



Investigating the Demographic Characteristics of Institutional Investors Affecting Representativeness, Conservatism and Overconfidence Biases in their Individual Investments

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Abstract

This study aims to identify the factors affecting representativeness, conservatism, and overconfidence biases in a sample of Turkish institutional investors. In difference to other studies, especially the individual investments of institutional investors in capital markets are focused on. The respondents who are selected with the method of convenience sampling are asked survey questions. In the study, models are formed with the stepwise method using linear regression analysis, and survey questions that are assumed to represent the examined biases are selected as the dependent variable. The age, gender, marital status, education, whether or not having children, and experience of institutional investors are included in the analysis as the independent variables. This way, which of the independent variables that are found to be statistically significant and the subcategories of these independent variables are most influential on the biases is revealed. As a result of the analysis, in addition to determining the variables that affect a single bias, it is understood that the variable of education level affects all examined biases, and especially the effect of low education levels on the examined biases is higher. In the regression analysis, experience is identified as a significant variable affecting representativeness and conservatism biases. It is observed that especially the institutional investors who are inexperienced or less experienced interact with these two biases more in their decisions related to their individual investments. Gender is found to be significant variable on both conservatism and representativeness biases, especially it was understood that female institutional investors were more effective than men on the representativeness and conservatism bias. Furthermore, it is determined that the marital status variable and the divorced institutional investors as a subcategory of this variable are significantly influential on conservatism and overconfidence biases.

Keywords:

Overconfidence bias
Conservatism bias
Representativeness bias
Demographic factors
Institutional investor
Individual investment.

JEL Classification:

G11, G23, G41.

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Publisher:

Scientific Publishing Institute

Received: 14 July 2021

Revised: 23 August 2021

Accepted: 7 September 2021

Published: 20 September 2021

Funding: This study received no specific financial support.

Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

1. Introduction

With the observations made, Pronin, Lin, and Ross (2015) stated that there are biases in the decisions of investors. Furthermore, psychologists argued that although biases are known, it is difficult to reduce their effects (Pronin et al., 2015). Chen, Kim, Nofsinger, and Rui (2007) found in their study that 43% of investors are affected by more than one bias. Bhandari and Deaves (2006) also inspired studies by saying "Do these [demographic characteristics like age, investment experience, education, income and wealth] influence the existence and degree of overconfidence?". Lin (2011) investigated the formation of biases in his study, stating that the possible effects of biases most attract the attention of individual investors.

Many studies in the literature examined the interaction of demographic characteristics and behavioral biases in making decisions regarding investments by individual or institutional investors. This study is about the individual investments of institutional investors. Consequently, it was investigated which demographic characteristics of institutional investors' decisions regarding individual investments affect representativeness, conservatism, and overconfidence biases. I based this study on the Turkish institutional investor sample.

Especially the overconfidence bias was the subject of many studies in the research on investors' biases (Asad, Khan, & Faiz, 2018; Baker, Kumar, Goyal, & Gaur, 2019; Barber & Odean, 2001; Bhandari & Deaves, 2006; Chen et al., 2007; Deaves, Lüders, & Luo, 2009; Prims & Moore, 2017; Prosad, Kapoor, & Sengupta, 2015). Therefore, in my study, I examined the conservatism and representativeness biases as well as the overconfidence bias. As demographic factors, variables of age, gender, marital status, education, whether or not having children, and experience were examined. As mentioned above, another difference of this study from other studies is that it focused on the individual investments of institutional investors. In other words, I built my work on the individual investments of institutional investors and their interaction with biases, instead of the investments made professionally by the institutional investors.¹

In summary, in this study, the interaction between the demographic characteristics and the biases was examined and an answer to the question "which demographic characteristics affect biases?" was sought. The paper comprises of four sections. In the next section I focus on the literature review. Section 3 outlines the sample and research methodology opted in the study. Section 4 presents and discusses the results of the study.

2. Literature Review

2.1. Investor Demographic Characteristics and Behavioral Biases

Gender: Many studies have found that in financial investments, women are relatively more risk-averse than men (Graham, Stendardi, Myers, and Graham (2002). Moreover, Jianakoplos and Bernasek (1998) asserted that the gender difference in financial risk taking is also affected by age, race, and number of children. Studies have also determined that women tend to focus on low-risk assets with fixed income rather than risky assets (Graham et al., 2002). Furthermore, Lease, Lewellen, and Schlarbaum (1976) concluded that older females prefer diversifying and making dividend-oriented investments. Regarding gender in terms of bias, it was concluded that women refrain from investing in risky assets and avoid risk, so women are less likely to be affected by the overconfidence bias than men. Beatrice, Murhadi, and Herlambang (2021) also stated that women are less confident and pessimistic than men.

In the literature, studies on gender and overconfidence bias are the majority. Nofsinger, Patterson, and Shank (2018) also discovered that the effects of testosterone and cortisol on the nucleus accumbens of the brain can affect investors' risk preferences and overconfidence level. Accordingly, Barber and Odean (2001); Barber and Odean (2001); Prosad et al. (2015) reported that men increase their trade volume by being more affected by the overconfidence bias than women, but the resulting returns are lower than those of women. Daniel, Hirshleifer, and Subrahmanyam (2005) stated that investors with the overconfidence bias underestimate their securities risks because they overestimate their abilities. Barber and Odean (2001); Bhandari and Deaves (2006) also found that male investors act with more overconfidence bias than female investors.

Dwyer, Gilkeson, and List (2002) also observed that in mutual fund investments, women make less risky investments. Dwyer et al. (2002) found that when they included "financial investment information" as a control variable in their studies, the gender distinction in investment asset preference largely disappeared. Women are more likely than men to invest in certificate of deposits and mutual funds weighted by money market instruments (Lascu, Babb, & Phillips, 1997). Barber and Odean (2001) showed that women's stock portfolio is lower than men's stock portfolio. Martenson (2008) noted that women investors avoid taking risks more than men in their investment decisions. He also revealed that not all male investors behave in the same way. Accordingly, he concluded that men, who are optimistic in their investment perspective, act more overconfidence, take risks, and invest in futures and options markets. He stated that, on the other hand, pessimist male investors prefer to take risks, but invest in stock markets with more limited risk. Graham et al. (2002) in question revealed that compared to male investors, female investors both avoid taking risks and have less confidence in their investments, they also trade less and the data processing is different from men. Barber and Odean (2001) confirmed that women have less overconfidence and take less action. Deaves et al. (2009) could not find a significant difference between men and women in terms of being affected by the overconfidence bias. Prosad et al. (2015) emphasized that male investors have more overconfidence than female investors because of their greater knowledge of the Indian stock market. According to Barber and Odean (2001), men's operations on common stock were 1,5 times that of women, consistent with the effect of overconfidence bias.

¹In the other study, which is in the peer review process, whether or not the institutional investor deviates from their rational investor identity in their individual investments is investigated, and it is concluded that the institutional investor is affected by behavioral biases by showing a normal investor behavior in their individual investment decisions in some cases.

Age: Results regarding the relationship between age and biases are varied in the literature [Prims and Moore \(2017\)](#). [Prosad et al. \(2015\)](#) showed that older people are prone to the biases. [Chen et al. \(2007\)](#) reported that older investors (they have more life experience than young people) make worse choices than other investors and are unable to diversify as much as necessary. [Lease et al. \(1976\)](#), on the other hand, showed that older investors attach less importance to short-term capital gains, they are more interested in dividends, they prefer diversified portfolios and avoid investing in high-risk assets. [Gervais and Odean \(2001\)](#) also demonstrated that younger investors invest more actively and expect to earn more income than older investors, but they can earn relatively low income from a portfolio with a "buy and hold" strategy. [Baker et al. \(2019\)](#) also reached the different result. Accordingly, investors over the age of 60 are less prone to representativeness bias than young people. [Prims and Moore \(2017\)](#) said that the widespread belief about the investors' age and overconfidence bias is that younger people are more aggressive, more prone to risk taking, and under the influence of overconfidence bias. But some studies also indicated that, although young people are prone to risky investments, they do not need to act with the overconfidence bias. In addition, [Prims and Moore \(2017\)](#) stated that as the age gets older, investors behave more cautiously, but overconfidence bias leads them to take more risks. [Bashir, Azam, Butt, Javed, and Tanvir \(2013\)](#) identified a positive relationship between age and overconfidence bias in their study. [Baker et al. \(2019\)](#) also found that retired investors have more overconfidence.

Marital Status: [Barber and Odean \(2001\)](#) stated that, in general, men trade more in the capital market than women and this general result applies to both single men and single women. Moreover, when married women and married men were compared, a difference in investment amount was found between them. It must be said that this difference is greater than between single men and single women. [Barber and Odean \(2001\)](#) reported that married women are less likely to take risks than married men and thus invest less in common stock, which is a risky investment instrument. This view is similar to what is generally said for "women investors". It was also deduced that if couples affect each other's investment decisions, gender differences in terms of overconfidence tendency would disappear ([Barber & Odean, 2001](#)). The study of [Ateş, Coşkun, Şahin, and Demircan \(2016\)](#) found that unmarried investors are more affected by the overconfidence bias than those who are married.

Education: [Chen et al. \(2007\)](#) acknowledged that being affected by bias due to different experiences in education and cultural life will lead to differentiation in people's decisions. [Nikiforow \(2009\)](#) expressed that the education about behavioral finance reduced the tendency of finance sector employees to the biases. [Dwyer et al. \(2002\)](#) also reported that investors with higher income and more education tend to take more risks. [Dreman and Berry \(1995\)](#) declared that many interacting historical information about stocks plays a role in future inferences for stocks. Moreover, when the representativeness bias is associated with education, [Baker et al. \(2019\)](#) found that those who graduated or have post graduate education are less affected by the representativeness bias. [Ateş et al. \(2016\)](#) also stated that the representativeness bias generally affects the decisions of groups with a lower education level. Likewise, [Goo, Chen, Chang, and Yeh \(2010\)](#) asserted that those with a high level of education will be confident in the decisions they make and will not be affected by other people's knowledge and investment decisions ([Beatrice et al., 2021](#)). [Bhandari and Deaves \(2006\)](#) stated that investors who did not receive a special education specific to investment make decisions under the influence of the overconfidence bias, considering that they make their investments well with their general education. In particular, when they surveyed a group that would soon retire, they found that this group was affected by the overconfidence bias. [Beatrice et al. \(2021\)](#), on the other hand, found that education is not related to overconfidence bias, and even if the investor does not have education on capital markets, they can develop themselves with the developing technology. In other words, investors will improve themselves with additional education, increase their knowledge of investment and will not need to make decisions with overconfidence. In fact, [Bhandari and Deaves \(2006\)](#) revealed that investors with a high level of education think they are more knowledgeable because they are overconfident in the results of their decisions ([Beatrice et al., 2021](#)).

Experience: [Deaves et al. \(2009\)](#) stated that experience allows the person to understand their knowledge and limits regarding their expertise well. [Gervais and Odean \(2001\)](#); [Barber and Odean \(2001\)](#); [Chen et al. \(2007\)](#) argued that investors who take part in frequent or large trade activities will learn more and gain experience. Moreover, [Deaves et al. \(2009\)](#) asserted that the experience gained in professional life will not only provide the individual with awareness and wisdom but also reduce their achievement motivation on the other hand. In this sense, in time, experienced investors reduce their trade volume, are not affected by behavioral biases and display rational investor behavior. By reducing their rates of making mistakes, a reduced trade volume will allow experienced investors to keep out of risky investments and be more involved in diversification ([Deaves et al., 2009](#)). [Gervais and Odean \(2001\)](#); [Menkhoff, Schmeling, and Schmidt \(2013\)](#) showed that investors are more overconfident at the beginning of their careers, but their levels of overconfidence decrease as their experience increases. [Gervais and Odean \(2001\)](#) claimed that experience will increase overconfidence to at least a certain extent. [Barber and Odean \(2001\)](#) associated excessive trading behaviors among investors with their acts under the influence of overconfidence bias. [Gervais and Odean \(2001\)](#), acknowledged that successful investors, albeit not all of them, are overconfident. [Prosad et al. \(2015\)](#)

found that investors with an experience level of longer than 7 years and high trade volumes are in an interaction with all biases. Deaves et al. (2009) also said, experience will lead individuals towards becoming overconfident while degrading their existing knowledge. Accordingly, the author determined that investment experience and overconfidence bias are associated. Likewise, Mishra and Metilda (2015) reported that along with their experience, the overconfident levels of investors also increase. Sharing the same view as Mishra, Baker et al. (2019) observed that investors with several years of experience had higher levels of overconfidence in comparison to those with an experience level of at most 2 years. Deaves et al. (2009) showed that investors with high levels of experience related to financial markets are more overconfident. Nevertheless, they also determined that the degree of overconfidence would decrease as experience increased even further. Different results have been obtained regarding the relationship between experience and overconfidence bias (Deaves et al., 2009). Baker et al. (2019); Bhandari and Deaves (2006) reported that retired investors were more overconfident than actively working investors. Of course, here, the correlation between age and experience was very high. Additionally, Baker et al. (2019) revealed that retired investors made decisions in their investments largely under the influence of representativeness bias, and thus, there was an association between representativeness bias and experience.

3. Sample Design and Analysis

3.1. The Sample

Studies in the literature have investigated the relationships between the individual biases and demographic characteristics of both individual investors and institutional investors in many cultures (Asad et al., 2018; Baker et al., 2019; Barber & Odean, 2001; Bhandari & Deaves, 2006; Chen et al., 2007; Deaves et al., 2009; Mishra & Metilda, 2015; Prims & Moore, 2017; Prosad et al., 2015). Past studies showed that cultural differences affect individuals' behavior (Ji, Zhang, & Guo, 2008). Considering this issue, this study covered institutional investors in the Turkish finance sector. The respondents who were included in the study were asked questions on the individual investments they had. With this study, it was aimed to establish a relationship between biases that may be effective on the decisions of institutional investors regarding their individual investments and their individual demographic characteristics. Accordingly, the main objective of this study was to investigate demographic factors influencing the biases of institutional investors in their decisions regarding their individual investments. In a previous study of mine, which is in the peer review process at the time of writing this article, I determined that while making their individual investments, the institutional investor may deviate from their identity as a rational investor, be influenced by some biases and make decisions about their individual investments like a normal (irrational) investor. Therefore, in this study, which may be considered an addition onto the previous one, by using the conclusion that institutional investors are affected by biases while making their individual investments, I aimed to determine "which demographic factors affected the biases of institutional investors" while they were making individual investments. Using the method of convenience sampling, 346 institutional investors working in Istanbul in Turkey were reached. The survey was conducted in person or by sending the form directly to the participants.

Table 1 summarizes the data collected on the sample. In the sample, about 40% female and 60% male participated in this survey. In terms of age range, the 21-30 age group constituted the majority in sample. The majority of them were married couples, followed by singles. In the sample, the rate of those who had no children was quite high. The percentage of college and university educated people was higher than the percentage of master and Ph.D. education. In the sample, the education that the participants received was organized as economy, finance and business category, another category as engineering and technical sciences, and the rest as mathematics, statistics, and "others". According to this, while the rate of those who received economy, finance and business education was 76,5% for Turkish institutional investors. While engineering and technical sciences graduates was 8,1% in this sample, mathematics, statistics graduates, and others was 15,4%. In the meantime, it should not be forgotten that some people received education in more than one field.

3.2. Regression Models and Analysis: Identifying Demographic Factors Associated with Biases

In this section, it was investigated which demographic factors affected the biases that the institutional investor was influenced by in the decisions regarding their individual investments. With the linear regression analysis "stepwise" method, it was determined which variables most affected the representativeness, conservatism, and overconfidence biases. Regression analyses were performed for the Turkish institutional investors. Survey questions representing the biases were considered as dependent variables in the regression. Due to the large number of questions representing the biases in the survey, the questions were examined one by one and the following survey questions, which were considered to be more meaningful, were included in the regression analysis as the dependent variable.

3.3. Variables Affecting the Representativeness Bias

The evaluation of the investors' future predictions about the security according to the past performance of the security is the representativeness bias (Chen et al., 2007). For this reason, it was stipulated that the 38th question in the survey represented representativeness bias, and this question was included as a dependent

variable in the regression analysis. With the 38th question, the institutional investors were asked whether or not they would invest in previously losing stocks in the future in relation to their individual investments.

Table- 1. Demographic profile of the respondents.

Current profession	Commercial bank head office	39.0
	Bank branches	14.6
	Portfolio management company	1.1
	Investment company	5.1
	Mutual fund	0.0
	Venture capital fund and real estate investment company	1.4
	Insurance company	17.1
	Pension fund	0.8
	Investment bank	0.0
	Private equity company	0.0
	Participation bank	9.6
Gender	Others ^a	11.2
	Female	40.3
	Male	59.7
Age	Non binary	0.0
	21-30	43.7
	31-40	38.7
	41-50	16.0
	51-60	1.4
Marital status	61 and over	0.3
	Married	54.6
	Single	41.7
	Divorced	3.6
	Separated	0.0
Having child/children	Living with partner	0.0
	No children	55.2
	1 child	25.4
	2 children	14.4
	3 children	2.0
Education level	More than 3 children	3.0
	High school	2.5
	Some colleges and bachelor's	70.9
Educational profession	Master and /or Ph.D.	26.7
	Economy, finance and business	76.5
	Engineering	8.1
Individual experience in the capital markets	Mathematics, statistics and others ^b	15.4
	Less than 1 year	17.0
	1-2 years	15.6
	2-3 years	10.9
	3-4 years	16.1
	5 years and more	40.3

Note:

^a Financial and economy consulting, commercial bank branch employee, fintech company, risk management company.

^b Banking and insurance, actuary, international relations, labor economics, politics, political sciences, communications, law, art and science, public administration.

In the regression analysis made for representativeness bias, the R² value was determined as 4.6%. According to the F test result of the model, the p value was less than 0.05, and the model was statistically significant. All independent variables were statistically significant in the model 4, since the p values of the t-test result of the said independent variables were less than 0.05.

The regression equation;

Representativeness Bias (Q38)=2.466 +0.194*gender +0.069*experience -0.040*having children/not +0.032*education level

Table-2. Demographic factors affecting the representativeness bias (Model 4*).

						95.0% Confidence Interval for B	
Dependent Variable: Question 38		Standardized Coefficients Beta	Std. Error	t	p	Lower Bound	Upper Bound
R ² : 4.6% F: 46.864 p: 0.0000	Constant	2.466	0.113	21.762	0.000	2.244	2.688
	Q2	0.194	0.031	12.435	0.000	0.327	0.449
	Q10	0.069	0.016	4.313	0.000	0.037	0.098
	Q5	-0.040	0.012	-2.411	0.016	-0.052	-0.005
	Q7	0.032	0.028	2.000	0.046	0.001	0.112

Note:

Dependent variable ; Q38: "If I lost money in some stock(s) in the past, I would never invest in the same stock(s) again in the future." independent variables; gender(Q2), experience (Q10), having children(Q5), education level(Q7).
* Number of models were tested; other models did not find a high R² value.

As can be seen from the above regression equation and model table Table 2, "gender", the independent variable was found to be significant in affecting the representativeness bias. Accordingly, among the institutional investors participating in the survey, it was understood that female institutional investors were more effective than men on the representativeness bias.

"Experience" is one of the variables revealed to be significant as an independent variable in the regression model. The experience of the investor mentioned here was associated with the long or short period of investment as an individual investor (10th question of survey).

The institutional investor was envisioned as an experienced investor if he/she had invested individually in the capital market for a long time. As a result of the analysis, it was understood that institutional investors with 1 year or less experience (these are investors who are new in making individual investments and deemed inexperienced) were more effective than experienced investors in influencing the representativeness bias. In other words, the more time invested, namely the experience, the less the effect on the representativeness bias. Finally, it can be said that "investors with less experience" are related to the representativeness bias. Baker et al. (2019), on the other hand, determined a direct relationship between experience and representativeness bias, stating that investors with more experience affect or are more related to the representativeness bias. About the representativeness bias, Tekçe, Yılmaz, and Bildik (2016) concluded that experience reduces the representativeness bias.

The variable of "whether or not having children" was also one of the independent variables that affected the representativeness bias. It was understood that those who did not have children affected the representativeness bias more. In this case, the fact that those who did not have children were more associated with the representativeness bias, suggesting that a more rational investor behavior can be displayed when having a child.

Another independent variable that affected the representativeness bias was the "education level" of the institutional investors. It was concluded that the institutional investors, who were high school graduates, affected the representativeness bias. Institutional investors with a high level of education had less impact on the representativeness bias. In addition to these results, Ateş et al. (2016) also found that the low education level and the representativeness bias were more correlated in their study in the Turkey sample.

If the results are summarized, the representativeness bias in this sample was more affected by female investors, who were generally high school graduates, who did not have children and with no experience.

3.4. Variables Affecting the Conservatism Bias

Luo (2012) stated that investors with the conservative bias are moving more slowly in updating their thinking about the asset according to new information coming to the market about financial assets. Barberis, Shleifer, and Vishny (1998) alleged that investors with the conservatism bias think that information about the securities from the market may contain transient elements and therefore it is better to stick with their previous estimates.

In order to determine the factors affecting the conservatism bias in this study, many questions of the survey, which was thought to represent the dependent variable, were tried and many models were created. Consequently, it was determined that the 25th question in the survey was the question that represented conservatism bias best, and the question was included as a dependent variable in the regression analysis.

With the 25th question, the institutional investors were asked about a financial asset they had had a positive experience with in the past, and in the case that future projections and news stories about the financial asset in question were negative, whether or not they would take these negative views into account while making their investment.

Table-3. Demographic factors affecting the conservatism bias (model 7*).

		95.0% Confidence Interval for B					
Dependent Variable: Question 25		Standardized Coefficients Beta	Std. Error	t	p	Lower Bound	Upper Bound
R ² : 5.8%	Constant	2.903	0.129	21.054	0.000	2.460	2.965
F: 35.155	Q7	0.168	0.027	10.890	0.000	0.245	0.353
P: 0.0000	Q4	-0.191	0.040	-9.586	0.000	-0.460	-0.303
	Q5	0.070	0.014	3.382	0.001	0.021	0.077
	Q2	0.041	0.030	3.072	0.002	0.034	0.152
	Q10	0.048	0.015	3.289	0.001	0.020	0.081
	Q3	-0.038	0.037	-2.636	0.008	-0.171	-0.025

Note:

Dependent variable: Q25: "If I had positive experience investing in a stock, I don't take into account any negative developments or news about this stock in future. independent variables: education level(Q7), marital status(Q4), having/not children(Q5), gender(Q2), experience(Q10), age(Q3).

* Number of models were tested; other models did not find a high R² value.

The following regression equation was constructed.

$$\text{Conservatism Bias (Q25)} = 2.903 + 0.168 * \text{education level} - 0.191 * \text{marital status} + 0.070 * \text{having/not children} + 0.041 * \text{gender} + 0.048 * \text{experience} - 0.038 * \text{age}$$

As can be seen from Table 3, the "education level" of the institutional investors participating in the survey is one of the variables effective in explaining the conservatism bias. Accordingly, it was determined that the investors who were high school graduates had more influence on the conservatism bias, as in the other biases. Although this is a normal situation for the institutional investor, it is estimated that the institutional investor demonstrates the same rational behavior in his/her individual investments.

"Marital status" was also one of the variables found to be significant in the regression analysis. The divorced group had a greater influence on the conservatism bias. This effect decreased towards single and married people. Barber and Odean (2001) stated that the influence of the married couples on the conservatism may be due to the influence of married couples to each other. Divorced individuals in this sample were more associated with the conservative bias, perhaps due to the decreased responsibilities of the divorced individuals. This might have led them to make decisions with biases.

It was observed that those who had 1 child affected the conservatism bias more than the other groups (those with more than 1 child and those without children). Likewise, the effect of those with 1 child was determined for the overconfidence bias.

It was demonstrated that "women" were more effective on the conservatism than men. In other words, men's influence on conservative bias was weaker. This situation can be explained by the more conservative behavior of women in their decisions and their late response to market information.

"Experience" was another variable that influenced the conservatism bias. It was concluded that especially the institutional investors, those who had individual investments in the securities markets for "1 year or less" affected the conservatism bias more. The greater the experience, the less likely it is to affect the bias. Chen et al. (2007) stated that as investment experience increases, investors will learn to be more rational. Thus, as can be seen from our example, inexperienced people were the ones who affected the bias most. As investors increase their experience, they will move away from the biases and approach the rational investor behavior.

The "age" independent variable was also one of the independent variables that affected the conservatism bias. The "age" variable of the participants was divided into two as "40 years old and below" and "40 years old and above" and included in the regression analysis. Accordingly, it was observed that the institutional investors whose ages were "40 years and above" were an effective variable in the conservatism bias.

As a result of the regression analysis, 6 variables affecting the conservatism bias in the sample were determined. Women who were over 40, inexperienced, high school graduates, divorced and having 1 child had the greatest effect on the conservatism bias. It was found that the effect on the conservative bias decreased as we moved towards those who were experienced, male, college or other higher education level graduate and having more than 1 or no children.

3.5. Variables Affecting the Overconfidence Bias

Barber and Odean (2001) showed that the overconfidence bias causes investors to hold underdiversified portfolios. Overconfident investors exaggerate their own judgments, believing that their valuations are stronger and more accurate (Barber & Odean, 2001) and invest in portfolios that are more risky than rational investors (Barber & Odean, 2001). De Bondt (1998) also stated that while institutional investors invest in portfolios that they diversify, individual investors avoid diversifying. Therefore, in the regression analysis for the sample, the question 16 was found appropriate as the dependent variable and various models were created

accordingly. With the 16th question in the survey, the respondents were asked whether or not they preferred to create a portfolio in their investments.

As can be seen from Table 4, the variables affecting the overconfidence bias of the institutional investors in the sample as a result of the regression analysis were determined as age, marital status, number of children and education level.

Overconfidence bias (Q16) = 2.492 + 0.181 * education level + 0.157 * age - 0.174 * marital status + 0.108 * having/not children

The R² value of the created model was 7.4%. According to the F test result of the model, the p value showed that the model was statistically significant.

Table-4. Demographic factors affecting the overconfidence bias (Model 4*).

							95.0% Confidence Interval for B	
Dependent Variable: Question 16		Standardized Coefficients Beta	Std. Error	t	p	Lower Bound	Upper Bound	
R ² : 7.4%	Constant	2.492	0.220	11.319	0.000	2.060	2.924	
F: 16.598	Q7	0.181	0.065	5.694	0.000	0.244	0.500	
P: 0.0000	Q3	0.157	0.088	4.871	0.000	0.255	0.598	
	Q4	-0.174	0.090	-4.166	0.000	-0.550	-0.198	
	Q5	0.134	0.034	3.154	0.002	0.041	0.175	

Note:

Dependent variable: Q16: "It is more effective to have a portfolio of financial instruments of the same asset class "- e.g. many kinds of stocks or many kinds of bonds-". Independent variables: education level (Q7), age (Q3), marital status (Q4), having/not children (Q5)

* Number of models were tested; other models did not find a high R² value.

One of the variables affecting the overconfidence bias was "education level". Accordingly, institutional investors who graduated from high school had an impact on the overconfidence bias. College and university graduates were less influential on the bias than the high school graduates. Masters and other education levels were also observed to be the least effective. In other words, it was generally concluded that those who affected the overconfidence bias were high school graduates rather than university or master/Ph.D. graduates. Goo et al. (2010) stated that the higher the education level, the higher the investors' self-confidence. In other words, the overconfidence of investors is affected by the higher education graduated, and investors do not follow the information and investment decisions of others with this confidence (Beatrice et al., 2021).

The "age" independent variable was another variable that was found significant in the regression equation. In the analysis, it was understood that the effect of institutional investors aged 40 and under was more effective on the overconfidence bias than those aged 40 and over. In other words, the older the participants (over age 40), the less their effects on the overconfidence bias.

Reaching a similar conclusion, Prims and Moore (2017) also reported that young individuals are affected by overconfidence bias as they are more likely to take risks in their investments.

It was understood that those who had the most effect on the overconfidence bias according to their marital status were the "divorced" ones. Thus, the influence of divorces was greater than that of married couples or singles. Married couples had the least effect on the overconfidence bias.

In the regression analysis, "whether or not having children" was found to be significant as an independent variable in affecting the overconfidence bias. Those who had one child had more of an effect on the overconfidence bias than the others. Among institutional investors, those who did not have children had the least influence on affecting the overconfidence bias.

Thus, in the sample, it was understood that the overconfidence bias was affected by the investors who were high school graduates, had one child, divorced and were at the age of 40 or younger.

4. Results

Many studies focused on biases affecting the demographic characteristics of investors (Baker et al., 2019; Barber & Odean, 2001; Bashir et al., 2013; Beatrice et al., 2021; Bhandari & Deaves, 2006; Deaves et al., 2009; Dwyer et al., 2002; Goo et al., 2010; Graham et al., 2002; Jianakoplos & Bernasek, 1998; Lease et al., 1976; Martenson, 2008; Nofsinger et al., 2018; Prims & Moore, 2017; Prosad et al., 2015; Tekçe et al., 2016). In this study, with this regression analysis, the demographic characteristics of the institutional investors, which affected the representativeness, conservatism, and overconfidence biases were tried to be determined. As can be seen from Table 5 regarding the regression analysis below, it was concluded that the biases of the institutional investors were affected by variables.

To sum up the results regarding the variables that were found to affect the participants' representativeness, conservatism and overconfidence biases based on the regression analysis results, it was observed that the education level variable, especially the category of being a high school graduate, affected all

three biases that were examined in this study. In other words, among the investors, those with low levels of education were in an interaction with the aforementioned biases more in their decisions on their individual investments. According to this result, one may state that an institutional investor who is expected to have a specialized or college/university would have a more limited interaction with biases in comparison to investors who are high school graduates by not deviating from their identity as a rational investor even in their individual investments. This may be interpreted as that the institutional investment continues to make rational decisions even in their individual investments. On the other hand, [Mishra and Metilda \(2015\)](#) found that overconfidence levels increased in direct proportion to education. Nevertheless, [Baker et al. \(2019\)](#) reported in their study that individuals who had high-level (e.g., university, college, master's, doctorate) education were less influenced by representativeness bias.

Table-5. Summary of regression analysis.

Biases	Independent variables affecting biases according to regression analysis	Subgroups of the independent variables affecting the biases in regression analysis
Representativeness bias	Experience; Gender; Education level; Having/not children;	-1 year or less, -female -high school -no children.
Conservatism bias	Age; Education level; Marital status; Having/not children; Gender; Experience;	-40 and over -high school -divorced - 1 child - female -1 year or less
Overconfidence bias	Having/not children; Age; Marital status; Education level;	-1 child -40 and under -divorced -high school

Furthermore, it was seen in this study that the variable on having/not having a child was associated with all three biases. Nonetheless, while the institutional investors who had 1 child affected conservatism and overconfidence biases, those who did not have any children affected representativeness bias. Hence, it may be concluded that as institutional investors who have multiple children have increased levels of responsibility, they display rational investor behaviors by not interacting with biases not only in investments directly associated with their profession but also in their individual investments.

[Mishra and Metilda \(2015\)](#) determined gender to be a variable associated with biases. In this study, too, it was discovered that gender was an influential variable on both representativeness and conservatism biases, especially among the women investors. Although several studies have determined a relationship between the female gender and overconfidence bias, in this study, no such link could be identified. Studies by [Baker et al. \(2019\)](#) and many other researchers ([Barber & Odean, 2001](#); [Bhandari & Deaves, 2006](#); [Kumar & Goyal, 2016](#); [Lin, 2011](#)) have demonstrated that men have an increased tendency towards overconfidence bias. By reporting on the variables of experience and gender together, [Baker et al. \(2019\)](#) revealed that men who have experience in terms of investment are more overconfident. When the variables of experience and gender were analyzed together in this study, as opposed to the findings of [Baker et al. \(2019\)](#), it was revealed that the inexperienced and women investors were influenced more by representativeness and conservatism biases.

The 10th question in the survey was about the investment experience of the institutional investor regarding their individual investments, where experience was defined based on the “number of years investment in capital markets”. It was discerned that representativeness and conservatism biases were influenced more by the investors who had very little experience, or in other words, those who were inexperienced. Similarly, [Baker et al. \(2019\)](#) identified a relationship between being young or inexperienced and representativeness bias. [Prosad et al. \(2015\)](#) stated that people with little investment experience, acting in accordance with the representativeness bias, rely on the knowledge and advice of external sources rather than their own knowledge. [Deaves et al. \(2009\)](#) determined that investors who gain experience over time will reduce their transaction volumes and will not be affected by behavioral biases in investment decisions and will exhibit rational investor behavior.

In addition to the variable of gender, [Mishra and Metilda \(2015\)](#) determined that the experience and educational level of investors were also related to biases. [Gervais and Odean \(2001\)](#) argued that experienced, to at least a certain extent, will affect overconfidence.

In this study, it was observed that both conservatism and overconfidence bias were affected by the divorced institutional investors. Considering that couples influence each other in their investment decisions, and their likelihood to be affected by overconfidence bias would diminish ([Barber & Odean, 2001](#)), with the inference that divorced institutional investors would make decisions alone in their individual investments and

act independently, it may be stated that they would interact with biases, and their divorced status would influence their status of having biases.

Finally, regarding the age variable, it was seen that being an institutional investor at the age of 40 or younger affected overconfidence bias in individual investments, whereas being over the age of 40 affected conservatism biases. This finding that conservatism bias was influenced by the participants in this study being over the age of 40 suggested that this age group is more conservative regarding past information. Tekçe et al. (2016) found that the Turkish investors are affected by the representativeness bias as the age increases. Baker et al. (2019) similarly reported that age, occupation, and investment experience were demographic factors associated with biases among individual investors.

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Appendix: Survey questions used in the hypotheses.

10. How long have you been investing for?

1. Less than 1 year 2. 1-2 years 3. 2-3 years 4. 3-4 years 5. 5 years and more

16. "It is more effective to have a portfolio of financial instruments of the same asset class "(e.g. many kinds of stocks or many kinds of bonds)

1. Strongly agree
 2. Agree
 3. Neither agree nor disagree
 4. Disagree
 5. Strongly disagree

25. "If I had positive experience investing in a stock, I don't take into account any negative developments or news about this stock in future.

1. Strongly agree
 2. Agree
 3. Neither agree nor disagree
 4. Disagree
 5. Strongly disagree

38. "If I lost money in some stock(s) in the past, I would never invest in the same stock(s) again in the future.

1. Strongly agree
 2. Agree
 3. Neither agree nor disagree
 4. Disagree
 5. Strongly disagree