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Behavioral biases of finance professionals: Turkish evidence[☆]Halil Kiyamaz^{a,b}, Belma Öztürkkal^{c,*}, K. Ali Akkemik^d^a Crummer Graduate School of Business, Rollins College, Winter Park, FL 32789, USA^b Kadir Has University, Istanbul, Turkey^c Department of International Trade and Finance, Kadir Has University, Cibali, 34083 Istanbul, Turkey^d Department of Economics, Kadir Has University, Cibali, 34083 Istanbul, Turkey

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ABSTRACT

This study extends the existing literature on the determinants of behavioral biases of Turkish finance sector professionals. It examines the impact of various personal and objective attributes of finance sector professionals on their risk choices derived from their portfolio allocation, and personal wealth data. Utilizing survey data from 206 professionals, we find that these professionals take higher risk in the form of investment in equities when investing in home country firms (geographic bias) and investing in firms headquartered in their home towns (home bias). Those relying on their own predictions when making investment decisions and those with emotional biases invest less in equities. Findings further show that younger professionals, professional with less education, with lower risk aversion, and with single broker accounts are more likely to invest in equities. We also find that those with higher expected returns invest more in equities, showing overconfidence. Subsample analysis results for finance professionals suggest that portfolio managers and brokerage company professionals display differing risk taking behavior.

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1. Introduction

While traditional finance theories assume investor rationality in financial decision making, several behavioral finance researchers (i.e. Barber and Odean, 2000, 2001, 2008, French and Poterba, 1991, Ivkovic and Weisbenner, 2005, and Statman et al., 2006, among others) show that investors act irrationally in their financial decisions making. For example, Odean (1999), Barber and Odean (2001) focus on behavioral biases in the investment decisions of individual investors focusing on the selection of individual stocks, Bailey et al. (2011) show the effect of behavioral biases on the mutual fund choices of a large US brokerage investors. Findings show behaviorally biased investors tend to make poor deci-

sions about their investments, trading frequency with poor timing, resulting in poor investment performance. Behavioral finance studies also document various biases that affect the investors' decision making processes. These biases include investors' highly valuing their own predictions (overconfidence), investing only in home country securities (home bias variable), investing only in companies whose headquarter is close to their place of residence (geographical bias variable), and media coverage influencing investment decisions (emotional bias variable).

Several survey studies also attempt to explain investor behavior using various dimensions in addition to investors' biases. Georgarakos and Inderst (2011) use financial competence and show that financial advice is more important for investors with low perceived financial competence. Other studies argue investor sophistication is important for wealth. For example, Hoffmann et al. (2010) find that investors using fundamental analysis are more likely to be risk-takers, have high trading volumes, and are overconfident. van Rooij et al. (2011) report that basic and self-assessed financial literacy is positively related to stock market participation using Dutch household data. Dorn and Sengmuller (2009) find that excessive trading occurs for entertainment purposes for German brokers' clients. Nicolosi et al. (2009) report that, despite their irrational behavior, investors learn from their investment experiences. Many other studies (Jacobsen et al., 2014; Halko et al., 2012; Heimer, 2014; Mugerman et al., 2014) use

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gender, marital status, co-workers' impact, financial literacy, and cultural differences to explain investor behavior.

Previously, [Fuertes et al. \(2014\)](#) with actual individual investor trade data and [Ozturkkal \(2013\)](#) with survey study on professional individual investors documented that the investors in this emerging market are under-diversified. [Ozturkkal \(2013\)](#) shows that male investors trade more and the number of trades increases with the investor's equity portfolio increase as well as when diversification level increases. The findings suggest that male investors being more confident than females in their investment decisions and have better portfolio diversification choices with increasing confidence. Our study depicts the different levels of finance professionals and the variances in their behavior.

The growing behavioral finance literature helps us uncover a variety of decision-making biases in how investors use in decision making. This study extends the existing literature on the determinants of the risk choices and preferences of investors by using a survey conducted on Turkish finance professionals. Our study aims to explain the risk taking behaviors of these professionals regarding their investment choices (i.e. equity investment) and uses the proportion of funds invested in equities as a proxy for a risk measure. Our explanatory variables include the following categories: behavioral bias, demographic, risk, and information variables.

Providing evidence from the risk taking behavior of Turkish professionals is interesting and important for several reasons. First, it will provide additional evidence on growing literature on behavioral finance that demonstrate how a variety of decision-making biases influence investment decision and potential outcomes. Second, the share of emerging markets in global investments and total portfolio value and number of the investment funds in Turkey has increased during the last two decades. There are very few survey studies on investment choices of finance professionals in emerging markets. This study provides additional evidence on the issue. Third, the Turkish market has been experiencing a high turnover ratio (107.7%) measured by trading volume regarding market capitalization. Korean and Chinese markets are two other similar markets with high share turnover ratios.¹ The existence of high turnover indicates a large amount of new information coming to the market. As a result, this market may provide a laboratory environment for testing markets with high turnover for signs of behavioral biases. This may further provide information advantages to finance professionals over other investors and hence influence their investment choices.

Our study contributes to the literature in the following ways. First, to our knowledge, this is the first behavioral finance survey study carried out with an emphasis on behavioral biases with different types of finance sector professionals in Turkey. It is increasingly important to understand investment behaviors of professionals for individual as well as institutional investors. Second, we examine whether finance sector professionals have an information advantage over other individual investors and whether they are subject to behavioral biases to a smaller extent. Specifically, we analyze the trading behavior of finance sector professionals by measuring their investment choices and risk attitudes. We use multiple categories of variables to explain their behaviors. Third, a unique dataset is obtained through the survey of portfolio managers. To collect data, we used a questionnaire similar to one employed by [Dorn and Huberman \(2005\)](#). The survey includes both objective and subjective attributes such as actual portfolio and trading choices, and self-reported personal attributes.

By using the proportion of investment in equities as the dependent variable, we find that finance professionals who rely on their

own predictions in investment decisions and have emotional biases are less likely to invest in equities and those with geographical and home biases are more likely to invest in equities. We further find that younger and less educated finance professionals have smaller portions of their funds invested in equities. Among the risk variables considered, we find that respondents with a higher number of transactions invest more in equities while those who classify themselves as risk averse put a smaller portion of their wealth in equities. We finally note that a higher return expectation by finance professionals leads to a larger portion of funds invested in equities, showing overconfidence in their decisions. We find the source of information being insignificant in explaining the risk taking behavior of finance professionals. Dividing the sample into two subsamples shows that statistically significant behavioral variables continue to be significant for the manager subsample while only *own predictions* and *geographical bias* variables are significant in the brokerage company professional subsample.

The rest of the paper is organized as follows. The Section 2 reviews the literature on biases of investors' trading behavior. Section 3 describes the data, method, and hypotheses. The next section reports the empirical findings and interpretation of results. The final section concludes the study.

2. Literature review

Investor irrationality is observed by several behavioral finance researchers (i.e. [Barber and Odean, 2000, 2001, 2008](#), [French and Poterba, 1991](#), [Ivkovic and Weisbenner, 2005](#), and [Statman et al., 2006](#), among others). The question of how investors decide to invest is investigated using survey studies from various perspectives.

Among them, several empirical studies ([French and Poterba, 1991](#); [Odean, 1998](#); [Barber and Odean, 2000](#), [Bailey et al., 2011](#) among others) in behavioral finance provide evidence that investors are subject to various behavioral biases. One such bias is 'home bias'. [French and Poterba \(1991\)](#), [Ivkovic and Weisbenner \(2005\)](#), and [Grinblatt and Keloharju \(2001\)](#) report that investors often focus on local stocks in their investments.

Another bias is overconfidence bias. The effect of overconfidence in financial markets is studied and documented. For example, [Odean \(1998\)](#) finds that overconfidence increases trading volume, volatility and liquidity in markets. Overconfident traders have under-diversified portfolios. [Odean \(1998\)](#) reports that traders believe their information is superior to others and they overestimate their abilities. Findings also show that overconfident traders have lower returns and riskier portfolios. [Barber and Odean \(2000\)](#) confirm that investors with the most active trades have lower returns. [Graham et al. \(2009\)](#) report that if investors are more competent they are less subject to home bias but they trade more compared to other investors.

[De Long et al. \(1990\)](#), taking a contrary view, show that overconfident traders have higher expected returns because they may assess risk incorrectly. Noise traders who act irrationally with less information can change the direction of prices from fundamental values. Therefore, sophisticated investors may refrain from holding positions against them. [Gervais and Odean \(1997\)](#) note that there is a survivorship bias among traders, as over time unsuccessful traders will disappear from markets and successful traders will control more wealth and become overconfident. This outcome proves that the process of becoming wealthy leads traders to become overconfident. [Georgarakos and Inderst \(2011\)](#) use financial competence and show that financial advice is more important for investors with low perceived financial competence. [Hoffmann et al. \(2010\)](#), using brokerage customers in the Netherlands, find that investors using fundamental analysis are more likely to be risk-takers, have high trading volumes, and be overconfident.

¹ World Federation of Exchanges, September 2012, available online at <http://www.world-exchanges.org/statistics/monthly-reports>.

Menkhoff and Nikiforow (2009) argue that many behavioral finance patterns are so deeply rooted in human behavior that they are difficult to overcome by learning. By using German fund managers, the authors test their argument by splitting the sample into endorsers and non-endorsers of behavioral finance. They find that endorsers view markets differently as they are under stronger influences from behavioral biases. Muradoglu and Yazici (2002) showed the insider trading possibilities of recommendations in weekly publications and imperfections and inefficiencies of the Turkish stock market. Hence, Muradoglu et al. (2005) showed the subjective forecasting capacity of professional portfolio managers to be superior to time series models.

Overconfidence is also related to financial literacy. The expectation is that there is a behavioral difference between sophisticated and non-sophisticated investors such that sophisticated investors are more educated and financially literate, and, hence, more rational. Kimball and Shumway (2010) show that financial education is positively related with sophistication. van Rooij et al. (2011) report that basic and self-assessed financial literacy is directly related to stock market participation based on Dutch household data. Dorn and Sengmuller (2009) find that excessive trading occurs for entertainment in their analysis of surveys of transaction records for the period 1995–2000 for German brokers' clients.

There are also a number of studies using self-reported personal attributes. For example, Jacobsen et al. (2014), Halko et al. (2012), and Heimer (2014) investigate investment behavior based on gender. Jacobsen et al. (2014) report that men hold more stocks and are more optimistic than women. After controlling for optimism, the difference disappears. The authors also report an inverse relationship between wealth and optimism. Halko et al. (2012), using Finnish data, find that women are less likely to take part in stock markets. Risk taking appears to be a major difference between male and female financial decision making. The authors further report that investment advisors are more willing to take risk than others. Older investors take less risk, and risk taking increases with income and decreases with the level of wealth. Heimer (2014) also supports the previous findings that males have more active investments while married investors have lower active investments. Heimer (2014) reports that social interaction and active investing are directly correlated. In the same vein of studies, Roth and Voskort (2014) run an experiment on risk taking with finance professionals and non-professionals, where professionals perform better than non-professionals. The authors find that males show more risk taking behavior than females. Professionals take lower risk for the portfolios they manage for their clients compared to their own portfolios. They further find that forecasts by professionals are more accurate than those by non-professional investors.

Another stream of study focuses on factors including financial literacy, impact of co-workers, risk perception, and investor mood to explain investor behaviors. For example, Guiso and Jappelli (2008) report that financial literacy and diversification are strongly correlated. Similarly, van Rooij et al. (2011) find investors with low financial literacy are less likely to invest in stocks and higher education increases stock market participation. Shu (2010) argues investor mood affects stock investments and positive mood relates to higher stock market levels. Beckmann et al. (2008) compare cultural differences such as individualism, power distance, masculinity and uncertainty avoidance of fund managers from the US, Germany, Japan, and Thailand and report complex cross-cultural differences. Other studies argue that investor sophistication is important for wealth. For example, Nicolosi et al. (2009), using US broker data for the period of 1991–1996, argue that the learning curve is valid for trading experience, and that, despite their irrational behavior, investors learn from investment experience. This would be applicable for rational investors and finance sector professionals

in a natural environment who learn from their experiences. Hoffmann et al. (2013), using survey data, measure change in risk perception and return expectations. Findings show that investors with higher levels of and upward revisions of return expectations are more likely to trade, have higher turnover, trade larger amounts per transaction, and are more likely to use derivatives. Investors with higher levels of and upward revisions in risk tolerance are more likely to trade, have higher buy–sell ratios, use limit orders more often, and hold riskier portfolios. Investors with higher levels of risk perception are more likely to trade, have higher turnover, have lower buy–sell ratios, and hold riskier portfolios.

Although the investment choices and behavioral biases literature is extensively studied for developed markets, there is a lack of studies in emerging markets. This study fills the gap in the literature by studying and providing evidence on the behavioral biases and risk taking behaviors of investment professionals in Turkey.

3. Data and model

3.1. Data

The survey questionnaire (reported in Appendix Table A.2 in Turkish only) included 76 questions and was sent to 206 finance sector professionals either through e-mail or as printed copy during July/September 2012. The completed surveys were collected by the brokerage company and the Institutional Investor Association of Turkey (TKYD). Two groups of finance sector professionals were surveyed: The first group includes employees of a major brokerage company (134 people all employees of the company responded). The company performed the survey and returned the results to the researchers. The second group includes portfolio managers working at portfolio management companies (72 managers, majority of the portfolio managers of all companies as members of the association responded). The second group's survey was finalized with the collaboration of TKYD. TKYD performed the research on behalf of the researchers. We employed the questionnaire used by Dorn and Huberman (2005), which includes questions about socio-demographic properties, perceived characteristics, wealth, financial literacy, investment preferences, risk perception, and choices (see Table 1).

The summary statistics of the survey and the variables used in the empirical analysis are presented in the next section. Table 2 reports descriptive statistics of the variables. For example, the average age of the respondents is 33.6 years. 63.4% of the respondents are male, and 62.6% are married. The average amount of work experience is 8.7 years.

3.2. Model and variables

We run ordered logit regressions to examine the determinants of risk choices and the speculative preferences of finance sector professionals for their own portfolios. A list of dependent and independent variables and their descriptions are presented in Appendix A. Our dependent variable is an ordinal variable defined as the share of equities (EQ) in investors' portfolios. This variable takes values from 0 to 1 (100%). We specify the following empirical model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

where Y is the dependent variable and X_1 , X_2 , X_3 , and X_4 are vectors of independent variables explained below. X_1 refers to the set of variables pertaining to behavioral biases. X_2 refers to risk variables related to investment decisions. X_3 includes socio-demographic variables. Finally, X_4 includes variables about the sources of information. The terms α and β are parameters to be estimated, and ε is the error term. We adopt a hierarchical

Table 1
Sample selection.

Period	Survey	Number of people	
2012 Fall	TKYD	72	Total
		64	Portfolio manager
		7	Research analyst
		1	Sales–Portfolio management
2012 Fall	Broker	134	Employees
		206	Grand total

Table 2
Summary statistics.

Variable	Entire sample					Subsample 1: managers only					Subsample 2: others				
	Obs	Min	Max	Mean	Stdev	Obs	Min	Max	Mean	Stdev	Obs	Min	Max	Mean	Stdev
EQ	181	0	1	0.30	0.29	72	0	1	0.16	0.26	109	0.01	1	0.39	0.28
OWNPREDICTIONS	206	0	1	0.38	0.49	72	0	1	0.94	0.23	134	0	1	0.07	0.26
HOMEBIAS	200	0	1	0.48	0.50	72	0	1	0.64	0.48	128	0	1	0.38	0.49
GEOGBIAS	200	0	1	0.05	0.22	72	0	1	0.03	0.17	128	0	1	0.06	0.24
EMOTBIAS	200	0	1	0.31	0.46	72	0	1	0.19	0.40	128	0	1	0.38	0.49
AGE	199	3.04	3.89	3.52	0.19	72	3.18	3.83	3.55	0.17	127	3.04	3.89	3.49	0.19
KID	206	0	3	0.59	0.76	72	0	2	0.60	0.76	134	0	3	0.58	0.77
MALE	205	0	1	0.63	0.48	72	0	1	0.76	0.43	133	0	1	0.56	0.50
MARRIED	204	0	3	0.68	0.56	70	0	1	0.73	0.45	134	0	3	0.65	0.60
EDU	203	0	9	0.88	0.68	69	0	9	0.91	1.07	134	0	1	0.87	0.34
EXP	206	−1.11	3.22	1.79	1.12	72	0	3.22	2.09	0.89	134	0	3.14	1.62	1.20
MANAGER	206	0	1	0.35	0.48										
RISKVERSE	198	0	1	0.14	0.35	72	0	1	0.17	0.38	126	0	1	0.13	0.33
NRFUND	206	0	5.30	1.41	1.29	72	0	5.30	2.40	1.41	134	0	3.56	0.88	0.83
TRAN	206	0	5	2.58	1.40	72	0	5	2.08	1.35	134	1	5	2.84	1.35
INTERNET	200	0	1	0.72	0.45	72	0	1	0.57	0.50	128	0	1	0.80	0.40
MULTIPLE	197	0	4	1.39	1.21	71	0	1	0.13	0.34	126	0	4	2.10	0.92
FORBID	206	0	1	0.11	0.31	72	0	1	0.31	0.46	134	0	0	0.00	0.00
EXPRETURN	169	1	5	3.69	0.65	49	1	5	3.98	0.78	120	3	5	3.57	0.55
FINLIT	206	0	4	1.97	1.33	72	2	4	3.29	0.72	134	0	4	1.25	0.99
COMPANYREPORT	206	0	5	2.41	1.77	72	0	1	0.56	0.50	134	0	5	3.40	1.35
INTERNATIONAL	206	0	5	2.88	1.75	72	0	1	0.94	0.23	134	0	5	3.93	1.25
NEWSPAPER	206	0	5	1.80	1.55	72	0	1	0.24	0.43	134	0	5	2.63	1.27
EXPERTS	206	0	5	2.58	1.77	72	0	1	0.54	0.50	134	0	5	3.67	1.11
FRIENDS	206	0	5	1.50	1.50	72	0	1	0.07	0.26	134	0	5	2.28	1.32

approach in our analysis and add the set of variables one at a time. In the baseline model (Model 1), we only include variables related to personal behavioral biases. In Model 2, besides the personal biases, we also include some socio-demographic variables such as age, number of children, education, work experience, and dummy variables about gender, marital status, and the position at the company (manager or broker). Model 3 enlarges the set of variables in Model 2 by including variables that affect the decisions about portfolio investments, including risk attitude, number of funds, number of transactions, number of different companies worked, Internet use, financial literacy, and expected returns to investment. Finally, Model 4 includes a set of variables pertaining to the sources of information used in making investment decisions. In what follows, we explain the set of independent variables included in each model and how they are constructed.

First, we start with the set of variables about personal behavioral bias proxies. OWN PREDICTIONS, HOMEBIAS, GEOGBIAS, and EMOTBIAS measure, respectively, own predictions, home bias, geographical bias, and emotional bias. OWN PREDICTIONS is a dummy variable based on a question in the questionnaire and takes the value 1 if the respondent strongly agrees that she relies on her own predictions and expectations while making her investment decisions, 0 otherwise. HOMEBIAS is measured by the question: “I prefer to invest in assets in Turkey and I do not prefer to invest in foreign equities”. This variable takes the value 1 if the respondent does not invest in equities of foreign country origin, and 0 if she does not invest or is not certain. GEOGBIAS is measured by the

question: “I prefer to invest in a company’s stock whose headquarter is near my area of residence”. This variable takes the value 1 if the respondent prefers to invest in equities whose headquarter is close to her place of residence, 0 if she does not invest or is not certain. HOMEBIAS is measured in country level (foreign vs. domestic) while GEOGBIAS is measured in city or local level EMOTBIAS is measured by the question: “My emotions will change with the news in media for a company. Sometimes I regret this decision”. This variable takes the value 1 if the respondent does not change her decision about equity investment and sometimes she regrets, 0 if she does not agree or not certain. The answers for the behavioral bias questions in the questionnaire are specified as “yes”, “no”, or “I am not sure”. The abovementioned behavioral bias dummy variables take the value 1 if the answer is “yes” and 0 otherwise. If the value of GEOGBIAS is 1 the respondent prefers to invest in equities whose headquarter is close to her place of residence. If the value of HOMEBIAS is 1, the respondent does not invest in foreign equities. If the value of EMOTBIAS is 1 the respondent does not change her decision about equity investment.

Socio-demographic control variables include the number of children in the family (KID), experience at work (EXP), natural logarithm of age (AGE), a dummy variable for education (EDU), and additional dummy variables for gender (MALE which takes the value 1 if male and 0 otherwise), managerial position (MANAGER), and marital status (MARRIED, which takes the value 1 if married and 0 otherwise). These variables are objective attributes as used in [Dorn and Huberman \(2005\)](#). The variable EDU is a dummy variable taking the value 1 if the respondent has business or economics

education either at the undergraduate or graduate levels, and 0 otherwise. The variable EXP is the natural logarithm of the years of experience and it is used as a proxy for the learning effect. The dummy variable MANAGER takes the value 1 if the job description of the respondent is manager, and 0 otherwise.

Additional variables in Model 3 take into account risk-taking in investment decisions. We operate risk tolerance by constructing a dummy variable, RISKVERSE, which is based on the subjective evaluation of the respondent regarding risk tolerance. The respondent evaluates her risk tolerance on a scale from 1 to 5. We classify the answers 4 and 5 as risk-lovers and create a dummy variable taking the value 1 for these two answers and 0 if otherwise (i.e., risk neutral and risk averse). If the respondent's company forbids equities trading by its staff, we capture this with the dummy variable FORBID which takes the value 1 if the company forbid and 0 otherwise. TRAN is the natural logarithm of the number of equity transactions by the participants. A higher value for this variable may imply relatively more risk taking behavior. If a person works with more than one broker, it implies that the respondent is more tolerant to equity trading and a higher level of risk taking. Trading behaviors of the respondents are captured by the following dummy variables. MULTIPLE shows that the respondent has accounts in more than one intermediary agency and takes the value 1 if the respondent has more than one account and 0 otherwise. INTERNET shows that the respondent trades online and takes the value 1 if the respondent trades online and 0 otherwise. We also measure financial literacy (FINLIT) by using a financial literacy index similar to van Rooij et al. (2011). This variable is constructed as the sum of the correct answers given to four questions related to financial literacy. These questions are as follows: (i) "IMKB100 implies the return to 100 stocks in the Istanbul Stock Exchange", (ii) "The criterion used to measure the performance of portfolio is benchmark return", (iii) "The availability of a bid price of a stock implies there is no demand but supply of stocks", and (iv) "To protect your wealth against inflation, a high nominal interest rate is sufficient". The answers to these questions are "yes" and "no". FINLIT takes a minimum value of 0 if all answers are incorrect and a maximum value of 4 if all answers are correct. EXPRETURN is a variable demonstrating the subjective evaluation of the respondent about the expected return from the invested equities (1 = very low or none, 2 = low, 3 = adequate, 4 = good, 5 = excessive). Finally, NRFUND is the natural logarithm of the number of funds in the portfolio.

We use the following five variables as the sources of information in making investment decisions: information from newspapers and magazines (NEWSPAPER), information from company reports (COMPANYREPORT), advice and information from experts (EXPERTS), advice from friends (FRIENDS), information from international sources (INTERNATIONAL). These variables are measured using the relevant question: "Which of the following sources affect your investment decisions?" For each of the sources of information above, the respondent chooses a number on a scale from 1 to 5 where 1 corresponds "not at all", while 5 means "very much". We take the answers 4 and 5 as implying a strong influence of a given factor and hence create a dummy variable taking the value 1 for these two answers and 0 otherwise.

Table 2 reports descriptive statistics of the variables. Some quick observations are noteworthy here. 35% of the respondents have managerial positions. About 88% of the respondents have an economics or business training at the college level. In our sample, 49% of the respondents show home bias, 5% exhibit geographical bias, and 31% exhibit emotional bias (19% for managers). The average score for financial literacy questions is 2.0 out of 4 (3.2 for managers) which indicates a fair degree of financial literacy. 14% of the respondents consider themselves as risk-averse. The percentage of the respondents receiving information from friends and newspapers are far lower than those receiving information

from company reports, experts, and international sources. This number is significantly higher for others working in brokerage company than managers.

In addition, Table 3 provides pairwise correlations of the variables used in the regressions. Behavioral bias, risk-taking, and socio-demographic variables do not exhibit serious correlation with each other. EXP (work experience) and KID (number of children in the family) variables are highly correlated with AGE. Cross-correlations among the variables indicating the sources of information, NEWSPAPER, COMPANYREPORT, EXPERTS, FRIENDS, and INTERNATIONAL, are highly correlated with other with correlations coefficients larger than 0.7. Dropping these variables from the analysis boils down to Model (3). However, for the purpose of exposition we prefer to report the results for the model including these variables (Model 4) as well. As a matter of fact, the information variables turn out to be statistically insignificant, and the statistical significance and the signs of the coefficients of the remaining variables do not exhibit any change. The correlations between the variables about the sources of information and the following variables are also high: the manager dummy variable (MANAGER), financial literacy (FINLIT), the dummy variable for having multiple accounts (MULTIPLE), and own predictions (OWNPREDICTIONS).

4. Empirical findings

4.1. Entire sample

Tables 4 and 5 report the logit regression results for the entire sample where EQ is the dependent variable. Due to missing data for the EXPRETURN variable, the number of observations drops to 133. Table 4 presents logit regression results and Table 5 presents the marginal effects. We interpret the results in Table 5 as we deem that the marginal effects are important. The results of the logit regressions in Table 4 show that all models other than Model 4 suffer from omitted variable bias. Therefore, we focus our attention on the results from Model 4.

Among the behavioral biases, only own predictions and geographical bias variables are statistically significant at least at 5% level in Model 1. When we include all variables in our analysis in Model 4, we find that three of the behavioral bias variables are statistically significant at 5% level and one is at 10% level. The sign of the coefficients is negative for the OWNPREDICTIONS and EMOTBIAS and positive for the remaining variables (HOMEBIAS and GEOGBIAS). This means that investors with geographical and home bias are more likely to have a larger share of equities in their portfolios and then tend to take higher risk, i.e., the respondents who do not prefer to invest in foreign equities are more likely to invest in equities in their portfolios.

On the other hand, investors who rely more on their own predictions in investment decisions and investors with emotional biases are less likely to hold a larger share of equities. Hence, they tend to take lower risk.

Among the socio-demographic variables, only the coefficient of age is statistically significant and its sign is negative. Accordingly, this finding implies that older respondents are more likely to have smaller portions of their portfolios invested in equities. In the set of risk-taking variables, three variables are statistically significant at least at 10% level. The coefficient of RISKVERSE is statistically significant at 10% level and negative while the coefficients of TRAN and EXPRETURN are also statistically significant at least at 5% and positive. These findings mean that the respondents with a higher number of transactions are more likely to have large share of equities in their portfolios, i.e., they are more likely to show risk-taking behavior. The positive coefficient of expected return implies rational behavior; when the expected return is high, the likelihood that the share of equities in the portfolio

Table 4

Logit regression results for the entire sample. This table reports logit regression results using the proportion of funds invested in equity (EQ) as dependent variable.

	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>Behavioral variables</i>								
OWNPREDICTIONS	−1.801	(0.309)***	−1.690	(0.396)***	−1.462	(0.519)***	−1.362	(0.577)**
HOMEBIAS	0.189	(0.274)	0.418	(0.304)	0.766	(0.350)**	0.830	(0.374)**
GEOGBIAS	1.107	(0.514)**	1.004	(0.580)*	1.295	(0.620)**	1.339	(0.668)**
EMOTBIAS	−0.333	(0.296)	−0.614	(0.326)*	−0.694	(0.377)*	−0.687	(0.391)*
<i>Demographic variables</i>								
AGE			−2.151	(1.263)*	−2.648	(1.592)*	−2.878	(1.654)*
KID			−0.398	(0.250)	−0.429	(0.294)	−0.456	(0.301)
MALE			0.254	(0.326)	−0.088	(0.381)	−0.027	(0.402)
MARRIED			0.320	(0.312)	0.413	(0.344)	0.413	(0.357)
EDU			−0.910	(0.410)**	−0.552	(0.464)	−0.576	(0.477)
EXP			0.322	(0.203)	0.310	(0.288)	0.342	(0.293)
MANAGER			−1.080	(0.388)***	−0.374	(0.463)	−0.223	(0.511)
<i>Risk variables</i>								
RISKAVERSE					−1.333	(0.543)***	−1.286	(0.547)***
NRFUND					−0.223	(0.159)	−0.230	(0.164)
TRAN					0.474	(0.137)***	0.484	(0.141)***
INTERNET					0.719	(0.475)	0.646	(0.493)
MULTIPLE					−0.219	(0.222)	−0.204	(0.252)
FORBID					−1.622	(0.877)*	−1.534	(0.887)*
EXPRETURN					0.765	(0.283)***	0.720	(0.299)**
FINLIT					−0.099	(0.184)	−0.056	(0.197)
<i>Information variables</i>								
COMPANYREPORT							−0.074	(0.194)
INTERNATIONAL							0.006	(0.256)
NEWSPAPER							−0.071	(0.221)
EXPERTS							0.186	(0.242)
FRIENDS							0.039	(0.199)
Observations	177		167		133		133	
Log likelihood	−430.3		−389.4		−311.7		−311.2	
Pseudo R ²	0.045		0.082		0.108		0.109	

Note: Coef.: Coefficient, S.E.: Standard error.

* $p < 0.01$ indicate the statistical significance.** $p < 0.05$ indicate the statistical significance.*** $p < 0.10$ indicate the statistical significance.

increases. The subjective measure of risk aversion has a statistically significant and negative effect on portfolio allocation. We also note that forbidding by the company of equity trading by its staff has a weakly significant negative coefficient but its marginal effect is statistically insignificant. Furthermore, the results show that financial literacy of the respondents does not have a statistically significant impact.

The coefficients of none of the variables about the sources of information are statistically significant.² Overall, we conclude that two behavioral biases (own predictions and the geographical bias) are important in explaining portfolio allocation decisions and the sources of information do not have a statistically significant explanatory power.

4.2. Subsamples

Our data come from two separate surveys conducted with portfolio managers and professionals working at brokerage companies. We split our sample into two subsamples, one consisting only of the respondents who hold a managerial post (Subsample 1) and one with the remaining professionals (Subsample 2). The summary statistics for these two subsamples are presented. In Table 2. In terms of their portfolio allocations these two groups exhibit

diversity. While the managers allocate far a lower portion (only 16%) of their portfolios to equities the other professionals keep larger portion (39%). In addition, they also differ in behavioral biases. While the managers depend largely on their own predictions (with a mean of 94%), other professionals do not (mean: only 7%). The mean value for home bias is much larger for managers compared to other professionals, and the mean value for emotional bias for other professionals is twice large as that of the managers. Risk-taking behavior variables show somehow similarity for both groups. However, there are stark differences between these two groups in some of the risk-taking variables. Compared to other professionals, managers have a far higher number of funds under management, are more financially literate, more of them face forbidding of equity trading by their companies, and relatively few of them keep multiple accounts. Finally, the mean values for the information variables are much higher for other professionals than managers. Based on our causal observations, we expect the managers to be more professional than the other sub-sample and to have better training and experience in asset management. In fact, on average, they have higher financial literacy and lower emotional bias. Therefore, managers and the other professionals exhibit differences. Accordingly, we run logit regressions for these subsamples and compare the results. We especially focus our attention in behavioral biases, information sources, and the determinants of investment decisions. It is important to note that the cross-correlations among information variables are low while they are significantly high in the full sample. This is because the pairwise correlations are high in the sample including brokerage company professionals. Accordingly, we choose Model 4 for manager subsample also for the brokerage company professionals for the sake of comparison.

² One option here is to drop these variables altogether from the model, as exemplified by Model (3) in Table 5. It is observed that the results of the logit regression and the marginal effects do not change qualitatively. We deem it important to report the results for the information variables. Therefore, we focus on Model 4 rather than Model 3.

Table 5
Logit regression results for the entire sample: marginal effects. This table reports the marginal effects for the logit regressions using the proportion of funds invested in equity (EQ) as d the dependent variable.

	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>Behavioral variables</i>								
OWNPREDICTIONS	−0.292	(0.056) ^{***}	−0.256	(0.066) ^{***}	−0.096	(0.047) ^{**}	−0.087	(0.049) [*]
HOMEBIAS	0.029	(0.042)	0.059	(0.044)	0.042	(0.023) [*]	0.045	(0.024) [*]
GEOGBIAS	0.121	(0.041) ^{***}	0.104	(0.044) ^{***}	0.043	(0.018) ^{***}	0.044	(0.018) ^{***}
EMOTBIAS	−0.052	(0.049)	−0.093	(0.053) [*]	−0.041	(0.027)	−0.040	(0.027)
<i>Demographic variables</i>								
AGE			−0.304	(0.181) [*]	−0.141	(0.093)	−0.151	(0.096) [*]
KID			−0.056	(0.036) [*]	−0.023	(0.017)	−0.024	(0.017)
MALE			0.037	(0.049)	−0.005	(0.020)	−0.001	(0.021)
MARRIED			0.045	(0.044)	0.022	(0.019)	0.022	(0.020)
EDU			−0.129	(0.061) ^{**}	−0.025	(0.019)	−0.026	(0.019)
EXP			0.045	(0.029) [*]	0.016	(0.016)	0.018	(0.016)
MANAGER			−0.165	(0.066) ^{***}	−0.021	(0.028)	−0.012	(0.029)
<i>Risk variables</i>								
RISKAVERSE					−0.113	(0.070) [*]	−0.106	(0.068) [*]
NRFUND					−0.012	(0.009)	−0.012	(0.009)
TRAN					0.025	(0.010) ^{***}	0.025	(0.010) ^{***}
INTERNET					0.047	(0.039)	0.041	(0.038)
MULTIPLE					−0.012	(0.012)	−0.011	(0.013)
FORBID					−0.161	(0.141)	−0.146	(0.134) [*]
EXPRETURN					0.041	(0.017) ^{**}	0.038	(0.018) [*]
FINLIT					−0.005	(0.010)	−0.003	(0.010)
<i>Information variables</i>								
COMPANYREPORT							−0.004	(0.010)
INTERNATIONAL							−0.000	(0.013)
NEWSPAPER							−0.004	(0.012)
EXPERTS							0.010	(0.013)
FRIENDS							0.002	(0.010)
Observations	177		167		133		133	
Log likelihood	−430.3		−389.4		−311.7		−311.2	
Pseudo R ²	0.045		0.082		0.108		0.109	

* $p < 0.01$ indicate the statistical significance.

** $p < 0.05$ indicate the statistical significance.

*** $p < 0.10$ indicate the statistical significance.

The results for the logit regressions and the marginal effects are presented in Table 6. The left panel shows the results for managers and the right panel shows the results for finance professionals in brokerage companies. The former sample has 45 observations due to missing data for EXPRETURN variable while the latter sample has 88 observations. We interpret the marginal effects below.

The most striking result is that none of the marginal effects for the brokerage company professionals are statistically significant. Therefore, the results from the logit regressions for this subsample are statistically weak. The results of the marginal effects for the behavioral bias variables in the manager subsample reveals that own predictions, home bias, and emotional bias have statistically significant coefficients, and the signs are the same as those for the entire sample in Table 5 except for geographical bias. The respondents in this subsample who rely more on their own predictions and with emotional bias are less likely and those with geographical bias are more likely to hold a higher share of equities in their portfolios. For the other professionals subsample, while the marginal effects are statistically insignificant, the results from the logit regression indicate that the relation between own predictions and share of equities in the portfolio is the same as that in professionals sample, GEOGBIAS takes the opposite sign compared with the managers subsample, i.e., those professionals with geographical bias tend to have a larger share for equities in their portfolios. The assumption of the surveyed people is that investment in unknown territories tends to be riskier than the environment that investors are familiar. Statistically significant positive coefficient for HOMEBIAS variable supports this view for managers. Among the variables about risk tolerance in investment decisions, the coefficients of RISKAVERSE, TRAN, MULTIPLE, and

EXPRETURN are statistically significant for brokerage company professionals' sample. However, as explained above the marginal effects are statistically insignificant. The statistically significant variables for the managers subsample are TRAN and FORBID. These results conform to the results for the entire sample. The managers who trade more, captured by the variable TRAN, are more likely and the managers whose companies forbid trading of equities by their staff are less likely to have more equities in their asset allocations. Logit regression results for the brokerage company professionals imply that the professionals who have higher expected returns and those who trade more are likely to have more equities in their asset allocations whereas more risk-averse respondents are less likely to do so. While having multiple accounts in financial intermediaries and being risk-averse negatively affect this likelihood for professionals, these do not hold for managers. In the case of information sources, it is found that only NEWSPAPER and FRIENDS for the managers' subsample have a statistically significant explanatory power at 5% level. Managers who receive more advice from friends are less likely and those receiving advice from newspapers are more likely to hold more equities in their portfolios.

Overall findings show that even after controlling demographic, risk, and information variables, Turkish finance professionals appear to exhibit behavioral biases in their risk taking behavior that may have various implications. First, behaviorally biased investors tend to make poor decisions about their investments, trading frequency with poor timing, resulting in poor investment performance and higher risk taking. Finance professionals are not exceptions. Our results demonstrate the types of biases investors can expect from their financial service professionals, but less so

Table 6

The results of the logit regressions for two subsamples.

	Subsample: Managers				Subsample: Brokerage company professionals			
	Logit results		Marginal effects		Logit results		Marginal effects	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>Behavioral variables</i>								
OWNPREDICTIONS	−6.319	(3.341)**	−0.322	(0.121)***	−1.788	(0.768)***	−0.023	(0.028)
HOMEBIAS	3.076	(1.242)***	0.615	(0.215)***	0.565	(0.472)	0.003	(0.004)
GEOGBIAS	−0.176	(2.346)	−0.033	(0.461)	1.347	(0.799)*	0.005	(0.005)
EMOTBIAS	−3.937	(2.103) [†]	−0.750	(0.250)***	−0.189	(0.480)	−0.001	(0.003)
<i>Demographic variables</i>								
AGE	−0.129	(4.449)	0.023	(0.808)	−2.184	(2.192)	−0.012	(0.018)
KID	−1.66	(0.991) [†]	−0.301	(0.193) [†]	−0.44	(0.371)	−0.002	(0.003)
MALE	−2.693	(1.396)**	−0.314	(0.138)**	0.564	(0.506)	0.003	(0.005)
MARRIED	−0.142	(1.085)	−0.025	(0.189)	0.819	(0.437) [†]	0.005	(0.005)
EDU	−2.774	(1.191)**	−0.344	(0.139)***	−0.110	(0.706)	−0.001	(0.004)
EXP	1.136	(0.873)	0.206	(0.166)	0.101	(0.393)	0.001	(0.002)
MANAGER	−0.692	(1.655)	−0.109	(0.228)	−0.705	(0.763)	−0.005	(0.009)
<i>Risk variables</i>								
RISKAVERSE	−1.796	(1.388)	−0.396	(0.324)	−1.685	(0.743)**	−0.020	(0.025)
NRFUND	−0.433	(0.332)	−0.079	(0.062)	−0.113	(0.283)	−0.001	(0.002)
TRAN	1.177	(0.403)**	0.214	(0.090)**	0.322	(0.184) [†]	0.002	(0.002)
INTERNET	1.322	(1.048)	0.262	(0.235)	0.009	(0.709)	−0.000	(0.004)
MULTIPLE	−0.226	(1.410)	−0.042	(0.273)	−0.555	(0.343) [†]	−0.003	(0.004)
FORBID	−3.111	(1.396)**	−0.643	(0.223)***	−	−	−	−
EXPRETURN	0.609	(0.716)	0.111	(0.132)	1.049	(0.495)**	0.006	(0.006)
FINLIT	−0.942	(1.011)	−0.171	(0.189)	0.038	(0.246)	−0.000	(0.001)
<i>Information variables</i>								
COMPANYREPORT	0.177	(1.289)	−0.032	(0.233)	−0.039	(0.232)	−0.000	(0.001)
INTERNATIONAL	−0.788	(1.549)	−0.117	(0.193)	0.115	(0.354)	0.001	(0.002)
NEWSPAPER	4.377	(1.965)**	0.465	(0.177)***	−0.217	(0.240)	−0.001	(0.002)
EXPERTS	−1.159	(1.502)	−0.216	(0.284)	0.047	(0.286)	−0.000	(0.002)
FRIENDS	−3.960	(1.930)**	−0.746	(0.173)**	0.102	(0.235)	0.001	(0.001)
Observations	45				88			
Log likelihood	−75.1				−202.2			
Pseudo R ²	0.256				0.067			

Note: Coef: coefficient, S.E.: standard error.

* $p < 0.01$.** $p < 0.05$.*** $p < 0.10$.

if they are at managerial positions. Second, total portfolio value and number of the investment funds in Turkey has increased during the last two decades. Hence, it is increasingly important to understand investment behaviors of professionals as more investors are investing through various funds. Third, recently the government proposed a process of replacing voluntary private pension system with a mandatory private pension scheme, which stipulates that, every wage-earner Turkish citizen under 45 years of age will be automatically enrolled in a pension plan determined by employers. Government further provides state subsidy for employees, amounting to 25% of employees' paid contributions to private pension account. This proposal is expected to make private pension more attractive to many wage-earner and hence more needs for the investment advises of finance professionals. Our findings about the biases of finance professionals may help these new group investors to be aware of these biases in their investments to various pension funds. Finally, our findings may help finance professionals to review their own biases and get into professional development certification programs to enhance their rational financial decision making abilities.

5. Conclusion

The purpose of this study is to examine the impact of various personal (subjective) attributes and objective attributes of finance sector professionals on their risk choices, derived from portfolio allocation, and personal wealth in Turkey. In particular, using the

proportion of portfolio invested in equities as our dependent variable, we find that behavioral biases and risk variables largely explain investment behaviors of finance professionals and the biases are at a lower degree for managers. Particularly, we find statistical evidence toward a positive relationship between the proportion of investment in equities and a set of variables including geographical bias, home bias, number of transactions, and return expectations in equity markets. For example investment in unknown territories tends to be riskier than the environment that investors are familiar. The statistically significant positive coefficient for home and geographic bias variables support this view. Because of their tendency to invest in familiar securities, these biases would cause overinvestment to equities hence resulting in a higher level of risk taking. On the other hand, own predictions and emotional bias are negatively related to the proportion invested in equities, showing biases toward firms they are familiar with. It is interesting to find that higher trading frequency, educational attainment, and older age reduce the allocation of equities in the portfolio. We also find that professionals with higher expected returns increase their investment in equities in various models used. It is specifically important that investors trade with a higher level of financial information as the turnover rate is high in Turkey. It is also likely that investor wealth may plunge drastically with number of transactions and commission expenses. This is in line with Odean (1998) who reports that decreasing investor utility is associated with higher level of trades. In this sense, this study bears an important policy implication and suggests that the Capital Markets Board, the regulatory authority in Turkey, should promote the improvement of financial literacy of investors. We also find that age, education, risk

Table A.1

List of variables.

Dependent Variable:
EQ Percentage share of equity in ISE in total investments

Independent Variables:

(a) Behavioral Variables:
OWNPREDICTION: Dummy variable (1 if the respondent strongly agrees that she relies on her own predictions and expectations while making her investment decisions, 0 otherwise)
HOMEBIAS: Dummy for home bias (1 if the respondent does not invest in equities of foreign country origin, 0 if she does not invest or not certain)
GEOGBIAS Dummy for geographical bias (1 if the respondent prefers to invest in equities whose headquarter is close to her place of residence, 0 if she does not invest or not certain)
EMOTBIAS Dummy for emotional bias (1 if the respondent does not change her decision about equity investment and sometimes she regrets, 0 if she does not agree or not certain)

(b) Demographic Variables:
AGE: Age of the respondent
KID: Number of children
MALE: Dummy for gender (1 if male, 0 female)
MARRIED: Dummy for marital status (1 if married, 0 otherwise)
EDU: Dummy for educational attainment (1 if business/economics undergrad/grad education, 0 otherwise)
EXP: This variable measures the years of experience which may be used as a proxy for the learning effect. It is expressed in natural logarithms
MANAGER: Dummy for job type (1 if job description is manager, else 0)

(c) Risk Variables:
RISKAVERSE: Dummy for self-reported risk tolerance (1 if the respondent evaluates herself as risk averse, 0 otherwise)
NRFUND: Number of funds (natural logarithm)
TRAN: Number of equity transactions in a year (1 = none, 2 = up to 10, 3 = between 11 and 30, 4 = between 31 and 50, 5 = more than 50)
INTERNET: Dummy variable (1 if the respondent trades online, 0 otherwise)
MULTIPLE: Dummy variable (1 if the respondent has accounts in more than one intermediary agency, 0 otherwise)
FORBID: Dummy variable (1 if the company forbids trading of equities, 0 otherwise)
EXPRETURN Expected return on invested equities (1 = very low or none, 2 = low, 3 = adequate, 4 = good, 5 = excessive)
FINLIT: Financial literacy measured with an index of four questions for nominal return and return measurement.

(d) Information Variables:
COMPANYREPORT: Dummy variable (1 if the respondent strongly agrees that she receives information from company reports while making her investment decisions, 0 otherwise)
INTERNATIONAL: Dummy variable (1 if the respondent strongly agrees that she receives information from international sources while making her investment decisions, 0 otherwise)
NEWSPAPER: Dummy variable (1 if the respondent strongly agrees that she receives information from newspapers and magazines while making her investment decisions, 0 otherwise)
EXPERTS: Dummy variable (1 if the respondent strongly agrees that she receives information from experts in the sector while making her investment decisions, 0 otherwise)
FRIENDS: Dummy variable (1 if the respondent strongly agrees that she receives information from friend while making her investment decisions, 0 otherwise)

aversion variables are inversely related to the proportion of investment in equities in our various models. This may be due to very low stock market participation in this emerging market.

Our findings, however, should be interpreted with caution due to some limitations. Notwithstanding that we use a unique dataset, we are bound by the data availability and we had a sample of 206 respondents. Therefore, although we have more information about subjective personal attributes, because of the degrees of freedom problem we cannot include most of these factors.

Appendix A

See Table A.1.

Appendix B. Supplementary data

Supplementary material related to this article can be found online at <http://dx.doi.org/10.1016/j.jbef.2016.10.001>.

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