
Salience	9	0.73
Representativeness	8	0.80
Mental accounting	10	0.71

found to be 0.09. All indices are found to meet to the threshold values indicating that the measurement models provide good support for the factor structure.

Convergent validity is the extent to which indicators of heuristics constructs converge or share a high proportion of variance in common (Hair *et al.*, 1998). Most of the fit indices are within the acceptable range as given by Bentler (1990) for the model. This provides a direct support for reliability and convergent validity of the scales. We further examine standardized regression weights for all variables constituting each dimension which are also found to be significant ($p < 0.05$), providing support to convergent validity of the constructs (Gerbing and Anderson, 1988), as shown in Table III.

Discriminant validity of the constructs is achieved when measures of each construct converge on their corresponding true scores and can be tested by observing the covariance between pairs of constructs that must be significantly different from unity. Table IV reports the results of three pair-wise tests conducted for discriminant validity. All three tests indicated strong support for the discriminant validity criterion indicating that the conceptual domains of these dimensions do not overlap significantly ($p < 0.01$) and exhibit different patterns of relationships with other dimensions (Venkatraman, 1989).

4.2 Second-order CFA

As shown in Figure 1, all three constructs constituting heuristics are found to have positive and significant ($p < 0.01$) standardized regression weights. Of these constructs, salience ($\beta = 0.993$, $p < 0.01$) is found to be the most important dimension followed by mental accounting ($\beta = 0.821$, $p < 0.01$), while representativeness features as relatively less important ($\beta = 0.740$, $p < 0.01$). This finding is not particularly surprising in that salience affects the remembering of the instances. Because people tend to quickly scan their memories for certain cues to ease decision making especially when confronted with difficult investment choices. In fact, they take cues from every experience they have, every person they meet and every external factor they are subject to, which in turn make people suffer more from salience as compared to other sources of heuristics (Hirshleifer, 2001).

4.3 Moderating effects of investor specific influences – multiple-group analysis

A multiple-group analysis within AMOS is used to assess the moderating effects of investor specific variables on the relationship between the perceived level of heuristics and their constituent dimensions. The examination of the moderating effect is conducted in a three-step approach suggested by Byrne (2001). Two structural models are created for a comparison of statistics. The first model is an unconstrained model in which path coefficients are allowed to vary across two subgroups (e.g. member vs non-member). The second model is a constrained model in which path coefficients are constrained to be equal across the two subgroups. The next step is to test the difference between the unconstrained and constrained models. The χ^2 difference is determined to compare the χ^2 values of the unconstrained structural model and the constrained structural model. Table V presents model fits of both unconstrained and constrained models and also values of model differences for a total of eight investor related variables as moderators. Of these variables, only investment experience ($\Delta\chi^2 = 93.63$; $p < 0.01$) is noted to have a significant moderating effect.

To further investigate how investment experience influences the underlying nature and pattern of heuristics for this sample of investors, the analysis is developed by considering the relative importance of heuristics in terms of this moderator variable. Table VI shows the means and standard deviations of the individual items constituting each dimension of heuristics and the appropriate ANOVA test statistic for comparing

Item No.	Heuristics	Regression weight	*t*-value
Salience			
Q1	Expert opinions in written and visual media should be taken into consideration when investing	0.201	–
Q2	A company's stock which is often in the media with favorable news coverage should be preferred when investing	0.46**	2.50
Q3	To invest in companies that have a good brand name is important to me	0.34**	2.35
Q5	It is risky to invest in relatively unknown public companies rather than known ones	0.21*	1.75
Q6	I invest in companies whose products I like	0.41**	2.17
Q7	I invest in companies that reflect my personal values	0.65**	2.33
Q8	I prefer to invest in local firms because it benefits the local economy	0.68**	2.35
Q9	I believe that investors should purchase the stock of the company the work for if it is well run	0.38**	2.15
Q10	I believe in buying the stocks of companies in my own country	0.71**	2.35
Representativeness			
Q12	A good company's stock will perform well	0.28	–
Q14	Technical analysis increases my chance to buy a higher performing stock	0.19**	2.01
Q15	I weigh heavily a company's social responsibility when I invest	0.56***	3.28
Q16	One of my primary indicators of investing in a company is its level of social responsibility	0.44***	3.07
Q17	I do not invest in stocks whose products or services I find morally objectionable, (e.g. adult entertainment, tobacco, or that use child labor)	0.56***	3.17
Q18	Investor should not invest in companies that outsource jobs to other countries	0.91***	3.52
Q19	Investor should not invest in firms that move jobs overseas	0.88***	3.52
Q20	Blue-chip companies, such as those contained in the Dow Jones Industrial average will always be a good long-term investment	0.27**	2.43
Mental accounting			
Q23	If the actual price of the stock decreases to below its purchasing price, it should be held until it breaks even	0.64	–
Q24	I am reluctant to realize my losses (gains)	0.22**	2.39
Q25	I have unwillingness to accept losses easily and realized them	0.19**	2.15
Q26	The sadness resulting losses in my investments has a relatively greater impact on me than the joy I receive from gains	0.39***	4.09
Q27	If I lose a lot of money on a specific investment, I hesitate to invest in that instrument again	0.62***	5.25
Q28	I am more likely to check one of my winning stocks/mutual funds instead of my losing ones	0.40***	4.15
Q29	If my stock investments are declining in value, I am less likely to check their status	0.29***	3.20
Q31	We have to diversify our investments by distributing them equally among the instruments which are being considered	0.28***	3.03
Q32	When I am in need of money, I spend the incoming interest and dividends instead of selling my stocks and bonds	0.25***	2.78
Q34	If a stock does not give a cash dividend, I prefer the one that splits more often	0.27***	2.98

Notes: –, fixed for estimation. ***p* < 0.1; ****p* < 0.05; *****p* < 0.01

Table III.
First order confirmatory factor analysis

differences in mean scores. Since we have more than two independent groups to compare and also given the relatively sufficient sample size and the reasonable assumption that the sample is from a normal distribution, it was deemed appropriate to implement ANOVA test. The non-parametric equivalent of the above test (Kruskal-Wallis test) was also conducted to remove any doubts that may stem from the nature of the data. The non-parametric tests (not reported here) confirm the findings of the ANOVA test scores.

Table VI shows some significant variation in the relative importance of each group of heuristics with respect to the investment experience of investors. Three of the nine items constituting salience, i.e. "a company's stock which is often in the media with favorable news coverage should be preferred when investing" ($p < 0.01$), "I prefer to invest in local firms because it benefits the local economy" ($p < 0.01$) and "I believe in buying the stocks of companies in my own country" ($p < 0.05$) with all three items having been emphasized more highly by those responding investors with relatively lower level of investment experience. This finding is not particularly surprising in that investors with lower level of investment experience are relatively more receptive to such signals such as a company's stock with favorable media attention. They are also likely to be more sensitive to patriotic feelings and social responsiveness when compared with those who have higher level of investment experience.

There are also some significant differences in the mean scores for two of the eight items comprising representativeness – "investor should not invest in companies that outsource jobs to other countries" ($p < 0.01$) and "investor should not invest in firms that move jobs overseas" ($p < 0.05$) with both items having relatively higher mean scores for investors with lower level of investment experience. This finding might also be explained by investors' growing patriotism and social consciousness. This group of investors with low level of investment experience may tend to behave more emotionally in case of severe economic crisis.

Although Table VI displays some significant differences in the mean scores for five of the ten items constituting mental accounting "If my stock investments are declining in value, I am less likely to check their status" ($p < 0.01$), "I am reluctant to realize my losses (gains)" ($p < 0.05$), "I am more likely to check one of my winning stocks/mutual funds instead of my loosing ones" ($p < 0.05$), "when I am in need of money, I spend the incoming interest and dividends instead of selling my stocks and bonds" and "the sadness resulting losses in my investments has a relatively greater impact on me than the joy I receive from gains" ($p < 0.1$), there is not a linear pattern of variation with respect to the level of emphasis placed on each item by investor's level of investment experience.

5. Conclusions

Drawing on a thorough review and synthesis of the literature in behavioral finance and cognitive psychology, this study has made an attempt to develop an instrument to operationalize the effects of heuristics on investment decisions of individual investors.

Test No.	Description	χ^2 constrained model	χ^2 unconstrained model	Difference
1	Salience – representativeness	371.65	227.02	144.63*
2	Salience – mental accounting	252.53	167.18	85.35*
3	Representativeness – mental accounting	277.32	202.92	74.40*

Note: *$p < 0.01$

Table IV. Assessment of discriminant validity

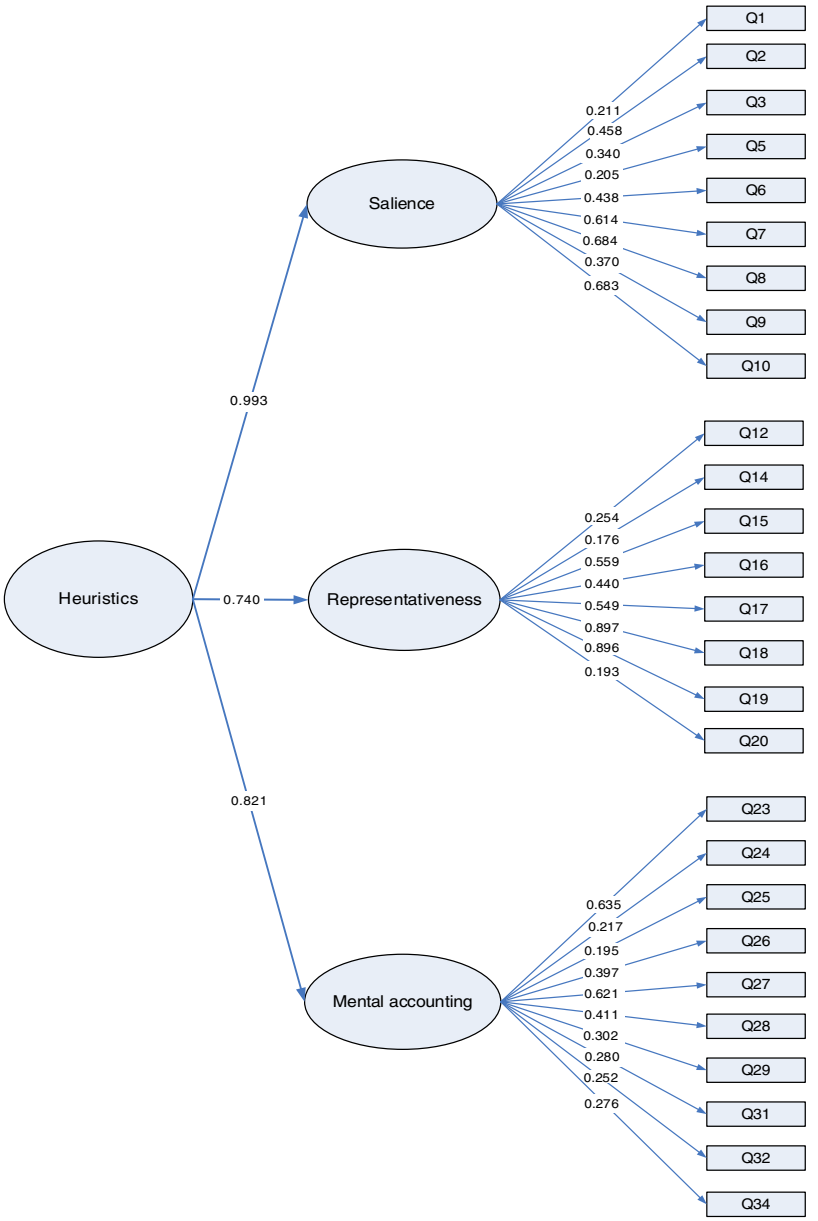

Figure 1.
Second-order confirmatory factor analysis[a]

Note: [a]The standardized regression weights are significant at $p < 0.05$

The measures proposed were empirically tested using perceptual data obtained from a sample of academics that hold personal investment portfolio or have some prior investment experience, and shown to be reliable and valid.

From a total of three sets of heuristics, salience was found to be the most important followed by mental accounting, while representativeness featured as relatively less

important. Regarding the moderating effects of investor specific characteristics on the relationship between the perceived level of heuristics and their underlying dimensions, only investment experience was noted to have a significant moderating impact.

5.1 Implications

Operational measures of heuristics in behavioral finance in terms of certain critical factors would be useful to improve the quality of decision making in investment analysis. Decision makers should be cognizant of these behavioral biases. They can use this instrument reported here to evaluate the perceptions of individual investors. First, researchers in the field of behavioral finance can use the instrument to better understand the impact of heuristics on individual investment decisions and also to develop models that relate the critical factors of heuristics to the performance of individual investment decisions. It should also be borne in mind that these attempts do not replace but complement traditional models in standard finance theory. Second, investment brokerage houses and private equity firms may also provide more effective service and guidance to their clients once they are aware of behavioral biases hampering their investment decisions. Moreover, both national and international financial regulatory authorities and supervisory agencies are likely to have superior performance in coping with financial anomalies caused by behavioral biases. Through understanding the causes of these biases, these regulatory bodies would better contribute to the effective functioning of stock markets and also protecting investors' rights.

5.2 Limitations and future research

While the findings of this study improve our understanding of this field, its limitations should also be recognized. First, relying on perceptual data introduces biases through increased measurement error and the potential for mono-method bias. Although it would be probable to make use of objective measures of heuristics, gaining access to such measures at individual investor level is extremely difficult. Another limitation of this study is that the data utilized for testing and validating this instrument was acquired from a relatively small sample of individual investors in the USA, which makes the generalization of findings somewhat limited.

In order to improve external validity of the instrument, further research would be definitely called for. Although this instrument was empirically tested and validated using data from US investors, researchers and practitioners from other countries would be able to utilize it. More research is definitely needed to investigate the impact of other contingency variables such as personality types, political and religious orientation of investors on the relationship between the perceived level of heuristics and their

Moderators	Unconstrained model χ^2	Constrained model χ^2	Δ in χ^2
Age	1403.22 (915)[a]	1469.29 (967)	66.07 (52)
Gender	987.25 (610)	1021.65 (636)	34.40 (26)
Education level	995.45 (610)	1024.49 (636)	29.04 (26)
Income level	1421.36 (915)	1485.87 (967)	64.51 (52)
Marital status	1042.94 (610)	1068.87 (636)	25.93 (26)
Number of dependents	1435.44 (915)	1497.96 (967)	62.52 (52)
Size of investment portfolio	1520.45 (915)	1579.96 (967)	59.51 (52)
Investment experience	1523.11 (915)	1616.74 (967)	93.63 (52)*

Notes: [a]Numbers in parentheses are degrees of freedom. *$p < 0.01$

Table V.
Moderating effects of investor specific influences

Dimensions	Group (years)	Mean	SD	*F*-value
Salience				
Expert opinions in written and visual media should be taken into consideration when investing	5 or less	3.92	0.75	0.23
	6-15	4.02	0.77	
	Over 15	3.94	0.80	
A company's stock which is often in the media with favorable news coverage should be preferred when investing	5 or less	3.02	1.01	4.24***
	6-15	2.47	0.96	
	Over 15	2.78	0.87	
To invest in companies that have a good brand name is important to me	5 or less	3.53	1.02	1.40
	6-15	3.20	0.95	
	Over 15	3.42	0.97	
It is risky to invest in relatively unknown public companies rather than known ones	5 or less	3.24	1.09	0.60
	6-15	3.18	0.95	
	Over 15	3.38	0.90	
I invest in companies whose products I like	5 or less	3.67	0.96	1.15
	6-15	3.39	0.99	
	Over 15	3.54	0.85	
I invest in companies that reflect my personal values	5 or less	3.59	1.17	1.16
	6-15	3.31	0.98	
	Over 15	3.33	0.99	
I prefer to invest in local firms because it benefits the local economy	5 or less	3.16	1.21	3.57***
	6-15	2.94	1.00	
	Over 15	2.61	1.15	
I believe that investors should purchase the stock of the company the work for if it is well run.	5 or less	3.49	1.13	0.49
	6-15	3.37	1.23	
	Over 15	3.58	1.06	
I believe in buying the stocks of companies in my own country	5 or less	3.76	1.18	2.78**
	6-15	3.53	1.26	
	Over 15	3.23	1.17	
Representativeness				
A good company's stock will perform well	5 or less	3.24	0.94	1.54
	6-15	2.96	0.86	
	Over 15	2.97	0.97	
Technical analysis increases my chance to buy a higher performing stock	5 or less	3.76	0.85	0.24
	6-15	3.65	0.87	
	Over 15	3.65	0.83	
I weigh heavily a company's social responsibility when I invest	5 or less	3.51	1.04	2.09
	6-15	3.12	1.14	
	Over 15	3.10	1.16	
One of my primary indicators of investing in a company is its level of social responsibility	5 or less	3.33	1.06	0.41
	6-15	3.16	1.19	
	Over 15	3.14	1.12	
I do not invest in stocks whose products or services I find morally objectionable (e.g. adult entertainment, tobacco, or that use child labor)	5 or less	4.10	1.21	1.15
	6-15	3.96	1.30	
	Over 15	3.75	1.24	
Investor should not invest in companies that outsource jobs to other countries	5 or less	3.29	1.25	4.70***
	6-15	3.02	1.29	
	Over 15	2.58	1.24	
Investor should not invest in firms that move jobs overseas	5 or less	3.18	1.23	3.19**
	6-15	3.04	1.22	
	Over 15	2.62	1.30	
Blue-chip companies, such as those contained in the Dow Jones Industrial average will always be a good long-term investment	5 or less	3.04	1.09	0.25
	6-15	3.02	1.05	
	Over 15	2.91	1.01	

Table VI.
Heuristics and investment experience

(*continued*)

Dimensions	Group (years)	Mean	SD	*F*-value
Mental accounting				
If the actual price of the stock decreases to below its purchasing price, it should be held until it breaks even	5 or less	3.00	1.06	1.47
	6-15	2.82	1.09	
	Over 15	2.65	1.09	
I am reluctant to realize my losses (gains)	5 or less	2.98	1.26	2.31**
	6-15	3.12	1.23	
	Over 15	2.65	1.18	
I have unwillingness to accept losses easily and realized them	5 or less	3.16	1.06	0.52
	6-15	2.96	0.88	
	Over 15	3.00	1.15	
The sadness resulting losses in my investments has a relatively greater impact on me than the joy I receive from gains	5 or less	3.33	1.04	2.20*
	6-15	3.06	1.10	
	Over 15	2.90	1.11	
If I lose a lot of money on a specific investment, I hesitate to invest in that instrument again	5 or less	3.86	1.08	0.36
	6-15	4.00	0.91	
	Over 15	3.86	0.97	
I am more likely to check one of my winning stocks / mutual funds instead of my losing ones	5 or less	2.84	1.23	2.25**
	6-15	2.90	1.22	
	Over 15	2.48	1.09	
If my stock investments are declining in value, I am less likely to check their status	5 or less	2.31	1.10	4.44***
	6-15	2.73	1.05	
	Over 15	2.14	1.06	
We have to diversify our investments by distributing them equally among the instruments which are being considered	5 or less	3.47	1.04	0.50
	6-15	3.41	1.05	
	Over 15	3.26	1.30	
When I am in need of money, I spend the incoming interest and dividends instead of selling my stocks and bonds	5 or less	3.16	0.98	2.03
	6-15	2.92	1.11	
	Over 15	3.32	1.06	
If a stock does not give a cash dividend, I prefer the one that splits more often	5 or less	3.61	1.05	0.13
	6-15	3.53	0.98	
	Over 15	3.62	0.94	

Notes: $n = 167$. 5 years or less = 49; 6-15 years = 49; over 15 years = 69. The mean is the average on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table VI.

underlying dimensions. Finally, as this study relies on self-reported measurements provided by individual investors, future research could make use of more direct objective measurements of the constructs, which could enhance the quality of the findings.

References

Allais, M. (1953), "Le Comportement de L'homme Rationnel Devant le Risque: Critique Des Postulats et Axiomes de L'ecole Americaine", *Econometrica*, Vol. 21 No. 4, pp. 503-546.

Andreassen, P.B. and Kraus, S.J. (1990), "Judgmental extrapolation and the salience of change", *Journal of Forecasting*, Vol. 9 No. 4, pp. 347-372.

Arbuckle, J.L. and Wothke, W. (1999), *Amos 4.0 User's Guide*, SmallWaters, Chicago, IL.

Armstrong, J.S. and Overton, T.S. (1977), "Estimating non-response bias in mail surveys", *Journal of Marketing Research*, Vol. 14 No. 3, pp. 396-402.

Aronson, E. (1999), *The Social Animal*, 8th ed., Worth Publishers, New York, NY.

Bagozzi, R.P. and Phillips, L.W. (1982), "Representing and testing organizational theories: a holistic construal", *Administrative Science Quarterly*, Vol. 27 No. 3, pp. 459-489.

Barber, B.M. and Odean, T. (2001), "Boys will be boys: gender, overconfidence, and common stock investment", *The Quarterly Journal of Economics*, Vol. 116 No. 1, pp. 261-292.

Barber, B.M., Odean, T. and Zheng, L. (2005), "Out of sight, out of mind: the effects of expenses on mutual fund flows", *Journal of Business*, Vol. 78 No. 6, pp. 2095-2120.

Barberis, N. and Huang, M. (2006), "The loss aversion/narrow framing approach to the equity premium puzzle", NBER Working Paper No. 12378, Massachusetts, pp. 1-36.

Barberis, N., Shleifer, A. and Vishny, R. (1998), "A model of investor sentiment", *Journal of Financial Economics*, Vol. 49 No. 3, pp. 307-343.

Benartzi, S. and Thaler, R. (2001), "Naive diversification strategies in defined contribution saving plans", *American Economic Review*, Vol. 91 No. 1, pp. 79-98.

Bentler, P.M. (1990), "Comparative fit indexes in structural models", *Psychological Bulletin*, Vol. 107 No. 2, pp. 238-246.

Bhandari, G. and Deaves, R. (2006), "The demographics of overconfidence", *Journal of Behavioral Finance*, Vol. 7 No. 1, pp. 5-11.

Black, F. (1986), "Noise", *Journal of Finance*, Vol. 41 No. 3, pp. 529-543.

Byrne, B.M. (2001), *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*, Lawrence Erlbaum Associates, Inc, Mahwah, NJ.

Churchill, G.A. (1979), "A paradigm for developing better measures of marketing constructs", *Journal of Marketing Research*, Vol. 16 No. 1, pp. 64-73.

Churchill, G.A. (1987), *Marketing Research: Methodological Foundations*, 4th ed., Dryden Press, Chicago, IL.

Cronbach, L.J. (1951), "Coefficient alpha and the internal structure of tests", *Psychometrika*, Vol. 16 No. 8, pp. 297-334.

DeBondt, W. and Thaler, R. (1985), "Does the stock market overreact", *The Journal of Finance*, Vol. 40 No. 3, pp. 793-805.

De Long, B.J., Shleifer, A., Summers, L.H. and Waldman, R.J. (1990), "Noise trader risk in financial markets", *Journal of Political Economy*, Vol. 98 No. 4, pp. 703-738.

Ellsberg, D. (1961), "Risk, ambiguity, and the savage axioms", *Quarterly Journal of Economics*, Vol. 75 No. 4, pp. 643-669.

Elvin, M. (2004), *Financial Risk Taking: An Introduction to the Psychology of Trading and Behavioural Finance*, 1st ed., John Wiley & Sons, West Sussex.

Emory, C.W. (1980), *Business Research Methods*, Rev. ed., Irwin, Homewood, IL.

Fama, E. and French, K.R. (1988), "Dividend yields and expected stock returns", *Journal of Financial Economics*, Vol. 22 No. 1, pp. 3-25.

Fox, C.R. and Tversky, A. (1995), "Ambiguity aversion and comparative ignorance", *Quarterly Journal of Economics*, Vol. 110 No. 3, pp. 585-603.

Gerbing, D. and Anderson, J. (1988), "An updated paradigm for scale development incorporating unidimensionality and its assessment", *Journal of Marketing Research*, Vol. 25 No. 2, pp. 186-192.

Grinblatt, M. and Han, B. (2005), "Prospect theory, mental accounting and momentum", *Journal of Financial Economics*, Vol. 78 No. 2, pp. 311-339.

Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998), *Multivariate Data Analysis*, Prentice-Hall, Englewood Cliffs, NJ.

Hirshleifer, D. (2001), "Investor psychology and asset pricing", *Journal of Finance*, Vol. 56 No. 4, pp. 1533-1597.

Huberman, G. (2001), "Familiarity breeds investment", *Review of Financial Studies*, Vol. 14 No. 3, pp. 659-680.

Jain, P.C. and Wu, J.S. (2000), "Truth in mutual fund advertising: evidence on future performance and fund flows", *Journal of Finance*, Vol. 55 No. 2, pp. 937-958.

Kadous, K., Tayler, W.B., Thayer, J.M. and Young, D. (2014), "Individual characteristics and the disposition effect: the opposing effects of confidence and self-regard", *Journal of Behavioral Finance*, Vol. 15 No. 3, pp. 235-250.

Kahneman, D. and Tversky, A. (1973), "On the psychology of prediction", *Psychological Review*, Vol. 80 No. 4, pp. 237-251.

Kahneman, D. and Tversky, A. (1979), "Prospect theory: an analysis of decision under risk", *Econometrica*, Vol. 47 No. 2, pp. 263-292.

Kahneman, D. and Riepe, M.W. (1998), "Aspects of investor psychology", *Journal of Portfolio Management*, Vol. 24 No. 4, pp. 52-65.

Kliger, D. and Kudryavtsev, A. (2010), "The availability heuristic and investors' reaction to company-specific events", *Journal of Behavioral Finance*, Vol. 11 No. 1, pp. 50-65.

Lakonishok, J., Shleifer., A. and Vishny, R. (1994), "Contrarian investment, extrapolation, and risk", *Journal of Finance*, Vol. 49 No. 5, pp. 1541-1578.

Lim, S.S. (2004), "Do investors integrate losses and segregate gains? Mental accounting and investor trading decisions", EFA 2003 Annual Conference Paper No. 87.

Mehra, R. and Prescott, E.C. (1985), "The equity premium: a puzzle", *Journal of Monetary Economics*, Vol. 15 No. 2, pp. 145-161.

Montier, J. (2002), "Global equity strategy part man, part monkey", Dresdner Kleinwort Wasserstein research report, London, pp. 1-12.

Morales-Camargo, E., Sade, O., Schnitzlein, C. and Zender, J.F. (2015), "On the persistence of overconfidence: evidence from multi-unit auctions", *Journal of Behavioral Finance*, Vol. 16 No. 1, pp. 68-80.

Nofsinger, J. (2005), *The Psychology of Investing*, 2nd ed., Prentice Hall, NJ.

Nunnally, J.C. (1978), *Psychometric Theory*, 2nd ed., McGraw-Hill, New York, NY.

Odean, T. (1999), "Do investors trade too much?", *The American Economic Review*, Vol. 89 No. 5, pp. 1279-1298.

Oran, J.S. (2008), "Behavioral finance: ivory towers are trembling", *Öneri: Marmara Üniversitesi Sosyal Bilimler Dergisi*, Vol. 29 No. 8, pp. 33-42.

Puustinen, P., Maas, P. and Karjaluoto, H. (2013), "Development and validation of the perceived investment value (PIV) scale", *Journal of Economic Psychology*, Vol. 36, June, pp. 41-54.

Ritter, J. (2003), "Behavioral finance", *Pacific – Basin Finance Journal*, Vol. 11 No. 4, pp. 429-437.

Sahi, S.K., Arora, A.P. and Dhameja, N. (2013), "An exploratory inquiry into the psychological biases in financial investment behaviors", *Journal of Behavioral Finance*, Vol. 14 No. 2, pp. 94-103.

Shefrin, H. (2002), *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*, 2nd ed., Oxford University Press, New York, NY.

Shefrin, H. and Statman, M. (1985), "The disposition to sell winners too early and ride losers too long: theory and evidence", *Journal of Finance*, Vol. 40 No. 3, pp. 777-790.

Shiller, R. (1998), "Human behavior and the efficiency of the financial system", NBER Working Paper No. W6375, Massachusetts.

Shiller, R. (2003), "From efficient markets theory to behavioral finance", *The Journal of Economic Perspectives*, Vol. 17 No. 1, pp. 83-104.

Shleifer, A. and Vishny, R. (1995), "The limits of arbitrage", NBER Working Papers, No. 5167, Massachusetts.

Sirri, E.R. and Tufano, P. (1998), "Costly search and mutual fund flows", *Journal of Finance*, Vol. 53 No. 5, pp. 1589-1622.

Simon, H. (1955), "A behavioral model of rational choice", *Quarterly Journal of Economics*, Vol. 69 No. 1, pp. 99-118.

Statman, M. (1999), "Behavioral finance: past battles and future engagements", *Financial Analysts Journal*, Vol. 55 No. 6, pp. 18-27.

Stracca, L. (2004), "Behavioral finance and asset prices: where do we stand?", *Journal of Economic Psychology*, Vol. 25 No. 3, pp. 373-405.

Subrahmanyam, A. (2008), "Behavioral finance: a review and synthesis", *European Financial Management*, Vol. 14 No. 1, pp. 12-29.

Thaler, R. (1987), "Anomalies: the january effect", *The Journal of Economic Perspectives*, Vol. 1 No. 1, pp. 197-201.

Thaler, R. (1999a), "The end of behavioral finance", *Financial Analysts Journal*, Vol. 55 No. 6, pp. 12-17.

Thaler, R. (1999b), "Mental accounting matters", *Journal of Behavioral Decision Making*, Vol. 12 No. 3, pp. 183-206.

Tversky, A. and Kahneman, D. (1973), "Availability: a heuristic for judging frequency and probability", *Cognitive Psychology*, Vol. 5 No. 2, pp. 207-232.

Tversky, A. and Kahneman, D. (1974), "Judgment under uncertainty: heuristics and biases", *Science*, Vol. 185 No. 4157, pp. 1124-1131.

Tversky, A. and Kahneman, D. (1981), "The framing of decisions and the psychology of choice", *Science, New Series*, Vol. 211 No. 4481, pp. 453-458.

Tversky, A. and Kahneman, D. (1986), "Rational choice and the framing of the decision", *The Journal of Business, Part 2: The Behavioral Foundations of Economic Theory*, Vol. 59 No. 4, pp. S251-S278.

Tversky, A. and Kahneman, D. (1992), "Advances in prospect theory: cumulative representation under uncertainty", *Journal of Risk and Uncertainty*, Vol. 5 No. 4, pp. 297-323.

Venkatraman, N. (1989), "The concept of fit in strategy research: toward verbal and statistical correspondence", *The Academy of Management Review*, Vol. 14 No. 3, pp. 423-444.

Yalcin, K.C. (2012), *Behavioral Finance: Investor Psychology*, 1st ed., Lap Lambert Academic Publishing, Saarbrücken.

Zikmund, W.G. (1991), *Exploring Marketing Research*, Dryden, Chicago, IL.

Appendix

Heuristics

The respondents were asked to indicate their level of agreement on the following statements based on five-point Likert scales (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree).

Scale 1: salience

Q1. Expert opinions in written and visual media should be taken into consideration when investing.

Q2. A company's stock which is often in the media with favorable news coverage should be preferred when investing.

Q3. To invest in companies that have a good brand name is important to me.

Q4. It is risky to invest in a company without a good reputation.
Q5. It is risky to invest in relatively unknown public companies rather than known ones.
Q6. I invest in companies whose products I like.
Q7. I invest in companies that reflect my personal values.
Q8. I prefer to invest in local firms because it benefits the local economy.
Q9. I believe that investors should purchase the stock of the company the work for if it is well run.
Q10. I believe in buying the stocks of companies in my own country.

Scale 2: representativeness

Q11. A good company's stock is a good stock (investment).
Q12. A good company's stock will perform well.
Q13. The past return performance of a stock provides information about its future performance.
Q14. Technical analysis increases my chance to buy a higher performing stock.
Q15. I weigh heavily a company's social responsibility when I invest.
Q16. One of my primary indicators of investing in a company is its level of social responsibility.
Q17. I do not invest in stocks whose products or services I find morally objectionable, (e.g. adult entertainment, tobacco, or that use child labor).
Q18. Investor should not invest in companies that outsource jobs to other countries.
Q19. Investor should not invest in firms that move jobs overseas.
Q20. Blue-chip companies, such as those contained in the Dow Jones Industrial average will always be a good long-term investment.
Q21. Blue-chip companies, such as General Electric and Dow Chemical, will always be a good long-term investment.
Q22. Large, well-known mutual funds are safe investments.

Scale 3: mental accounting

Q23. If the actual price of the stock decreases to below its purchasing price, it should be held until it breaks even.
Q24. I am reluctant to realize my losses (gains).
Q25. I have unwillingness to accept losses easily and realized them.
Q26. The sadness resulting losses in my investments has a relatively greater impact on me than the joy I receive from gains.
Q27. If I lose a lot of money on a specific investment, I hesitate to invest in that instrument again.
Q28. I am more likely to check one of my winning stocks / mutual funds instead of my losing ones.
Q29. If my stock investments are declining in value, I am less likely to check their status.
Q30. The losses in bonds and bills create sadness to people more than the same amount of losses in stock because bonds and bills are less risky.
Q31. We have to diversify our investments by distributing them equally among the instruments which are being considered.
Q32. When I am in need of money, I spend the incoming interest and dividends instead of selling my stocks and bonds.
Q33. If a stock does not give cash dividend, I prefer stock dividend instead of nothing.
Q34. If a stock does not give a cash dividend, I prefer the one that splits more often.

Corresponding author
Ekrem Tatoglu can be contacted at: ekrem.tatoglu@eas.bau.edu.tr