THE REPUBLIC OF TURKEY
BAHCESEHIR UNIVERSITY

BEHAVIOURAL BIASES IN INVESMENT DECISIONS: A COMPARISON BETWEEN FINANCE PROFESSIONALS AND INDIVIDUAL INVESTORS IN TURKEY

Master's Thesis

GÜRBEY FIÇI

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THE REPUBLIC OF TURKEY
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GRADUATE SCHOOL OF SOCIAL SCIENCES

CAPITAL MARKETS AND FINANCE

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ABSTRACT

BEHAVIOURAL BIASES IN INVESMENT DECISIONS: A COMPARISON BETWEEN FINANCIAL PROFESSIONALS AND INDIVIDUAL INVESTORS IN TURKEY

Gürbey FIÇI

Capital Markets and Finance

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The traditional finance paradigms depend on rationality. According to Efficient Market Hypothesis put forth by Eugene Fama, financial markets are efficient. But academic evidences has proved that there are deviations called anomalies from the rules of EMH, Behavioural finance, a relatively new field of study that uses cognitive psychology to explain these irrational behaviours and shortcomings of traditional finance has emerged.

The purpose of this thesis is to look for if there is a dependency between five identified behavioural biases and finance professionals or individual investors.

The behavioural biases that are examied namely anchoring, herding behaviour, overconfidence and hindsight bias and gambler fallacy.

Keywords: Behavioural Finance, Anchoring, Overconfidence, Gambler's Fallacy, Herding Behaviour, Hindsight Bias

ÖZET

YATIRIM KARARLARINDAKİ DAVRANIŞSAL ÖNYARGILAR:
TÜRKİYE'DE FİNANS PROFESYONELLERİ VE BİREYSEL
YATIRIMCILAR ARASINDA BİR KARŞILAŞTIRMA

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Geleneksel finans paradigmaları rasyonellik üzerine kuruludur. Eugene Fama tarafindan ortaya konmuş, Etkin Market Hipotezi'ne göre, piyasalar etkindir. Fakat akademik bulgular, genel olarak anomali olarak ifade edilen, Etkin Market Hipotezi'nin kurallarından sapmaların olduğunu ispat etmiştir.

Göreceli olarak yeni bir alan olan davranışsal finans ise, bu irrasyonellikleri ve geleneksel finans paradigmalarının açıklamakta zorlandıklari yetersizlikleri açıklamak için bilişsel psikolojiyi kullanmaktadır.

Bu tezin amacı, seçili beş farklı davranışsal önyargıyla, finans profesyonelleri ile bireysel yatırımcılar arasında bir bağımlılık olup olmadığını araştırmaktır.

Seçilen davranışsal önyargılar şunlardır; çıpalama, sürü psikolojisi, aşırı güven, geri bakış, kumarbaz yanılgısı

Anahtar Kelimeler: Davranışsal finans, Çıpalamak, Aşırı Güven, Kumarbaz Yanılgısı, Sürü Psikolojisi, Geri Bakış

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ABBREVIATIONS

BF	:	Behavioural Finance
CI	:	Confidence intervals
CAPM	:	Capital Asset Pricing Model
DF	:	Degree of Freedom
EMH	:	Efficient Market Hypothesis
TL	:	Turkish Lira
VS	:	Versus

1. INTRODUCTION

The traditional finance paradigms depend on rationality. According to efficient market hypothesis put forth by Eugene Fama, financial markets are efficient because investors make rational decisions when new information about financial assets is available. And since all market participants have access freely to all information about securities, prices are at their intrinsic values. So financial markets are efficient with large number of rational wealth maximizer individuals. As Barberis and Thaler (2003, p. 1054) denoted since prices are right in an efficient market at any given time, there is no free lunch. So no investor can outperform the overall market by earning average returns greater than are warranted for its risk level.

Modern Portfolio Theory which depends on efficient market hypothesis has become a basis with its mathematical formulation for the diversification in the financial literature. Given its assumptions about rationality, it provides a fair framework if the financial markets would work in the ideal world. However in reality, human beings have been experiencing bubbles and crashes, since from Dutch Tulip Bulb market to today's housing bubble and credit crisis. This all have been happening so far because operation of markets are remarkably different than the assumptions that EFM asserts.

As Latif, Arshad et al (2011, p. 1) showed that deviations from the rules of EMH called anomalies, can occur repeatedly. These anomalies can be grouped as three main types, First one is fundamental anomalies, second one is technical anomalies, and the last one is calendar or seasonal anomalies. And they claimed that stocks need not to be necessarily priced at their intrinsic values because of fundamental anomalies and also value strategies outperform than growth stock because of overreaction of markets which is not quite possible according to EMH. Grinblatt, Titman and Wermers (1994, p. 1088) had proved that trend-followers realized significantly better performance than the other funds on average in their study which will be detailed later.

So behavioural finance, a relatively new field of study that uses cognitive psychology to explain irrational behaviours and shortcomings of traditional finance has emerged. This new approach argues that investors who have emotions and biases may not be as rational as traditional finance literature assumes. Behavioural finance put special emphasize on human psychology to explain market anomalies. Sewell (2010, p. 1)

defines behavioural finance as below;

> *Behavioral finance is the study of the influence of psychology on the behavior of financial practitioners and the subsequent effect on markets. Behavioral finance is of interest because it helps explain why and how markets might be inefficient.*

Barberis and Thaler (2003, p. 1052) define two main block of the field as below:

> *Behavioral finance argues that some financial phenomena can plausibly be understood using models in which some agents are not fully rational. The field has two building blocks: limits to arbitrage, which argues that it can be difficult for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the kinds of deviations from full rationality we might expect to see.*

Leading initiator researchers of the field Kahneman and Tversky (1979), Thaler (1980), Shefrin and Statman (1994), Shiller (1995) has discovered existence of anomalies and irrationalities using psychological aspects of economic thought.

Kudryavtsev and Cohen (2011, p. 36) in their study hypothesized that women appear to more strongly effect by both behavioural biases by supporting evidence. They claimed that probably women learn less from experience.

The purpose of this thesis is to look for if there is a dependency between five identified behavioural biases and finance professionals or an individual investor. The behavioural biases are namely herding behaviour, overconfidence, anchoring, and hindsight bias and gambler fallacy. Particularly behavioural biases of finance professional and the individual investors are tested for dependency with education and experience.

2. LITERATURE OVERVIEW

2.1 ANCHORING

Anchoring[1] is a cognitive heuristic in which decisions are made based on an initial anchor.

The concept of anchoring heuristic can be thought as the tendency to make estimates and decisions on a known reference point, even though it may have no logical relevance at forehand and then to adjust it insufficiently to reach a final conclusion with relative to this start point, possibly an arbitrary value. For example if you have to judge another person´s wealth, the anchor for your judgment may probably be your own wealth level. This shows us people who have to make judgments under uncertainty tend to use relative thinking instead of absolute or critical thinking.

Anchoring concept is first identified by the two psychologists Kahneman and Tversky (1974, p. 1128) as below;

> *"In many situations, people make estimates by starting from an initial value that is adjusted to yield the final answer. The initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of a partial computation. In either case, adjustments are typically insufficient (Slovic & Lichtenstein, 1971). That is, different starting points yield different estimates, which are biased toward the initial values. We call this phenomenon anchoring."*

In their experiment, Kahneman and Tversky (1974, p. 1128) used a wheel containing the numbers one through one hundred. Participants were asked to estimate the percentage of United Nations membership accounted for by African countries. They were asked whether their guess was higher or lower than random value shown on wheel that was spun in front of them prior to answering. Tversky and Kahneman observed that the seemingly random anchoring value of the number on the wheel significantly affected the answers. For example, those who were asked to compare their estimate to when the wheel landed on 10, subsequently estimated 25 percent, while those who compared to 60, the average estimate was 45 percent.

In the financial decision makings, indicators such as market indexes can act as anchors. So investors may make their decisions based on irrelevant statistics.

[1] http://heuristics.behaviouralfinance.net/anchoring/ [accessed 10.04.2014]

And Fuller (2000, p. 14) explains that new information may not be processed rationally by the investors as below;

> *Psychologists have documented that when people make quantitative estimates, their estimates may be heavily influenced by previous values of the item. For example, it is not an accident that a used car salesman always starts negotiating with a high price and then works down. The salesman is trying to get the consumer anchored on the high price so that when he offers a lower price, the consumer will estimate that the lower price represents a good value. Anchoring can cause investors to underreact to new information.*

The same effect is very possible for the stock market investors who built their strategy to invest in stocks that have fallen considerably in a very short amount of time because they are undervalued by other investors. The recent high prices are now the anchor of the investor who thinks that he or she bought the stock at a discount but maybe short to process the newly available information in the market and leave stock valuation biased in the direction of the initial anchor value.

2.2 HERDING BEHAVIOUR

Herding behaviour can be described as tendency for individuals to act together in periods of bubbles or crashes.

Cont and Bouchaud (2000, p. 174) establishes the existence of herding behaviour in markets by implying certain number of studies as below:

> *Scharfstein and Stein (1990) discuss evidence of herding in the behavior of fund managers, Grinblatt et al. (1995) report herding in mutual fund behavior, and Trueman (1994) and Welch (1996) that show evidence for herding in the forecasts made by financial analysts.*

Herding bias is admitted as one of the main root causes of bubbles and crashes by majority. It is thought individual investors and also fund managers join the crowd of others in a rush without adequate information and calculating of the risk-reward trade-offs. So herding behaviour that is irrational in this manner destabilizes markets, increases volatility and portrayed a pejorative term.

However Grinblatt, Titman and Wermers (1994, pp. 1088 - 1105) examined the investment strategies of 155 mutual funds over the 1975-84 period to determine the extent to which the funds purchased stocks based on their past returns, and to determine

the relation of this behaviour to their observed portfolio performance. They found that about 77 percent of these mutual funds were momentum investors, buying stocks that were past winners; however, they did not systematically sell past losers. On average, these trend-followers realized significantly better performance than the remaining funds. Bikhchandani and Sharma (2001, p. 282) also confirmed that although this form of herding behaviour is not rational under the efficient-markets hypothesis, that positive-feedback strategies may be rational and participants who follow such "momentum-investment" can be seen as exploiting the persistence of returns over some time period. Bikhchandani and Sharma (2001, p. 283) then noted that it was important to distinguish between true (intentional) and spurious (unintentional) herding by adding imperfect information, concern for reputation, and compensation structures are most important of these several potential reasons for rational herding behaviour in financial markets.

2.3 HINDSIGHT BIAS

Hindsight bias also known as 'knew it all along' is the tendency to see past events as having been more predictable at the time even if the evidence indicates contrary.

First studies done by Fischhoff (1975) and Fischhoff and Beyth (1975) as mentioned in Muntazir et al (2013, p. 80) as below;

> *The first study conducted to check hindsight bias was (Fischhoff, 1975; Fischhoff & Beyth, 1975). Fischhoff (1975) finds that receipt of outcome knowledge affects subject's judgments in the direction predicted by the tendency to perceive reported outcomes as having been relatively inevitable. This tendency was called as creeping determinism but is nowadays better known as hindsight bias.*

Hindsight bias can be considered as a kind of memory distortion. Reconstructive nature of memory tend to 'fill in the gaps', reflecting a common response to surprise, to avoid embarrassing feelings such as guilt or shame when unexpected various outcomes of a bad decision happen.

Neal J. Roese and Kathleen D. Vohs (2012, p. 413) clarifies three aspects of hindsight bias as below:

> *Hindsight bias embodies any combination of three aspects: memory distortion, beliefs about events' objective likelihoods, or subjective beliefs about one's own prediction abilities. Hindsight bias stems from*

> *(a) Cognitive inputs (people selectively recall information consistent with what they now know to be true and engage in sense making to impose meaning on their own knowledge),*
> *(b) Metacognitive inputs (the ease with which a past outcome is understood may be misattributed to its assumed prior likelihood), and*
> *(c) Motivational inputs (people have a need to see the world as orderly and predictable and to avoid being blamed for problems).*

It is also important to note that one of findings of meta-analysis, conducted by Szalanski (1991, p154) was that an observed asymmetry in the effect of the hindsight bias suggests that cognitive and not motivational factors may be the main cause of the bias as explained below;

> *The hindsight bias in probability assessments is one of the most frequently cited judgment biases. A meta-analysis of 122 studies revealed evidence that the bias occurs under some conditions and that its effect can be moderated by a subject's familiarity with the task and by the type of outcome information presented. The data also suggest that the use of "almanac" questions can generate an unusually large hindsight effect. An observed asymmetry in the effect of the hindsight bias suggests that cognitive and not motivational factors may be the main cause of the bias. Finally, the overall magnitude of the effect of the hindsight bias was found to be small (r = .17). While these results suggest that the bias may not be as worrisome as commonly assumed in the literature, we discuss some situations when an effect this small may be of importance to practitioners. We also show that, depending upon the familiarity of the task and type of outcome information presented, anywhere from a minimum of 0 to a maximum of 7–27 percent of the population may make different decisions because of the hindsight bias.*

For investors the hindsight bias is dangerous in two manners. One of them it prevents from learning from the past and truly reconstructing minds for future decisions. And the second one is to provide a basis one of another most dangerous bias, overconfidence which can be thought falsely beliefs about exaggerated trading abilities.

2.4 OVERCONFIDENCE

Evidence shows that people tend to be overconfident in their decisions and may overestimate their ability to know what will happen. The belief of being more knowledgeable than they actually are, causes investors to believe that diversification of financial portfolios is unnecessary. Overconfidence bias is a frequent trait and investors suffer from reduced returns, through shortcomings of their decisions.

Fischhoff, Slovic and Lichtenstein (1977, p. 552) conducted a general knowledge test and then subjects were asked how sure they were about their responses. Subjects asserted being 100 percent sure when they were actually 70-80 percent correct only.

Alpert and Raiffa (1982, p. 301) showed that people are poorly calibrated in estimating probabilities.

Plous[2] has expressed the relationship between overconfidence and the accuracy levels as below;

> *Overconfidence is greatest when accuracy is near chance levels. Overconfidence diminishes as accuracy increases from 50 to 80 percent, and once accuracy exceeds 80 percent, people often become under confident. In other words, the gap between accuracy and confidence is smallest when accuracy is around 80 percent, and it grows larger as accuracy departs from this level. Discrepancies between accuracy and confidence are not related to a decision maker's intelligence.*

According to Kishore (2013, p. 5), people overestimate their confidence to the past positive outcomes and usually recalls only their successes than their failures.

Shefrin (2000, p. 151) states that there are two main implications of investor overconfidence. The first is that investors take bad bets because they fail to realize that they are at an informational disadvantage. The second is that they trade more frequently than is prudent, which leads to excessive trading volume.

As Shefrin (2000, p. 151) declared that overconfidence bias causes investors to make one important mistake when trading; too much trading. Barber and Odean (1999 , p. 792) highlighted that more active traders earned the lowest returns in their studies with US investors with retail brokerage accounts. 20 percent least active traders with 0.19 percent mean monthly turnover gained 18.5 percent average annual portfolio return where 20 percent most active traders with 21.49 percent mean monthly turnover gained only 11.4 percent average annual portfolio return.

However evidence shows that there are cultural differences in overconfidence bias. Whitcomb[3] found that Turkish subjects exhibited better discrimination but worse calibration than their US counterparts. Lee, et al. (1995, p. 89) found extreme Asian general knowledge overconfidence, again with the exception that the Japanese subjects' judgments were more like those of the Americans than those of other Asian groups.

And also Barber and Odean (2001, p. 283) concluded that men are more overconfident biased according women because men trade 45 per cent more than women and thereby reduce their returns more so than do women.

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[2] http://overconfidence.behaviouralfinance.net/ [accessed 15.04.2014]
[3] http://overconfidence.behaviouralfinance.net/ [accessed 15.04.2014]

Although overconfidence bias can help to recover from disappointments more quickly, as shown cognitive psychological experiments and other surveys, it has direct applications in investment like thinking having better such special information which the others do not have and also underestimating the risks associated with financial decisions.

2.5 GAMBLER'S FALLACY

The gambler's fallacy also known as the Monte Carlo fallacy is inaccurate understanding of probability that an individual assumes a certain random event is less likely to occur following a series of events. This assumption that what occurs on average will be corrected in the short term is incorrect because past series of events do not change the certain fixed probability.

For example, after serious of 10 coin tosses that have landed heads-up, it is very tempting for a person to expect the next coin more likely toss to land tails-up. But the probability of a fair coin to land tails up is always 50 percent and is statistically independent and all previous coin tosses has no effect on future outcomes of the next coin toss.

Monte Carlo fallacy term originally comes from a game of roulette at the Monte Carlo Casino on August 18, 1913. Huff and Geis (1959, pp. 28-29) describes this phenomenon as below;

> *On August 18, 1913, at the casino in Monte Carlo, black came up a record twenty-six times in succession in roulette. ... [There] was a near-panicky rush to bet on red, beginning about the time black had come up a phenomenal fifteen times. In application of the maturity [of chances] doctrine, players doubled and tripled their stakes, this doctrine leading them to believe after black came up the twentieth time that there was not a chance in a million of another repeat. In the end the unusual run enriched the Casino by some millions of francs.*

Shefrin (2000, p. 254) explains that Gambler's fallacy stems from two sorts of confusion. First, people have very poor intuition about the behaviour of random events. With gambler's fallacy, they expect reversals to occur more frequently than actually happens. The second source of confusion stems from the reliance on representativeness.

It is very likely for most of investors are subject to “gambler’s fallacy”. Some investors can assume that chance is self-correcting. Montier (2003, p. 4)[4] mentions that year on year returns in financial markets are examples of random process as tossing a coin. Saying markets can't go down four years sequentially shows the same mindset with the tossing a coin example. Montier (2003, p.1)[5] also supports this idea with evidence from US market.

> *... Since 1872 in the US there have been 32 years in which the earnings yield was below median, and the return over the subsequent year was above median. However, there have also been 34 years in which the earnings yield and the return were both below the median.*

[4] http://gamblers-fallacy.behaviouralfinance.net/Montier2003.pdf [accessed 18.04.2014]
[5] http://gamblers-fallacy.behaviouralfinance.net/Montier2003.pdf [accessed 18.04.2014]

3. DATA and METHOD

The objective of this thesis is to examine the effects following heuristics; overconfidence, anchoring, gambler's fallacy, herding behaviour and hindsight bias. The survey was filled by 104 people due to 95 percent confidence interval and 0.999999328271126 correction factor. A 27 question questionnaire is prepared as survey method. The surveys are carried for two main groups of people; finance professionals who works for commercial banks or employed by intermediary institutions and individual investors who have or have not professional help

All data collected through an online tool called surveymonkey. Surveymonkey allows one to design survey, collect response and also analyze the results. All questions and answer choices are uploaded to the surveymonkey and published via e-mail and other social media tools. The questionnaire can only be answered once per IP address. So multiple responses from same person are prevented. After questionnaire is answered by 104 persons, the data collection is closed down and all collected data is downloaded in Microsoft Excel tool format.

As a statistical method, Pearson Chi-Square test was used to conclude if hypothesis are approved or rejected.

4. RESULTS

As the results of data given by the survey evaluation, demographic information of the people who attended to the survey and their behaviours will be assessed by considering the percent of each item. A correction factor will be used in the analysis as 0,999999328271126 to maintain the confidence interval calculations due to the population size.

4.1 DEMOGRAPHIC, INCOME AND PROFILE RESULTS

According to the results of gender distribution, 37.5 percent of total survey attendances are female and 62.5 percent of the attendances are male as it is shown on Table 4.1.

Table 4.1: Gender distribution

Gender	**Count**	**Percent**
Female	39	37.5%
Male	65	62.5%
Total	**104**	

As the age distribution indicated on Table 4.2, 28.8 percent of survey attendances are between 22 and 26 years old. 45.2 percent of the total people are between 26 – 30 years old. Between 30 and 34 years old investors' percent is 10.6 percent. 4.8 percent of the total amount of people are between 34 and 38 years old. 38 and 42 years old range's percent is 9.6. Lastly, 1.0 percent of the investors are between 42 and 46 years old.

Table 4.2: Age distribution

Age	Count	Percent
22-26	30	28.8%
26-30	47	45.2%
30-34	11	10.6%
34-38	5	4.8%
38-42	10	9.6%
42-46	1	1.0%
Total	**104**	

Table 4.3 represents the marital status distribution. Single people percent in the survey is 72.1. Married people are 26.0 percent of these investors. Separated/divorced investor percent in the total amount is 1.0 percent as this is same for widowed people range.

Table 4.3: Marital status distribution

Marital status	Count	Percent
Single	75	72.1%
Married	27	26.0%
Separated/Divorced	1	1.0%
Widowed	1	1.0%
Total	**104**	

Due to the education level distribution indicated on Table 4.4, the investor education levels have been evaluated into four parts. 4.8 percent is doctorate degree investors, 40.4 percent of the attendance is master's degree, 49.0 percent of the investors are from bachelor's degree and lastly high school graduate people are 5.8 percent in the total amount of people who applied this survey.

Table 4.4: Education level distribution

Education level	Count	Percent
Doctorate degree	5	4.8%
Master's degree	42	40.4%
Bachelor's degree	51	49.0%
High school graduate	6	5.8%
Total	**104**	

According to job status distribution evaluation placed below on Table 4.5, different job status has been seen for the survey attendances. People employed for wages are 79.8 percent of the total amount. Also self-employed people percent is 6.7. And the 13.5 percent includes people who are retired, out of work and looking for work, students and unable to work.

Table 4.5: Job status distribution

Job status	Count	Percent
Employed for wages	83	79.8%
Self-employed	7	6.7%
Retired	1	1.0%
Out of work and looking for work	5	4.8%
A student	7	6.7%
Unable to work	1	1.0%
Total	**104**	

Monthly income distribution is shown on Table 4.6. The distribution has been evaluated between different income levels. 2.9 percent of the people has monthly between 0 and 1000 TL monthly income. 6.7 percent has monthly income between 1000 and 2000 TL. 17.3 percent has monthly income between 2001 and 3000 TL. 17.3 percent has monthly income between 3001 and 4000 TL. 13.5 percent has monthly income between 4001 and 5000 TL. 11.5 percent has monthly income between 5001 and 6000 TL. 4.8 percent has monthly income between 6001 and 7000 TL. 6.7 percent has monthly income between 7001 and 8000 TL. 1.9 percent has monthly income between 8001 and 9000

TL. 1.0 percent has monthly income between 9001 and 10000 TL. 9.6 percent has monthly income more than 10001 TL. Lastly, the people percent which does not want to specify their income is 6.7.

Table 4.6: Monthly income distribution

Monthly income	**Count**	**Percent**
0-1000	3	2.9%
1000-2000	7	6.7%
2001-3000	18	17.3%
3001-4000	18	17.3%
4001-5000	14	13.5%
5001-6000	12	11.5%
6001-7000	5	4.8%
7001-8000	7	6.7%
8001-9000	2	1.9%
9001-10000	1	1.0%
10001+	10	9.6%
I don't want to specify	7	6.7%
Total	**104**	

Due to investor profile inspection, the distribution is indicated on Table 4.7. Finance or banking professionals are 23.1 percent. Individual investor with professional assistance percent is 6.7. Individual investor without professional assistance percent is 41.3 in the total amount of survey attendances. Institutional investors are 5.8 percent in total. 23.1 percent is not categorized as above listed criteria.

Table 4.7: Investor profile distribution

Investor profile	Count	Percent
Finance or Banking professional	24	23.1%
Individual investor with professional assistance	7	6.7%
Individual investor without professional assistance	43	41.3%
Institutional investor	6	5.8%
Not at all	24	23.1%
Total	**104**	

Table 4.8 contains investment period distribution which is explaining the duration of the investment. 3.8 percent of total amount of people invests between 0 and 2 years. 51.9 percent invests between 2 and 4 years. 19.2 percent of total attendance invests between 4 and 6 years duration. The people investing between 6 and 8 years are 16.3 percent. 3.8 percent of total amount of people invests between 8 and 10 years. 1.9 percent invests between 10 and 12 years. 1.9 percent of total attendance invests between 12 and 14 years duration. Lastly, just 1.0 percent of people are investing more than 14 years.

Table 4.8: Investment period distribution

Investment Period (Years)	Count	Percent
0-2	4	3.8%
2-4	54	51.9%
4-6	20	19.2%
6-8	17	16.3%
8-10	4	3.8%
10-12	2	1.9%
12-14	2	1.9%
14+	1	1.0%
Total	**104**	

4.2 HERDING BEHAVIOURAL RESULTS

Investors attended in the survey have been asked two questions to be evaluated for the sources used the effects on their investment decisions for herding biases.

First question has been asked: "Do mainstream opinion on a stock affect your investment decision?" as the answers are listed on Table 4.9. The investor percent who says "always" is 8.7. The people say "never" is 9.6 percent. "Rarely" effected percent is 8.7. "Sometimes" effected percent is 35.6. The percent saying "usually" is 37.5.

In 95 percent confidence interval, participants saying "always" will be somewhere between 14.1 percent and 3.3 percent; "never" will be somewhere between 15.3 percent and 4.0 percent; "rarely" will be somewhere between 14.1 percent and 3.3 percent; "sometimes" will be somewhere between 44.8 percent and 26.4 percent; "usually" will be somewhere between 46.8 percent and 28.2 percent.

Table 4.9: First question about herding behaviour

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Always	9	8.7%	14.1%	3.3%
Never	10	9.6%	15.3%	4.0%
Rarely	9	8.7%	14.1%	3.3%
Sometimes	37	35.6%	44.8%	26.4%
Usually	39	37.5%	46.8%	28.2%
Total	**104**			

Second question was: "Do you think that trading volume of a stock is a useful indicator for investing/trading?" Table 4.10 shows that "yes" answer percent is 42.3; "no" answer percent is 2.9 and "sometimes" answer percent is 54.8.

In 95 percent confidence interval, participants saying "yes" will be somewhere between 51.8 percent and 32.8 percent; "no" will be somewhere between 6.1 percent and -0.3 percent; "sometimes" will be somewhere between 64.4 and 45.3 percent.

Table 4.10: Second question about herding behaviour

Answers	Count	Percent	Min CI	Max CI
Yes	44	42.3%	51.8%	32.8%
No	3	2.9%	6.1%	-0.3%
Sometimes	57	54.8%	64.4%	45.3%
Total	**104**			

4.3 OVERCONFIDENCE BIASES RESULTS

The survey attendances have been asked six questions about the investors' investment decision abilities, expectations, risk perceptions, behaviours against to the risks, and results of investment decisions according to overconfidence biases topic.

First question was: "When your investment decisions achieve successful results, do you always associate these results with your abilities?" as the answers are listed on Table 4.11. The investor percent who says "always" is 10.6. The people say "never" is 1.9 percent. "Rarely" percent is 7.7. "Sometimes" percent is 43.3. The percent saying "usually" is 36.5.

In 95 percent confidence interval, participants saying "always" will be somewhere between 16.5 percent and 4.7 percent; "never" will be somewhere between 4.6 percent and -0.7 percent; "rarely" will be somewhere between 12.8 percent and 2.6 percent; "sometimes" will be somewhere between 52.8 percent and 33.8 percent; "usually" will be somewhere between 45.8 percent and 27.3 percent.

Table 4.11: First question about overconfidence

Answers	Count	Percent	Min CI	Max CI
Always	11	10.6%	16.5%	4.7%
Never	2	1.9%	4.6%	-0.7%
Rarely	8	7.7%	12.8%	2.6%
Sometimes	45	43.3%	52.8%	33.8%
Usually	38	36.5%	45.8%	27.3%
Total	**104**			

Second question was: “What is your expectation for your investment portfolio versus stock exchange index?” Table 4.12 shows that “at par” answer percent is 54.8; “outperform” answer percent is 35.6 and “underperform” answer percent is 9.6.

In 95 percent confidence interval, participants saying “at par” will be somewhere between 64.4 percent and 45.3 percent; “outperform” will be somewhere between 44.8 percent and 26.4 percent; “underperform” will be somewhere between 15.3 and 4.0 percent.

Table 4.12: Second question about overconfidence

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
At Par	57	54.8%	64.4%	45.3%
Outperform	37	35.6%	44.8%	26.4%
Underperform	10	9.6%	15.3%	4.0%
Total	**104**			

Third question was: “Do you believe that you are better than the other investors about foreseeing the future price level of a certain stock?” Table 4.13 shows that “always” answer percent is 5.8; “never” answer percent is 35.6 and “sometimes” answer percent is 58.7.

In 95 percent confidence interval, participants saying “always” will be somewhere between 10.2 percent and 1.3 percent; “never” will be somewhere between 44.8 percent and 26.4 percent; “sometimes” will be somewhere between 68.1 percent and 49.2 percent.

Table 4.13: Third question about overconfidence

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Always	6	5.8%	10.2%	1.3%
Never	37	35.6%	44.8%	26.4%
Sometimes	61	58.7%	68.1%	49.2%
Total	**104**			

Forth question was: “Which of following describes your risk perception to undertake?” as the answers are listed on Table 4.14. The investor percent who says “high risk” is 10.6. The people say “low risk” is 41.3 percent. “Medium risk” percent is 48.1.

In 95 percent confidence interval, participants saying “high risk” will be somewhere between 16.5 percent and 4.7 percent; “low risk” will be somewhere between 50.8 percent and 31.9 percent; “medium risk” will be somewhere between 57.7 percent and 38.5 percent.

Table 4.14: Forth question about overconfidence

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
High Risk	11	10.6%	16.5%	4.7%
Low Risk	43	41.3%	50.8%	31.9%
Medium Risk	50	48.1%	57.7%	38.5%
Total	**104**			

Fifth question was: “Do you feel comfortable if you recognize that your valuation of a stock is quite different from that made by well-known investors?” Table 4.15 shows that “definitely” answer percent is 22.1; “maybe” answer percent is 63.5 and “never” answer percent is 14.4.

In 95 percent confidence interval, participants saying “definitely” will be somewhere between 30.1 percent and 14.1 percent; “maybe” will be somewhere between 72.7 percent and 54.2 percent; “never” will be somewhere between 21.2 percent and 7.7 percent.

Table 4.15: Fifth question about overconfidence

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Definitely	23	22.1%	30.1%	14.1%
Maybe	66	63.5%	72.7%	54.2%
Never	15	14.4%	21.2%	7.7%
Total	**104**			

Sixth question was: “To what extent do your investment decisions turn out to be right?” as the answers are listed on Table 4.16. The investor percent who says “<50 percent” is 24.0. The people say “>80 percent” is 45.4 percent. “50-80 percent” percent is 60.1.

In 95 percent confidence interval, participants saying “<50 percent” will be somewhere between 32.2 percent and 15.8 percent; “>80 percent” will be somewhere between 22.3 percent and 8.5 percent; “50-80 percent” will be somewhere between 70.0 percent and 51.2 percent.

Table 4.16: Sixth question about overconfidence

Answers	Count	Percent	Min CI	Max CI
<50%	25	24.0%	32.2%	15.8%
>80%	16	15.4%	22.3%	8.5%
50-80%	63	60.6%	70.0%	51.2%
Total	**104**			

4.4 ANCHORING BIASES RESULTS

Four questions have been asked to the survey attendances to search information about anchoring biases.

First question was: “Do you set a target price level for profit before investing in a stock?” as the answers are listed on Table 4.17. The investor percent who says “yes” is 46.2. The people say “no” is 17.3 percent. “Sometimes” percent is 36.5.

In 95 percent confidence interval, participants saying “yes” will be somewhere between 55.7 percent and 36.6 percent; “no” will be somewhere between 24.6 percent and 10.0 percent; “sometimes” will be somewhere between 45.8 percent and 27.3 percent.

Table 4.17: First question about anchoring

Answers	Count	Percent	Min CI	Max CI
Yes	48	46.2%	55.7%	36.6%
No	18	17.3%	24.6%	10.0%
Sometimes	38	36.5%	45.8%	27.3%
Total	**104**			

Second question was: “Do you set a stop loss level before investing a stock?” Table 4.18 shows that “always” answer percent is 35.6; “never” answer percent is 13.5 and “sometimes” answer percent is 51.0.

In 95 percent confidence interval, participants saying “always” will be somewhere between 44.8 percent and 26.4 percent; “never” will be somewhere between 20.0 percent and 6.9 percent; “sometimes” will be somewhere between 60.6 percent and 41.4 percent.

Table 4.18: Second question about anchoring

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Always	37	35.6%	44.8%	26.4%
Never	14	13.5%	20.0%	6.9%
Sometimes	53	51.0%	60.6%	41.4%
Total	**104**			

Third question was: “You have set 80 TL budget for shopping and you have learned that the price of the product you have chosen discounted from 200 TL to 120 TL. What would you do?” Table 4.19 shows that “purchase” answer percent is 53.8; “do not purchase” answer percent is 46.2.

In 95 percent confidence interval, participants saying “purchase” will be somewhere between 63.4 percent and 44.3 percent; “do not purchase” will be somewhere between 55.7 percent and 36.6 percent.

Table 4.19: Third question about anchoring

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Purchase	56	53.8%	63.4%	44.3%
Do not purchase	48	46.2%	55.7%	36.6%
Total	**104**			

Forth question was: “Your friend asks how much you pay in rent for your 80-square-meter apartment, and then asks how much a 120-square-meter apartment would cost to rent in the same building. Would you make an estimate by adding a little more to what

you pay even if you've no idea of the actual costs?" as the answers are listed on Table 4.20. The investor percent who says "yes" is 67.3. The people say "no" is 32.7 percent.

In 95 percent confidence interval, participants saying "yes" will be somewhere between 76.3 percent and 58.3 percent; "no" will be somewhere between 41.7 percent and 23.7 percent.

Table 4.20: Forth question about anchoring

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Yes	70	67.3%	76.3%	58.3%
No	34	32.7%	41.7%	23.7%
Total	**104**			

4.5 GAMBLERS' FALLACY BIASES RESULTS

The survey attendances have been asked three questions about the gamblers' fallacy biases.

First question was: "Assume that your friend flipped an unbiased coin 5 times and it turned out as 'Tails'. What do you think about next flip?" as the answers are listed on Table 4.21. The investor percent who says "heads" is 20.2. The people say "tails" is 15.4 percent. "No preference" percent is 64.4.

In 95 percent confidence interval, participants saying "heads" will be somewhere between 27.9 percent and 12.5 percent; "tails" will be somewhere between 22.3 percent and 8.5 percent; "no preference" will be somewhere between 73.6 percent and 55.2 percent.

Table 4.21: First question about gamblers' fallacy

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Heads	21	20.2%	27.9%	12.5%
Tails	16	15.4%	22.3%	8.5%
No Preference	67	64.4%	73.6%	55.2%
Total	**104**			

Second question was: “If you are playing roulette and the last 26 spins of the wheel have led to the balls landing on black, what do you feel would be the outcome of the next ball?” Table 4.22 shows that “black” answer percent is 22.1; “red” answer percent is 21.2. “No preference” answer percent is 56.7.

In 95 percent confidence interval, participants saying “black” will be somewhere between 30.1 percent and 14.1 percent; “red” will be somewhere between 29.0 percent and 13.3 percent; “no preference” will be somewhere between 66.2 percent and 47.2 percent.

Table 4.22: Second question about gamblers’ fallacy

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Black	23	22.1%	30.1%	14.1%
Red	22	21.2%	29.0%	13.3%
No preference	59	56.7%	66.2%	47.2%
Total	**104**			

Third question was: “Which of following lottery ticket numbers are more likely to win the lottery?” Table 4.23 shows that “1, 2, 3, 4, 5, 6” answer percent is 1.0; “8, 15, 21, 30, 38, 42” answer percent is 23.1. “Same possibility” answer percent from the investors is 76.0.

In 95 percent confidence interval, participants saying “1, 2, 3, 4, 5, 6” will be somewhere between 2.8 percent and -0.9 percent; “8, 15, 21, 30, 38, 42” will be somewhere between 31.2 percent and 15.0 percent; “same possibility” will be somewhere between 84.2 percent and 67.8 percent.

Table 4.23: Third question about gamblers’ fallacy

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
1, 2, 3, 4, 5, 6	1	1.0%	2.8%	-0.9%
8, 15, 21, 30, 38, 42	24	23.1%	31.2%	15.0%
Same possibility	79	76.0%	84.2%	67.8%
Total	**104**			

4.6 HINDSIGHT BIASES RESULTS

The investors applied in the survey have been asked two questions about hindsight bias. First question was: "How easy was it to wait for a meltdown at BIST100 when early signs of Global crash of 2008 appeared?" As the answers are indicated on Table 4.24, the people percent said "difficult" is 41.3 and "easy" answered percent is 51.0.

In 95 percent confidence interval, participants saying "difficult" will be somewhere between 50.8 percent and 31.9 percent; "easy" will be somewhere between 60.6 percent and 14.4 percent; "very easy" will be somewhere between 12.8 percent and 2.6 percent.

Table 4.24: First question about hindsight bias

Answers	**Count**	**Percent**	**Min CI**	**Max CI**
Difficult	43	41.3%	50.8%	31.9%
Easy	53	51.0%	60.6%	41.4%
Very Easy	8	7.7%	12.8%	2.6%
Total	**104**			

Second question was: "Would you agree if you have heard (in 2006 or 2007) that a financial crisis is going to happen next year?" Table 4.25 shows that the investors said "agree" answer percent is 27.9; the investors who are "not agree" percent is 13.5. "Slightly agree" investors' percent is 55.8. Lastly, "strongly agree" people percent is 2.9.

In 95 percent confidence interval, participants saying "agree" will be somewhere between 36.5 percent and 19.3 percent; "not agree" will be somewhere between 20.0 percent and 6.9 percent; "slightly agree" will be somewhere between 65.3 percent and 46.2 percent; "strongly agree" will be somewhere between 6.1 percent and -0.3 percent.

Table 4.25: Second question about hindsight bias

Answers	Count	Percent	Min CI	Max CI
Agree	29	27.9%	36.5%	19.3%
Not Agree	14	13.5%	20.0%	6.9%
Slightly Agree	58	55.8%	65.3%	46.2%
Strongly Agree	3	2.9%	6.1%	-0.3%
Total	**104**			

4.7 CHI-SQUARE TEST RESULTS

Four hypotheses have been built up under circumstances as education in finance professionals, experience in finance professionals, education in individuals and experience in finance professionals.

First hypotheses which contain the relation between education vs five biases of behavioural finance (herding, overconfidence, anchoring, gamblers' fallacy and hindsight biases) in finance professionals are independent. All tests have been performed with 95 percent confidence interval.

Table 4.26 represents the dependency results between herding and education in finance professionals. Two questions of herding bias have been considered during the evaluation. The dependency results belong to two herding questions are listed as below:

Table 4.26: Herding behaviour vs education in finance professionals

Herding vs Education in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Finance Professionals	21,5035	12	21,026	dependent
Q3 vs Education in Finance Professionals	9,02778	6	12,592	independent

Table 4.27 shows the dependency results between overconfidence and education in finance professionals. Six questions of overconfidence bias have been considered during the evaluation. The dependency results belong to six overconfidence questions are listed as below:

Table 4.27: Overconfidence vs education in finance professionals

Overconfidence vs Education in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Finance Professionals	10,66132	9	16,919	independent
Q2 vs Education in Finance Professionals	1,24158	6	12,592	independent
Q3 vs Education in Finance Professionals	5,27282	6	12,592	independent
Q4 vs Education in Finance Professionals	5,22282	6	12,592	independent
Q5 vs Education in Finance Professionals	8,19444	6	12,592	independent
Q6 vs Education in Finance Professionals	7,76587	6	12,592	independent

Table 4.28 represents the dependency results between anchoring and education in finance professionals. Four questions of anchoring bias have been considered during the evaluation. The dependency results belong to four anchoring questions are listed as below:

Table 4.28: Anchoring vs education in finance professionals

Anchoring vs Education in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Finance Professionals	7,625	6	12,592	independent
Q2 vs Education in Finance Professionals	12,1133	6	12,592	independent
Q3 vs Education in Finance Professionals	5,78125	3	7,815	independent
Q4 vs Education in Finance Professionals	1,375	3	7,815	independent

Table 4.29 represents the dependency results between gamblers' fallacy and education in finance professionals. Three questions of gamblers' fallacy bias have been considered during the evaluation. The dependency results belong to three gamblers' fallacy questions are listed as below:

Table 4.29: Gamblers' fallacy vs education in finance professionals

Gamblers' Fallacy vs Education in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Finance Professionals	10,2083	6	12,592	independent
Q2 vs Education in Finance Professionals	10,1515	6	12,592	independent
Q3 vs Education in Finance Professionals	2,89141	6	12,592	independent

Table 4.30 represents the dependency results between hindsight bias and education in finance professionals. Two questions of hindsight bias have been considered during the evaluation. The dependency results belong to two hindsight bias questions are listed as below:

Table 4.30: Hindsight vs education in finance professionals

Hindsight Bias vs Education in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Finance Professionals	8,94444	6	12,592	independent
Q2 vs Education in Finance Professionals	10,1964	9	16,919	independent

Second hypotheses which contain the relation between experience vs five biases of behavioural finance (herding, overconfidence, anchoring, gamblers' fallacy and hindsight biases) in finance professionals are independent. All tests have been performed with 95 percent confidence interval.

Table 4.31 represents the dependency results between herding and experience in finance professionals. Two questions of herding bias have been considered during the evaluation. The dependency results belong to two herding questions are listed as below:

Table 4.31: Herding vs experience in finance professionals

Herding vs Experience in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Finance Professionals	5,0583	4	9,488	independent
Q3 vs Experience in Finance Professionals	2,24490	2	5,991	independent

Table 4.32 shows the dependency results between overconfidence and experience in finance professionals. Six questions of overconfidence bias have been considered during the evaluation. The dependency results belong to six overconfidence questions are listed as below:

Table 4.32: Overconfidence vs experience in finance professionals

Overconfidence vs Experience in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Finance Professionals	3,93162	3	7,815	independent
Q2 vs Experience in Finance Professionals	1,83742	2	5,991	independent
Q3 vs Experience in Finance Professionals	2,25057	2	5,991	independent
Q4 vs Experience in Finance Professionals	5,24828	2	5,991	independent
Q5 vs Experience in Finance Professionals	2,22222	2	5,991	independent
Q6 vs Experience in Finance Professionals	0,34014	2	5,991	independent

Table 4.33 represents the dependency results between anchoring and experience in finance professionals. Four questions of anchoring bias have been considered during the evaluation. The dependency results belong to four anchoring questions are listed as below:

Table 4.33: Anchoring vs experience in finance professionals

Anchoring vs Experience in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Finance Professionals	0,05952	2	5,991	independent
Q2 vs Experience in Finance Professionals	0,41847	2	5,991	independent
Q3 vs Experience in Finance Professionals	2,06633	1	3,841	independent
Q4 vs Experience in Finance Professionals	0,71429	1	3,841	independent

Table 4.34 represents the dependency results between gamblers' fallacy and experience in finance professionals. Three questions of gamblers' fallacy bias have been considered during the evaluation. The dependency results belong to three gamblers' fallacy questions are listed as below:

Table 4.34: Gamblers' fallacy vs experience in finance professionals

Gamblers' Fallacy vs Experience in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Finance Professionals	2,32143	2	5,991	independent
Q2 vs Experience in Finance Professionals	5,18759	2	5,991	independent
Q3 vs Experience in Finance Professionals	0,68302	2	5,991	independent

Table 4.35 represents the dependency results between hindsight bias and experience in finance professionals. Two questions of hindsight bias have been considered during the evaluation. The dependency results belong to two hindsight bias questions are listed as below:

Table 4.35: Hindsight bias vs experience in finance professionals

Hindsight Bias vs Experience in Finance Professionals	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Finance Professionals	2,14286	2	5,991	independent
Q2 vs Experience in Finance Professionals	4,03912	3	7,815	independent

Third hypotheses which contain the relation between education vs five biases of behavioural finance (herding, overconfidence, anchoring, gamblers' fallacy and hindsight biases) in individual investors are independent. All tests have been performed with 95 percent confidence interval.

Table 4.36 represents the dependency results between herding and education in individual investors. Two questions of herding bias have been considered during the evaluation. The dependency results belong to two herding questions are listed as below:

Table 4.36: Herding vs education in individual investors

Herding vs Education in Individual Investors	**Value**	**df**	**Chi-Square Value**	**Dependency**
Q1 vs Education in Individual Investors	10,1042	12	21,026	independent
Q3 vs Education in Individual Investors	6,37481	6	12,592	independent

Table 4.37 shows the dependency results between overconfidence and education in individual investors. Six questions of overconfidence bias have been considered during the evaluation. The dependency results belong to six overconfidence questions are listed as below:

Table 4.37: Overconfidence vs education in individual investors

Overconfidence vs Education in Individual Investors	**Value**	**df**	**Chi-Square Value**	**Dependency**
Q1 vs Education in Individual Investors	10,87736	12	21,026	independent
Q2 vs Education in Individual Investors	6,83109	6	12,592	independent
Q3 vs Education in Individual Investors	2,09261	6	12,592	independent
Q4 vs Education in Individual Investors	1,50285	6	12,592	independent
Q5 vs Education in Individual Investors	3,43927	6	12,592	independent
Q6 vs Education in Individual Investors	1,24268	6	12,592	independent

Table 4.38 represents the dependency results between anchoring and education in individual investors. Four questions of anchoring bias have been considered during the

evaluation. The dependency results belong to four anchoring questions are listed as below:

Table 4.38: Anchoring vs education in individual investors

Anchoring vs Education in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Individual Investors	3,01576	6	12,592	independent
Q2 vs Education in Individual Investors	6,50856	6	12,592	independent
Q3 vs Education in Individual Investors	1,88509	3	7,815	independent
Q4 vs Education in Individual Investors	0,98667	3	7,815	independent

Table 4.39 represents the dependency results between gamblers' fallacy and education in individual investors. Three questions of gamblers' fallacy bias have been considered during the evaluation. The dependency results belong to three gamblers' fallacy questions are listed as below:

Table 4.39: Gamblers' fallacy vs education in individual investors

Gamblers' Fallacy vs Education in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Individual Investors	8,7155	6	12,592	independent
Q2 vs Education in Individual Investors	13,0942	6	12,592	dependent
Q3 vs Education in Individual Investors	5,57354	3	7,815	independent

Table 4.40 represents the dependency results between hindsight bias and education in individual investors. Two questions of hindsight bias have been considered during the evaluation. The dependency results belong to two hindsight bias questions are listed as below:

Table 4.40: Hindsight bias vs education in individual investors

Hindsight Bias vs Education in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Education in Individual Investors	7,4598	6	12,592	independent
Q2 vs Education in Individual Investors	6,31781	9	16,919	independent

Forth hypotheses which contain the relation between experience vs five biases of behavioural finance (herding, overconfidence, anchoring, gamblers' fallacy and hindsight biases) in individual investors are independent. All tests have been performed with 95 percent confidence interval.

Table 4.41 represents the dependency results between herding and experience in individual investors. Two questions of herding bias have been considered during the evaluation. The dependency results belong to two herding bias questions are listed as below:

Table 4.41: Herding vs experience in individual investors

Herding vs Experience in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Individual Investors	7,61805	4	9,488	independent
Q3 vs Experience in Individual Investors	0,22718	2	5,991	independent

Table 4.42 shows the dependency results between overconfidence and experience in individual investors. Six questions of overconfidence bias have been considered during the evaluation. The dependency results belong to six overconfidence questions are listed as below:

Table 4.42: Overconfidence Bias vs Experience in Individual Investors

Overconfidence vs Experience in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Individual Investors	3,70219	4	9,488	independent
Q2 vs Experience in Individual Investors	1,62506	2	5,991	independent
Q3 vs Experience in Individual Investors	2,74110	2	5,991	independent
Q4 vs Experience in Individual Investors	2,00286	2	5,991	independent
Q5 vs Experience in Individual Investors	6,39922	2	5,991	dependent
Q6 vs Experience in Individual Investors	2,31545	2	5,991	independent

Table 4.43 represents the dependency results between anchoring and experience in individual investors. Four questions of anchoring bias have been considered during the evaluation. The dependency results belong to four anchoring questions are listed as below:

Table 4.43: Anchoring vs Experience in Individual Investors

Anchoring vs Experience in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Individual Investors	0,94171	2	5,991	independent
Q2 vs Experience in Individual Investors	0,43778	2	5,991	independent
Q3 vs Experience in Individual Investors	0,06751	1	3,841	independent
Q4 vs Experience in Individual Investors	0,09148	1	3,841	independent

Table 4.44 represents the dependency results between gamblers' fallacy and experience in individual investors. Three questions of gamblers' fallacy bias have been considered during the evaluation. The dependency results belong to three gamblers' fallacy questions are listed as below:

Table 4.44: Gamblers' fallacy vs experience in individual investors

Gamblers' Fallacy vs Experience in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Individual Investors	0,4416	2	5,991	independent
Q2 vs Experience in Individual Investors	0,1354	2	5,991	independent
Q3 vs Experience in Individual Investors	0,0035	1	3,841	independent

Table 4.45 represents the dependency results between hindsight bias and experience in individual investors. Two questions of hindsight bias have been considered during the evaluation. The dependency results belong to two hindsight bias questions are listed as below:

Table 4.44: Hindsight bias vs experience in individual investors

Hindsight Bias vs Experience in Individual Investors	Value	df	Chi-Square Value	Dependency
Q1 vs Experience in Individual Investors	0,00566	2	5,991	independent
Q2 vs Experience in Individual Investors	0,85164	3	7,815	independent

5. DISCUSSION and CONCLUSION

The thesis tried to analyze the effects of five behavioural biases on decision making of investors namely: Anchoring, gamblers' fallacy, herding behaviour, hindsight bias and overconfidence. Effects of these five factors on decision making of a sample of 104 investors were studied. Out of this sample, finance professionals and individual investors were chosen. Sample divided into two categories which are finance professionals and individual investors. The sample analyzed by using Microsoft Excel. Hypotheses were tested using the Chi-squared test for dependency. The results from chi-square tests showed in the tables below.

Null hypotheses are shown in Table 5.1 below. And the results are summarized in Table 5.2 below. The hypothesis that there is no relationship between educations of financial professionals and herding behaviour is rejected because chi-squared showed that there is dependecy. But the same hypotheses is not rejected for individual investors. This shows that education can influence and improve finance professionals' decision making process in a more meaningful manner than do for individual investors. Also this result may give some insight about trend following attitude of finance professionals and can be a starting point for people who will do research about behavioural finance. On the other hand, the hypothesis that there is no relationship between experience of individual investors and overconfidence is rejected because chi-squared showed that there is dependecy. For individual investors, experience in financial markets are playing an important role for overconfidence. Further research that look for if this dependency about overconfidence is positively or negatively correlated with the experience among indiviual investors can be interesting. The counterpart hypothesis for finance professionals is not rejected. Lastly, the hypothesis that there is no relationship between education of individual investors and gambler's fallacy is rejected. This simply shows that education can influence understanding of probability and expectations of random events among individual investors.

The academic evidences that put by behavioural finance are undeniable so far. And knowing psychology aspects of financial decision making can certainly help for better invesments.

Table 5.1: List of null hypotheses

There is no relationship between education of financial professional and anchoring
There is no relationship between education of financial professional and overconfidence
There is no relationship between education of financial professional and gambler's fallacy
There is no relationship between education of financial professional and herding behaviour
There is no relationship between education of financial professional and hindsight bias
There is no relationship between experience of financial professional and anchoring
There is no relationship between experience of financial professional and overconfidence
There is no relationship between experience of financial professional and gambler's fallacy
There is no relationship between experience of financial professional and herding behaviour
There is no relationship between experience of financial professional and hindsight bias
There is no relationship between education of individual investors and anchoring
There is no relationship between education of individual investors and overconfidence
There is no relationship between education of individual investors and gambler's fallacy
There is no relationship between education of individual investors and herding behaviour
There is no relationship between education of individual investors and hindsight bias
There is no relationship between experience of individual investors and anchoring
There is no relationship between experience of individual investors and overconfidence
There is no relationship between experience of individual investors and gambler's fallacy
There is no relationship between experience of individual investors and herding behaviour
There is no relationship between experience of individual investors and hindsight bias

Results from hypothesis tests are summarized in Table 5.2 below.

Table 5.2: Summary of results

Null Hypothesis	Result
There is no relationship between education of financial professional and anchoring	Not rejected
There is no relationship between education of financial professional and overconfidence	Not rejected
There is no relationship between education of financial professional and gambler's fallacy	Not rejected
There is no relationship between education of financial professional and herding behaviour	Rejected
There is no relationship between education of financial professional and hindsight bias	Not rejected
There is no relationship between experience of financial professional and anchoring	Not rejected
There is no relationship between experience of financial professional and overconfidence	Not rejected
There is no relationship between experience of financial professional and gambler's fallacy	Not rejected
There is no relationship between experience of financial professional and herding behaviour	Not rejected
There is no relationship between experience of financial professional and hindsight bias	Not rejected
There is no relationship between education of individual investors and anchoring	Not rejected
There is no relationship between education of individual investors and overconfidence	Not rejected
There is no relationship between education of individual investors and gambler's fallacy	Rejected
There is no relationship between education of individual investors and herding behaviour	Not Rejected
There is no relationship between education of individual investors and hindsight bias	Not rejected
There is no relationship between experience of individual investors and anchoring	Not rejected
There is no relationship between experience of individual investors and overconfidence	Rejected
There is no relationship between experience of individual investors and gambler's fallacy	Not Rejected
There is no relationship between experience of individual investors and herding behaviour	Not rejected
There is no relationship between experience of individual investors and hindsight bias	Not rejected

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APPENDICES

Appendix A.1: Questionnaire

1. What is your gender?

   Female
   Male

2. What is your age?

   22-26
   26-30
   30-34
   34-38
   38-42
   42-46

3. Please select the answer that describes your marital status.

   Single
   Married
   Separated/Divorced
   Widowed

4. What is the highest degree or level of school you have completed?

   Doctorate degree
   Master's degree
   Bachelor's degree
   High school graduate

5. Please select the answer that describes your employment status.

   Employed for wages
   Self-employed
   Retired
   Out of work and looking for work
   A student
   Unable to work

6. What is your total monthly household income? Include income from all sources.

   0-1000
   1000-2000
   2001-3000
   3001-4000
   4001-5000
   5001-6000
   6001-7000
   7001-8000
   8001-9000
   9001-10000
   10001+
   I don't want to specify

7. Which of these describe you most accurately as an investor?

   Finance or Banking professional
   Individual investor with professional assistance
   Individual investor without professional assistance
   Institutional investor
   Not at all

8. Which of the financial instruments do you invest?

Stock Market
Treasury Bond & Notes
Time deposit
FX
Gold
ETF investment fund
Repo
Viop/Warrant
Other
Total

9. For how many years have you been investing/trading with stocks?

0-2
2-4
4-6
6-8
8-10
10-12
12-14
14+

10. Do mainstream opinion on a stock affect your investment decision?

Always
Never
Rarely
Sometimes
Usually
Total

11. How important are the following sources for your investment decisions?

Fundamental analysis
Technical analysis
Media
Friends
Analysts & Broker & Dealer
Experience

12. Do you think that trading volume of a stock is an useful indicator for investing/trading?

Yes
No
Sometimes

13. When your investment decisions achieve successful results, do you always associate these results with your abilities?

Always
Never
Rarely
Sometimes
Usually

14. What is your expectation for your investment portfolio versus stock exchange index?

At Par
Outperform
Underperform

15. Do you believe that you are better than the other investors about foreseeing the future price level of a certain stock?

    Always
    Never
    Sometimes

16. Which of following describes your risk perception to undertake?

    High Risk
    Low Risk
    Medium Risk

17. Do you feel comfortable if you recognize that your valuation of a stock is quite different from that made by well-known investors?

    Definitely
    Maybe
    Never

18. To what extent do your investment decisions turn out to be right?

    <50%
    >80%
    50-80 %

19. Do you set a target price level for profit before investing in a stock?

    Yes
    No
    Sometimes

20. Do you set a stop loss level before investing a stock?

    Always
    Never
    Sometimes

21. You have set 80 TL budget for shopping and you have learned that the price of the product you have chosen discounted from 200 TL to 120 TL. What would you do?

    Purchase
    Do not purchase

22. Your friend asks how much you pay in rent for your 80-square-meter apartment, and then asks how much a 120-square-meter apartment would cost to rent in the same building. Would you make an estimate by adding a little more to what you pay even if you've no idea of the actual costs?

    Yes
    No

23. Assume that your friend flipped an unbiased coin 5 times and it turned out as 'Tails'. What do you think about next flip?

    Heads
    Tails
    No Preference

24. If you are playing roulette and the last 26 spins of the wheel have led to the ball's landing on black, What do you feel would be the outcome of the next ball?

    Black
    Red
    No preference

25. Which of following lottery ticket numbers are more likely to win the lottery?

    1, 2, 3, 4, 5, 6
    8, 15, 21, 30, 38, 42
    Same possibility

26. How easy was it to wait for a meltdown at BIST100 when early signs of Global crash of 2008 appeared?

    Difficult
    Easy
    Very Easy

27. Would you agree if you have heard (in 2006 or 2007) that a financial crisis is going to happen next year?

    Agree
    Not Agree
    Slightly Agree
    Strongly Agree