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THE AMERICAN
UNIVERSITY IN CAIRO

SCHOOL OF
BUSINESS

Master of Science in Finance
The American University in Cairo
Cairo, Egypt

The Effect of behavioral biases and gender differences on portfolio returns &
investment decisions: An Experimental Approach

Submitted to the Faculty of the
School of Business
The American University in Cairo

in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE IN FINANCE

By
Noran El Kashef

Under the supervision of
Dr. ALIAA BASSIOUNY
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I am dedicating this thesis to my grandmother may her soul rest in peace; I hope one day I will make her proud.

The American University in Cairo
School of Business
Department of Management

By
Noran El Kashef
Under the supervision of Dr. Aliaa Bassiouny

ABSTRACT

This thesis examines the effect of risk attitude, confidence and optimism behavioral biases on investment decisions and portfolio returns. The thesis methodology utilizes an experimental approach, whereby students compete through a semester long stock market simulation using the Stock-Trak simulation platform. Behavioral biases are examined through a behavioral biases diagnostic assessment completed by students during the trading period. Findings of this study show that both confidence and optimism biases have statistically significant impact on investors' decisions and consequently affect investors' portfolio returns. Findings also show that high confidence levels have positive impact on portfolio returns, on the other side, portfolio optimism bias, has a negative impact on portfolio returns. Data also suggests that males who are found to be more optimistic tend to lose more than less optimistic males in the sample. Another finding in this study shows that gender is the only highly statistically significant variable that predicts and explains investors risk attitude.

Keywords: Behavior Finance, Traditional finance, Stock-Trak, Simulation, Behavioral biases, Gender, Confidence, Optimism, Number of trades, Diagnostic Assessment

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Chapter I

Introduction

1.1 Overview on the behavioral Finance field

Behavioral finance is a field that studies the deviations and anomalies of investors' behavior while taking any investment decision, the field expands the frameworks of traditional finance beyond portfolios, asset pricing and market efficiency, and it also investigates investors' behavior in a direct and indirect way. According to Graham et al (2002) the field of behavioral finance is focused on the psychological factors that lead to common investment practices. Bikas et al (2012) explained two dimensions in behavioral finance: (1) the Macro behavioral finance discloses and describes anomalies of efficient market hypothesis that could be explained by models of people behavior while (2) the micro behavioral finance analyses behavior and deviations of individual investors. According to the Behavioral Patterns and Pitfalls of US investors report prepared by the federal Research Division Library of Congress, Behavioral finance is a multidisciplinary field that draws on psychology and sociology to shed light on financial behavior. According to Jaiswal and Kamil (2012) behavioral finance analyses how investors struggle to find their way through the give and take between risk and return. It's worth noting that psychological behavioral biases were first identified by Tversky and Kahneman in 1974. According to Suresh (2013) understanding various behavioral key biases and traits can help individual take sound financial decisions and in turn make him a better trader/investor. As discussed by Jones (2012) overcoming the biases explained by behavioral finance is not easy but studies have pointed to some promising techniques that could better solve the dilemma. Moreover, understanding these biases will also lead to a more efficient and informational market. According to Duxbury (2015) experimental methods are currently becoming well established in finance and they work on advancing the understanding of the behavioral Finance field as well as understanding the deviations from the normal traditional theories of Finance. Experimental approaches also explore how the financial markets are affected by behavioral finance.

1.2 Factors affecting Investors' decisions

Findings from research studies, Experimental approaches as well as diagnostic assessments conducted in the field of behavioral finance concluded that there are three major biases that affect investors' performance while taking the investment decisions. These heuristic biases are as follows: risk aversion, optimism bias as well as the confidence bias. Consequently, the focus of this thesis is to tackle the significance of each of these biases on investors' performance. These biases are explained thoroughly in chapter II of the thesis.

1.3 Thesis objectives and findings

This thesis attempt to test for risk attitude, confidence, and optimism behavioral biases as well as other demographic variables that might affect investors' decisions and consequently affect investors' portfolio returns. To test the significance of these biases, two approaches were implemented the experimental approach as well as the behavioral diagnostic assessment approach¹.The experimental approach was implemented following the methodology of Felton et al (2010) and Lee et al (2013) and the behavioral diagnostic assessment was prepared following Wood and Lynne (2010).

The main findings of the thesis shows that both confidence and optimism biases have significant impact on investors' decisions and consequently affect investors' portfolio returns. Findings also show that high confidence levels have positive impact on portfolio returns, on the other side, portfolio optimism bias, has a negative impact on portfolio returns. Data also suggests that males who are found to be more optimistic tend to lose more than less optimistic males in the sample, this finding supports Felton et al (2010) where they claimed that optimism may lead to different behavioral tendencies and may not necessarily lead to higher returns. Another finding in this study shows that gender is the only highly statistically significant variable that explains investors' risk attitude this supports the findings of Lee et al (2013).

The thesis is organized as follows; Chapter II of the thesis is a literature review that introduces the science of behavioral finance and gives brief discussion on the domains and major blocks of behavioral Finance as well as gender differences and how they affect investment decisions. Chapter III introduces the methodologies implemented in the study to

¹ Appendix 1

tackle the earlier mentioned objectives; the chapter also explains the models and data implemented in the study. Chapter IV explains the results of the study. Finally, Chapter V of the thesis is a conclusion of the findings and limitations in the study.

Chapter II

Literature Review

2.1 Domains and frameworks of Behavioral Finance

Behavioral finance has two main blocks which are the cognitive psychology² and the limits to arbitrage³, these blocks were highlighted and explained by Ritter (2003). According to the Federal Reserve Bank of New York (2010) research in the behavioral finance field highlighted the social, cognitive and emotional factors that led investors to depart from the rational behavior that traditional economists assume. Lee et al (2013) defined and investigated the biases investors encounter while taking investment decisions, these biases are as follows: Loss aversion, Mental accounting⁴, Optimism, Prediction Overconfidence, Recency⁵, Regret Aversion, Self-attribution⁶, and self-control, Anchoring and adjustment⁷, Ambiguity, Conservatism⁸, Certainty overconfidence, Framing⁹, and Illusion of control. It's worth noting that these biases were also investigated and studied by Sahi et al (2013) as well as Ritter (2003) and Hayes (2010). According to Wood and Lynne (2010) investment behavior tends to be derived from five main Constructs: investment horizons, confidence, control, risk attitude and personalization loss, these sources segmentize individual investors into 4 main segments: risk tolerant traders, conservative traders, loss averse and confident traders. As stated by Massa and Simonov (2005) prior gains and losses affect investment behavior and consequently affect the risk tolerance of investors. Findings of the study conducted by Sahi et al (2013) revealed the following: investors tend to prefer known risks over unknown, they tend to make decisions based on available information, they like to play safely, they tend to invest differently based on their income levels, they also tend to invest more in familiar instruments, tendency to be more confident in their own abilities, and tendency to follow the trend.

² Refers to how people think

³ Predicting in what circumstances arbitrage forces will be effective

⁴ Mental accounting is the tendency to place investments into boxes and track each separately.

⁵ Recency: Investors place too much emphasis on recent events, and ignore long-term performance.

⁶ Self-attribution: investors believe that good decisions are based on their talents

⁷ Tendency to make decisions on irrelevant information

⁸ When investors avoid circumstances that have the illusion of being riskier than others.

⁹ The notion that how a concept is presented to investors matter

2.2 Behavioral Finance Vs. Traditional Finance

Financial models are all based on the same notion that all individuals are rational and their investment decisions are always based on a rational utility understanding. However, real circumstances and research showed that there are a lot of deviations and anomalies from these financial theories that lead to the rise of the field of Behavioral Finance. Shiller (2003) states that in 1990s a lot of focus of academic discussion shifted away from econometric analyses of prices, dividends and earnings toward developing models related to human psychology. According to Bikas et al (2012) the main difference between traditional and behavioral finances is that the first one does not deal with questions why investors make one or another decision. According to Ritter (2003) behavioral finance is a paradigm where financial markets are studied using less narrow models than those based on utility and arbitrage theory assumptions. Capital Asset Pricing Model (CAPM), Modern Portfolio Theory (MPT) and Arbitrage Pricing Theory (APT) and any asset pricing models add unrealistic assumptions and they were proved to be not empirically testable according to Nawrocki and Viole (2014). According to Sahi (2012) the MPT purposed by Markowitz, has failed to explain how decisions are made by individuals under real circumstances, where people violate the principles of expected utility. It's also worth mentioning that studies in neuro-finance and the autonomies of the brain has confirmed that emotions influence cognition and consequently the decisions taken by humans are not rational as claimed by the traditional theory of finance. Nevertheless, Sahi (2012) states that financial decision making is highly affected by emotional and motivational roots that lead to the deviations from the traditional financial theories as explained by the framework conducted by Kahueman and Tversky (2012), some assumptions like the prospects theory, and the heuristic biases were not explained in the traditional theoretical models of finance which make these models inefficient and imperfect. A study of the investment behavior based on behavioral finance conducted by Zhang and Zheng (2015) in China revealed that investors are not always rational as claimed by the traditional financial theories, on the other side investors always take irrational decisions based on some psychological and cognitive biases, these findings confirm that traditional theories have some deficiencies. According to Statman (2014) traditional finance is based on four foundations: people are rational, markets are efficient, people should design portfolios based on portfolio theory and expected returns are described by the standard asset pricing theory however, when looking at behavioral finance, we will find an alternative foundation block for every foundation explained by the traditional

theory. First, people are normal not rational, markets are not efficient, people design their portfolios based on rules of behavioral portfolios, expected returns are described by behavioral asset pricing theory. According to Bondt and Thaler (1991) over the past twenty years' psychologists confirmed that utility theory, bayesian, and rational expectations were proved to be descriptively false. According to Shiller (2003), it was confirmed by many researchers in the field of behavioral finance that the collaboration between traditional finance and behavioral finance has led to deepening the knowledge of financial markets.

2.3 Neuro-finance and Investment Behavior

To better explain how neuro-finance has evolved it's important to understand the journey that leads to neuro-finance. The first stage was the development of the traditional theories in finance, at earlier stage these theories failed to explain many of the deviations in decision making which lead to the rise of behavioral finance which explains the deviations but failed to explain how these deviations occur, and this lead to the evolution the science of neuro-finance. According to Sahi (2012) the why and how of financial decision making behavior called for the study of the human brain, the processor of information which forms the biases of all decision making and this gave the rise to the need for the neuro-finance to explain the reasons why people are not rational using insights from the field of neuroscience. Neuro-Finance explains the deviations that were hardly explained in all financial theories. as well as the biases that were not tackled by behavioral finance. Through the evolution of technological tools, the autonomies of the brain and how the brain responds can be observed in real time which enables a deeper understanding of the deviations in the decision making while investing. Sapra and Zak (2012) claimed that modern neuro-finance has shown that the vast majority of human information processing and decision making occurs on autopilot in the brain which leads to some decisions being taken without much thought. In addition to this, Sahi (2012) claims that neuro-finance explains how loss avoidance and reward system works in human brains and how they directly affect human behavior which directly affects the individual risk behavior. Moreover, studies have shown that what causes the biases and anomalies in human brain are not a defection in human brains, on the other hand it's the structure of the brain itself that arises these emotional and behavioral biases. Martenson (2007) claimed that behavioral biases in humans are explained by levels of enzymes and biological structures that differ from one human to the other. Figure (1), is a summary to illustrate the relation between traditional finance, behavioral finance and neuro-finance.

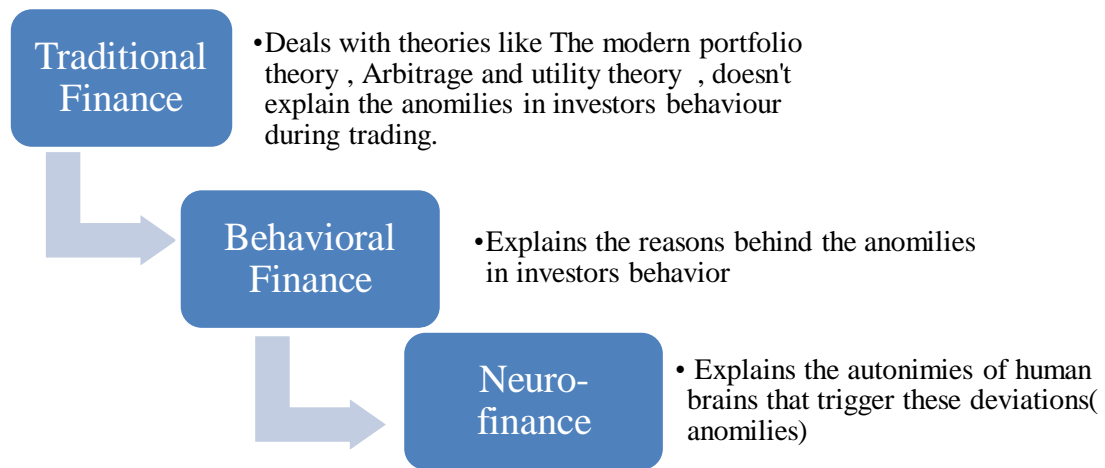


Figure (1)

2.4 Behavioral Finance and Financial Services

Behavioral Finance is a science that should be incorporated into the strategies and day to day schemes of every financial institution that offer financial services. According to the Federal Reserve Board Library of Congress (2010), if financial institutions understand the biases in investors' decisions and gender differences between men and women, they would have given better advices and targeted a bigger segment of consumers. Investment professionals should take into account the findings of behavioral finance when they advise their clients or monitor their accounts. Kunnanatt and Emiline (2012) urge financial services suppliers and governments especially in developing countries to offer investment educational programs to their investors to familiarize them with all behavioral biases that they encounter while taking their investment decisions. This notion was also discussed by Sahi et al (2013) where they claimed that understanding the behavioral and psychological biases would help financial advisors make better products and offer better advices to their customers. According to Burton (1995) research in the USA in 1998, revealed significant differences in the amount of advertising financial institutions directed at men and women, results show that least targeted and under informed segment was women. Moreover, financial services have been designated by some groups of women as masculine activity and this had led to the differences in consumption patterns between men and women. A study revealed by the department of social security research report in 1993 also explained the motivational difference between men and women when buying the financial services. Nevertheless, recent research has also indicated that some women believe they are treated less favorable by financial institutions. On the other side , According to Graham et al (2002) many investment industry professionals have come to the conclusion that it's very essential

to understand women's investment needs and tailor them and women investors should be categorized as a separate niche segment.

2.5 Gender Differences in behavioral Finance

Graham et al (2002) claim that gender plays a major role when it comes to investment decisions. Gender has been determined the third most powerful factor affecting investment decisions after age and income. Lee et al (2013) confirmed prior studies that show major behavioral biases between males and females that would affect investment performance. According to Deo and Sundar (2015) a recent study indicates that 80% of working women in India have no investments this finding is a result of risk aversion as well as lacking the financial knowledge in addition to lacking the freedom of taking any financial decision. Examples on gender differences behavioral biases will be explained thoroughly in part 2.6.

2.6 Major Behavioral biases in behavioral finance

2.6.1 Optimism

Puri and Robinson (2007) suggest that optimistic people in real life tend to invest more in individual stocks. According to Lee et al (2013) optimism bias seems to have an impact on stock selection performance in their sample. Their study also suggests that this bias was not overly represented in either gender but instead it impact genders differently. Also the study conducted by Felton et al (2010) suggests that optimism bias can lead to different behavioral tendencies in men and women according to the domain. Their findings also suggest that optimists don't always experience greater returns than pessimists.

2.6.2 Risk Aversion

According to a study conducted by Felton et al (2010) men are willing to take more risk when it comes to investment decisions, nonetheless men tend to be more optimistic in nature which tends to be the reason they take more risks. The notion was also explained and confirmed by Neelakantan (2010) where he confirmed that risk tolerance has been investigated in many frameworks and institutional surveys and all studies confirmed the fact that women risk tolerance tend to be less than men while taking any investment or financial decision. According to Beckman and Menkhoff (2008) research show that women are more risk averse. Martenson (2007) stated that Men are willing to take higher risks than women also women tend to be more risk averse than men which was confirmed in many studies. Faff et al (2008) investigated gender behavioral differences in investment decisions and

they confirmed that women tend to be more risk averse and less tolerant to financial risk. Also Bernasek and Shwiff (2001) argue that women proved to be more risk averse and men are willing to take more risk than women. According to an experimental economics approach study conducted by Vicki et al (2002) , men composition in a fund management team do influence the decisions making behavior and their findings show that the presence of men increases the chance of choosing a higher risky investment. Studies and research in the field of behavioral finance also show that women tend to be more risk averse and they mostly allocate their assets towards fixed income. Also using the Stock-Trak experimental approach used by Lee et al (2013) their findings show that men are more risk tolerant than women. Risk aversion was also tackled by Felton et al (2010) and the findings of their experiments and surveys confirm that men are more optimistic than women and consequently they are more risk takers than women. Also they revealed that women tend to be very conservative while taking any investment decision and they tend to move away from any risky investment. According to Jaiswal and Kamil (2012) women tend to be more conservative in their risk taking behaviors and they are more likely to invest for income objective rather growth. However, Wood and Lynne (2010) confirmed that men are more aggressive and aim for growth. Moreover, research proved that investors who trade more tend to have more levels of risk tolerance and this was very obvious with men in many experimental studies. Although most of the literature confirms that males are more risk takers than females. Kunnanatt and Emiline (2012) in a study of emerging Patterns in India, suggest that the male sample in their study tends to be more risk averse than females. Also the findings of Bogan and Cheitan (2013) show evidence that not all men are risk seeking and it differs from one sample to another depending on age, income and marital status.

2.6.3 Confidence

According to Beckam and Menkhoff (2008) confidence bias affect investors' decisions and consequently affect investors' returns. They also confirmed that women tend to be less confident and they shy away from competition, which was confirmed by a survey distributed among 649 fund managers in the US, Germany, Italy and Thailand. Also Zhang and Zheng (2015) claimed that overconfidence is one of the heuristic biases that affect investors' decisions. Moreover, Bernasek and Shwiff (2001) indicated that according to the results of detailed surveys conducted in a number of studies, women proved to be less confident than men and they are more conservative when it comes to taking any financial decision. According to a 1992 study conducted by the investment marketing group of

America entitled findings show that women tend to be less confidence to make the right financial decision. Barber and Odean (2001) also confirmed that psychologists and researchers found that men are more confident than women when taking any financial decisions and this yields a number of predictions, first this will trigger men to trade more and consequently get hurt more than women. Moreover in their experimental study they confirmed that men trade 45% more than women which reduce means' net returns by 2.5% points a year.

2.7 Contribution of this Thesis

The main contribution of this thesis is that it provides the first study of the effect of behavioral biases and gender differences on investment performance using a combination of both the experimental and the behavioral diagnostic Assessment approach. This extends the studies of Felton et al (2010) and Lee et al (2013) who only rely on the experimental approach to test for behavioral biases and gender differences.

The main platform used for the experimental methodology relies on Stock-Trak simulation which allows a good comparison of our results on Egypt to other existing studies that were conducted in the United States, Europe and India.

The findings of my study were also supported by the results of the major studies discussed in the literature review as well as the results of the experimental approaches developed by Felton et al (2010) and Lee et al (2013).

The findings in this thesis helps investors understand the major behavioral biases and traits that might affect their portfolio returns whereby help them take sound financial decisions and in turn make better traders/investors.

Chapter III

Methodology & Data

Examining the behavioral biases that could impact portfolio returns in this thesis has been tested through two main methodologies. The first methodology involves an experimental approach and the second involves a behavioral biases diagnostic assessment.

3.1 Experimental Approach

An experiment was conducted amongst students who were enrolled in the FINC3201, "Investment Analysis" course at the American University in Cairo. Students enrolled in this course come from various majors (business finance, economics, accounting, actuarial science) allowing us to examine behavioral differences across a wider sample. All students have taken an introductory course in finance as a pre-requisite. Our sample is made up of a total of 99 students who participated in the experiment, with 32 males and 67 Females. During the semester, students were required to participate in the Stock-Trak portfolio simulation project and were given detailed guidelines; each student owned a brokerage account with a pseudo-cash balance to manage a \$500,000 portfolio using "real time" market prices. Students were required to make a minimum of 30 total transactions during the semester. Cash owned by students must not exceed 20% of their portfolio at anytime during trading. North America was the only allowed exchange. The Portfolio performance of each student was evaluated in terms of absolute returns. Absolute returns are the returns students achieve on their portfolio over the trading period. The number of trades made by each student during the semester was also taken into consideration throughout the trading period. Students were asked to submit a written summary that includes their portfolio and investment strategies, the objective of their investment, the weights given to each stock in their portfolio and the reason they allocated these weights. Students were also asked to describe their benchmarks and the risks involved in their portfolios. Students were also required to document any adjustment they implemented in their portfolios during the trading period and the reason for these adjustments. For students, the objective of the simulation is to achieve high returns to be ranked in top of the class.

3.2 Behavioral biases Diagnostic Assessment

One month after the start of the simulation students were asked to fill in a detailed behavioral biases diagnostic assessment to test for some behavioral biases that might occur during the experiment and affect their investment decisions. The assessment captures three of the major behavioral biases that affect investment decisions which are students' confidence, risk appetite and optimism. The assessment also tracks the amount of time the student spends to take the investment decisions. It also covers some demographic variables like major, age and gender that might affect students' performance during the trading period.

3.3 Data

The data used in the analysis was collected from both the Stock-Trak platform and the behavioral biases diagnostic assessment conducted during the trading period. The holding period for the Stock-Trak project was from February 7 to May 14, 2016. The average portfolio value for the students was \$487,894.74 with a standard deviation of \$78,421.53. The average number of trades was 74 trades. Risk attitude, confidence and optimism were the major attributes tackled in the behavioral bias assessment. Other variables like age, major and time spent in taking the investment decision were also measured. Students' portfolio returns were used to proxy for investment performance over the tested sample.

3.4 Summary Statistics

Table (1): Descriptive Statistics of the Sample

Age
Return
No of trades
Time Spent

This table provides descriptive statistics that summarize the sample data that was used in the project, the average returns for the whole sample is 2.4% and the Average Number of trades is 74 trade.

Table (2): Age groups

Age	Frequency	Percent
Valid 19.00	5	5.1
20.00	23	23.2
21.00	42	42.4
22.00	19	19.2
23.00	9	9.1
24.00	1	1.0
Total	99	100.0

Table (3): Major

	Frequency	Percent
Valid Business	76	76.8
Other	23	23.2
Total	99	100.0

Table (4): Gender

	Frequency	Percent
Valid Male	32	32.3
Female	67	67.7
Total	99	100.0

3.5 Models used in the thesis

Three models are used in this thesis will test for the effect of behavioral biases on investment performance.

Model 1:

$$PR_i = \beta_0 + \beta_1(\text{Confidence}) + \beta_2(\text{Risk Attitude}) + \beta_3(\text{General Optimism}) + \beta_4(\text{Portfolio Optimism})$$

Model 2:

$$PR_i = \beta_0 + \beta_1(\text{Gender}) + \beta_2(\text{Major}) + \beta_3(\text{Age}) + \beta_4(\text{No of trades}) + \beta_5(\text{Time spent}) + \beta_6(\text{Confidence}) + \beta_7(\text{Risk attitude}) + \beta_8(\text{General Optimism}) + \beta_9(\text{Portfolio Optimism})$$

Model 3:

$$\text{Risk Attitude} = \beta_0 + \beta_1(\text{Gender}) + \beta_2(\text{Major}) + \beta_3(\text{Age})$$

3.6 Variables used in the Models

In Models 1 and 2, PR_i denotes portfolio returns which were used as a proxy for investment performance since students were evaluated using the absolute returns and throughout the trading period students were only focusing on achieving better portfolio returns.

Confidence denotes students' self-reliance on their own decisions and their belief in themselves while taking any investment decision throughout the trading period. *Confidence* is measured using survey questions developed by Ryan and Ziachkowsky (2004). *Confidence* bias was measured using four questions and the average score was embedded in the model. Below are the questions used to test for the *confidence* bias: (1 =strongly disagree 5=Strongly Agree)

1. *I feel that on average my investments perform better than the stock market.*
2. *When I purchase a winning investment, I feel that my actions and investment strategy affected the result.*
3. *I expect my investments to perform better than the stock market.*
4. *I feel more confident in my own investment opinions over opinions of friends, colleagues and financial Analysts*

Risk attitude denotes students' tendency to favor or avoid investing in risky assets. *Risk attitude* was measured using survey questions developed by Ryan and Ziachkowsky (2004). *Risk attitude* has been calculated using the behavioral Biases diagnostic assessment. The methodology has been implemented following Dohmen et al (2011). Two questions were used to measure the risk attitude and the average score of these questions was used in the model. Below are the Questions used to test for the risk attitude: (1 =strongly Disagree 5=Strongly Agree)

1. *I am prepared to take greater risks (possibility of initial losses) in order to earn greater future returns.*
2. *I feel more comfortable taking risks when my investments are performing well.*

Optimism denotes students' hopefulness about the success of their investment. *Optimism* was measured using two types of Optimism biases the *General Optimism* which is used to test for students' general optimism toward the market and *Portfolio Optimism* which is directly testing students' optimism toward their own investment. Two questions were developed to test for the two types of optimism biases. The first question was developed by

Puri and Robinson (2007) and the second was developed by Greenwood and Shleifer (2014). Below are the questions used to test for the 2 types of optimism biases:

1. *What do you think will happen to the prices of assets you invested in?*
2. *At the end of the semester, Will you expect to gain the highest returns?*

Time spent denotes the time students spent to make their strategy and take the investment decision. The time spent by each student was measured using the behavioral diagnostic assessment, the below question was included in the assessment to test for the effect of time spent in taking the investment decision on students portfolio returns.

- 1) *How much time do you spend to make the stock selection?*
 - a) *Less than an hour*
 - b) *1-3 hours*
 - c) *3-6 hours*
 - d) *More than 6 hours*
 - e) *More than one day*

Gender, age and major were tracked and measured from the demographic section included in the behavioral diagnostic assessment.

Chapter IV

Results

This Chapter presents the results of the methodology described in Chapter V.

The average return for the whole sample was 2.40%, with males achieving an average return of 2.13 % and females 2.54% as illustrated in table (5).

Table (5): Descriptive statistics for portfolio Returns broken down to three samples: male, female and full sample.

	Male Portfolio Returns	Female Portfolio Returns	Full Sample
Mean	0.0213	0.0254	0.0240
Standard deviation	0.0479	0.0453	0.0460
Maximum	0.2300	0.1900	0.2300
Minimum	0.0000	0.0000	0.0000

The difference in average return in the males and females sample was tested for significance using Model 2 discussed in Chapter III, however, results show that both males and females have similar returns and gender differences doesn't have an impact on portfolio return. As mentioned earlier three behavioral biases were tackled in the assessment, risk attitude, confidence bias and optimism bias according to almost all literature reviews these are the most significant biases that proved to have an impact on investors' return which was discussed thoroughly in Chapter II of the thesis.

4.1 The Effect of behavioral Biases on Portfolio Returns

$$PR_i = \beta_0 + \beta_1(\text{Confidence}) + \beta_2(\text{Risk Attitude}) + \beta_3(\text{General Optimism}) + \beta_4(\text{Portfolio Optimism})$$

Table (6): Model 1

	Males		Females		Full Sample	
	Beta	Sig	Beta	Sig	Beta	Sig
Constant	-0.042	.573	-0.034	.401	-0.028	.380
Confidence	.214	.309	.303**	.019	.275**	.012
Risk Attitude	.101	.611	-.034	.788	-.019	.859
General Optimism	.135	.479	.115	.398	.129	.237
Portfolio Optimism	-.395*	.076	-.112	.410	-.227*	.053
Sample Size	32		67		99	
R-Square	0.122		0.099		0.088	

*This table shows the results of an OLS regression that regresses portfolio returns on behavioral biases. The regression is broken down into three sample, males, females and the fill sample. ***, ** and * denotes significance at 1%, 5% and 10% respectively.*

The above tabulation is broken down by gender in order to test for difference in returns by gender when exhibiting the behavioral biases. The portfolio returns of the 99 students were regressed against the 3 biases In Model 1.

Confidence bias seems to be statistically significant in the full sample; this significance is mainly driven by the female sample which is statistically significant at the 5% level. The full sample with a coefficient of 0.275 indicates the positive relation between confidence and portfolio returns. This entails the positive impact confidence has on Portfolio Returns which supports the findings of Beckam and Menkhoff (2008), where they claim that confidence bias affect investors decisions and consequently affect their returns. The finding also supports Zhang and Zheng (2015).

Portfolio optimism also seems to be statistically significant at the 5% level, the significance is mainly driven by the male sample that shows high statistically significant results when it comes to the portfolio optimism bias. The full sample has a beta of -0.227 which indicates that the Portfolio optimism has a negative impact on portfolio returns. Since the significance is mainly driven by the male sample, this gives an indication that males who tend to be very optimistic sometimes tend to lose more, and this finding was supported by Felton et al (2010) where they claimed that men are willing to take more risk when it comes into investment decisions, nonetheless men tend to be more optimistic in nature

which tend to be the reason they take more risks and consequently get lower returns in many occasions. Their findings also suggest that optimists don't always experience greater returns than pessimists which support my findings. The finding was also supported by Barber & Odean (2001) where psychologists and researchers found that men tend to be more confident and optimistic than women when taking any financial decisions and this yields a number of predictions, which will trigger men to trade more and consequently get hurt more than women.

These findings concerning the confidence bias and portfolio optimism supports the findings that behavioral biases have significant impact on investors' decisions while trading, these findings were intensely explained in the literature review discussed in Chapter II, as for the general optimism bias and risk attitude bias, both seems to be insignificant in our tested sample. The R^2 of this model is 8.8% meaning that the independent variables in this model explain only 8.8% of the variability in the portfolio returns. As a result, model 2 was conducted to capture more of the variability in portfolio returns.

4.2 Results of Ordinary Least Squares Regression using Portfolio Returns as a dependent variable.

$$PR_i = \beta_0 + \beta_1(\text{Gender}) + \beta_2(\text{Major}) + \beta_3(\text{Age}) + \beta_4(\text{No of trades}) + \beta_5(\text{Time spent}) \\ + \beta_6(\text{Confidence}) + \beta_7(\text{Risk attitude}) + \beta_8(\text{General Optimism}) \\ + \beta_9(\text{Portfolio Optimism})$$

Table (7): Model 2

	Males		Females		Full Sample	
	Beta	Sig	Beta	Sig	Beta	Sig
Intercept	-0.398	.035	-0.099	.437	-0.205	.044
Gender					.106	.340
Major	.059	.761	-.100	.435	-.045	.653
Age	.307*	.094	.072	.563	.157	.115
No. of Trades	.326	.130	.059	.645	.126	.230
Time spent	.124	.521	.144	.272	.153	.138
Confidence	.177	.401	.266**	.046	.260**	.016
Risk Attitude	.063	.761	-.065	.629	-.031	.779
General Optimism	.299	.171	.134	.349	.184	.109
Portfolio Optimism	-.332	.145	-.123	.397	-.220*	.067
Sample Size	32		67		99	
R-Square	0.319		0.137		0.159	

*This table shows the results of an OLS regression that regresses portfolio returns on behavioral biases but adding the other variables under measurement. ***, ** and * denotes significance at 1%, 5% and 10% respectively.*

Table (7) is broken down by gender in order to test for difference in returns by gender when exhibiting the behavioral biases as well as the other variables tested in this paper. Again portfolio optimism and confidence biases seem to be the 2 independent variables that are statistically significant and are able to predict the Returns of students' portfolios after including all other variables into the model.

Confidence bias tend to be statistically significant in the whole sample with a beta of 0.016 and this entails the fact the high confidence levels have positive impact on portfolio returns. This finding was supported by Sahi et al (2013) their findings show that high level of confidence lead to high returns. Significance is driven from the female sample which confirms the findings in Table (6)

Portfolio Optimism bias as well is statistically significant in the whole sample with a beta of -0.220 which indicates that the portfolio optimism has a negative impact on portfolio returns, again the results of this model are consistent with the results from model 1. The R^2 of the model is 15.9% meaning that the independent variables in this model explains 15.9% of the variability in the portfolio returns, which is higher than model 1 that only explains

8% of the variability in portfolio returns. In model 2, the female sample has an R^2 of 13.7% and the male sample has an R^2 of 31.9%, this explains that the independent variables in the Male sample tend to explain the variability in the model more than the full sample.

Other variables like gender, major, time spent, number of trades and risk attitude have failed to explain any variability in the portfolio returns. In our sample the age variable was slightly significant at 10% only in the male sample. It's worth noting that age as a variable was not highly indicative since all students were within the same age group and this could be the reason why age was not highly significant in the full sample. Major was also not indicative since most of our sample were from business and accounting majors.

4.3 Effect of Gender, Age, and Major on students' risk attitude.

$$Risk\ Attitude = \beta_0 + \beta_1(Gender) + \beta_2(Major) + \beta_3(Age)$$

Table (8): Model 3

Full Sample		
	Beta	Sig
Constant	4.544	.012
Gender	-.294***	.003
Major	-.106	.281
Age	-.000	.998
Sample Size	99	
R-Square	0.106	

*This table shows the results of an OLS regression that regresses Risk attitude on three demographic variables: Gender, Major and Age. ***, ** and * denotes significance at 1%, 5% and 10% respectively.*

The risk attitude has been regressed against three demographic variables: gender, major and age in order to test whether these demographic variables have a significant effect on the risk attitude of the students. Risk attitude has been calculated using the behavioral bias diagnostic survey discussed in Chapter III. The methodology has been implemented following Dohmen et al (2011), their results show that gender is the only highly statistically significant variable that predict and explains students (investors) risk attitude. This supports the literature review that confirms that gender differences have an impact on individuals risk attitude. The finding also supports Graham et al (2002), where they claimed that gender has been determined the third most powerful factor affecting investment decisions after age

and income. A beta of -0.281 indicates that male students tend to be more risk averse than females students in my sample, this finding doesn't support many of the literature review discussed in the literature. However, these findings were supported by Thomas and Emiline (2012). The similarity between my results and James Thomas and Mithu results could be triggered by the fact that both behavioral bias diagnostic surveys were conducted on a sample in an emerging market with similar economic and market conditions. The findings were also supported by Bogan and David (2012) whose paper shows evidence that not all men are risk seeking and it differs from one sample to another depending on age, income and marital status. The R^2 of the model is 10.6% which indicates that the independent variables in the model explain 10.6% of the variability in the risk attitude of the students in the sample.

4.4 Table 9: Top performers in the stock Track Simulation

Final Stock- Trak Rank	Gender	Final Portfolio Value	Return	Sharpe Ratio
1	Male	613447.1	0.23	2.52
2	Female	593304.3	0.19	1.12
3	Female	589226.5	0.18	1.28
4	Female	573016.9	0.15	1.61
5	Female	577055.8	0.15	0.6
6	Male	571459.7	0.14	0.51
7	Female	562363.8	0.12	1.61
8	Female	556547.3	0.11	4.25
9	Female	557294.5	0.11	1.07
10	Female	532752.9	0.07	4.31
11	Male	536787.0	0.07	0.59
12	Female	527632.4	0.06	1.29
13	Male	529304.9	0.06	2
14	Female	526059.3	0.05	2.02
15	Male	524931.6	0.05	3.14

This table summarizes the performance of the first 15 students based on their portfolio balances , the gender, return and sharpe ratio are also reported along side the final portfolio Values.

For robustness purposes, the methodology of Lee et al (2013) was implemented and results were as follow , 66.7% of the top performers during the semester are females. The results supports the findings that women are more conservative and consequently they are very

cautious when making any financial decision, as a result their returns tend to be higher than males. (Bimal Jaiswal and Naela Kamil , 2012). The finding was supported by Barber Odean (2001) in their experimental study where they confirmed that men trade 45% more than women which reduce men's net returns by 2.5% points a year.

Chapter V

Conclusion & Limitations

This thesis focuses on four major behavioral biases and some demographic variables that affect investment performance and investors' portfolio returns. The objective of the research is to confirm the concept discussed in many literature review concerning behavioral biases and their relation to investment decisions and portfolio returns. The thesis also focuses on gender differences and how they affect portfolio returns. These objectives were achieved by implementing two research methods, the experimental approach using stock-Trak simulation and the behavioral biases diagnostic assessment. Three models were implemented to test for the confidence, risk attitude, general optimism and portfolio optimism biases. The models used in the thesis also test for some demographic variables like gender, age, and major and their impact on portfolio returns.

Model 1 has been conducted to regress portfolio returns on the 4 behavioral biases without including any demographic variable. The results of model 1, shows that both Confidence bias and portfolio Optimism were found to be statistically significance at the 5 % level. Next, Model 2 has been implemented where an Ordinary Least Squares regression using portfolio returns as a dependent variable has been performed. This model included all the variables tackled in the study.

The results of the two regressions were as follows, confidence bias, and portfolio optimism were the only 2 variables that explain the variability in the models, noting that the second model explains the variability in portfolio returns more than the first one. Confidence bias tends to be statistically significant in the whole sample with a positive beta, which entails that high confidence levels have positive impact on portfolio returns. As for the portfolio optimism bias, it tends to have a negative impact on portfolio returns. Since the significance is mainly driven by the male sample, this gives an indication that males who tend to be very optimistic sometimes tend to lose more. Age in this model has a slight significance in the male sample at 10% level. However, gender, major, and time spent taking the investment decision tend not to have any impact on portfolio returns.

Model 3 was conducted using an OLS regression that regresses Risk attitude on three demographic variables: gender, major and age. The results show that gender is the only highly statistically significant variable that predict and explains students (investors) risk attitude.

Finally, for robustness, the performance of the first 15 students was summarized based on their portfolio the results showed that 66.7% of the top performers during the semester are

females. The results support the findings that women are more conservative and consequently they are very cautious when making any financial decision, as a result their returns tend to be higher than males.

This thesis provides the first study of the effect of behavioral and gender biases on investment performance using a combination of both the experimental and the behavioral diagnostic Assessment approach. This extends the studies of Felton et al (2010) and Lee et al (2013) who only rely on the experimental approach to test for behavioral and gender biases. The findings of the thesis were supported by the results of the major studies conducted by researchers in the behavioral finance field as well as the results of the experimental approaches developed by Felton et al (2010) and Lee et al (2013).

Although this experimental study was able to capture some of the behavioral biases that affect investment decisions it's somehow difficult to generalize the results as individuals' decisions and reactions might completely differ in real life circumstances, this was also one of the limitations of the experimental approaches conducted by many researchers in the field of behavioral finance.

The experiment was done on only one country (Egypt); further experiments should be conducted cross-sectionally in cooperation with other universities with students from different cultures and behavior to provide comparative analysis. The experiment was restricted to certain age brackets and previous research show that age could affect risk preferences so may be the results would have differed if taking different samples of students. For-example involving both undergraduate and graduate students in the experiment would results more significant results.

The majority of the sample was accounting or business students, consequently major as an independent variable was not able to capture the variability in portfolio returns. A more comprehensive look at the factors that affect risk attitude should also be tackled. The study didn't investigate the effect of marital status and income of investment decisions, in this experiment these factors were controlled since the whole sample was undergraduate students with the same age bracket.

The behavioral biases diagnostic assessment implemented to track investment behavior should be conducted with one to one open interviews to better understand students' behaviors.

Another limitation is that the experiment was covering only one semester which prevents the isolation of any business cycles during the trading period. In the future, the same approach can be implemented using not only the American market and an American platform but it could be tackled using the Egyptian stock exchange were students will be more familiar with the market and the economic conditions.

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Appendices

Appendix 1

Behavioral Biases diagnostic Assessment

In-order to test for Behavioral biases Students will be required to fill in the below survey 6 weeks after the start of the experiment:

2) Gender:

- Male
- Female

3) Age:

4) Major:

5) I feel that on a average my investments perform better than the stock market.

1 2 3 4 5

1= Strongly Disagree

5= Strongly Agree

6) When I purchase a winning investment, I feel that my actions and investment strategy affected the result.

1 2 3 4 5

7) I expect my investments to perform better than the stock market.

1 2 3 4 5

8) I feel more confident in my own investment opinions over opinions of friends, colleagues and financial Analysts

1 2 3 4 5

9) I am likely to purchase investments that have been recommended by friends or colleagues

1 2 3 4 5

10) I am prepared to take greater risks (possibility of initial losses) in order to earn greater future returns.

1 2 3 4 5

11) I feel more comfortable taking risks when my investments are performing well.

1 2 3 4 5

12) How much time do you spend to make the stock selection?

- 1) Less than an hour
- 2) 1-3 hours
- 3) 3-6 hours
- 4) More than 6 hours
- 5) More than one day

13) What do you think will happen to the prices of assets you invested in?

- 1) Will go down
- 2) Will stay the same
- 3) Will increase

14) At the end of the semester, Will you expect to gain the highest returns?

1 2 3 4 5

Appendix 2

SPSS Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.297 ^a	.088	.049	.044831

a. Predictors: (Constant), Portfolio Optimism , Risk, Confidence Average, General optimism

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.018	4	.005	2.272	.067 ^b
	Residual	.189	94	.002		
	Total	.207	98			

a. Dependent Variable: Return

b. Predictors: (Constant), Portfolio Optimism , Risk, Confidence Average, General optimism

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.028	.032		-.882	.380
	Confidence Average	.018	.007	.275	2.576	.012
	Risk	-.001	.005	-.019	-.178	.859
	General optimism	.009	.008	.129	1.190	.237
	Portfolio Optimism	-.009	.004	-.227	-1.958	.053

a. Dependent Variable: Return

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.399 ^a	.159	.074	.044237

a. Predictors: (Constant), Portfolio Optimism , Major, Age, No of trades , Time Spent, Risk, Confidence Average, Gender, General optimism

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.033	9	.004	1.875	.066 ^b

Residual	.174	89	.002		
Total	.207	98			

a. Dependent Variable: Return

b. Predictors: (Constant), Portfolio Optimism , Major, Age, No of trades , Time Spent, Risk, Confidence Average, Gender, General optimism

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.205	.100		-2.043	.044
	Gender	.010	.011	.106	.959	.340
	Major	-.005	.011	-.045	-.452	.653
	Age	.007	.004	.157	1.592	.115
	No of trades	.000	.000	.126	1.209	.230
	Time Spent	.007	.004	.153	1.499	.138
	Confidence Average	.017	.007	.260	2.447	.016
	Risk	-.002	.006	-.031	-.281	.779
	General optimism	.013	.008	.184	1.618	.109
	Portfolio Optimism	-.008	.005	-.220	-1.852	.067

a. Dependent Variable: Return

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.565 ^a	.319	.082	.045896

a. Predictors: (Constant), Portfolio Optimism , No of trades , Age, Time Spent, Major, Risk, Confidence Average, General optimism

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.023	8	.003	1.347	.271 ^b
	Residual	.048	23	.002		
	Total	.071	31			

a. Dependent Variable: Return

b. Predictors: (Constant), Portfolio Optimism , No of trades , Age, Time Spent, Major, Risk, Confidence Average, General optimism

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.398	.177		-2.245	.035
	Major	.008	.025	.059	.308	.761
	Age	.013	.007	.307	1.747	.094
	No of trades	.000	.000	.326	1.568	.130
	Time Spent	.005	.007	.124	.652	.521
	Confidence Average	.013	.016	.177	.856	.401
	Risk	.003	.011	.063	.308	.761
	General optimism	.032	.023	.299	1.412	.171
	Portfolio Optimism	-.013	.009	-.332	-1.510	.145

a. Dependent Variable: Return

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.371 ^a	.137	.018	.044918

a. Predictors: (Constant), Portfolio Optimism , Major, Age, No of trades , Time Spent, Risk, Confidence Average, General optimism

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.019	8	.002	1.155	.342 ^b
	Residual	.117	58	.002		
	Total	.136	66			

a. Dependent Variable: Return

b. Predictors: (Constant), Portfolio Optimism , Major, Age, No of trades , Time Spent, Risk, Confidence Average, General optimism

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.099	.126		-.783	.437
	Major	-.010	.013	-.100	-.786	.435
	Age	.003	.006	.072	.582	.563
	No of trades	6.464E-05	.000	.059	.463	.645
	Time Spent	.007	.006	.144	1.108	.272
	Confidence Average	.017	.008	.266	2.043	.046
	Risk	-.003	.007	-.065	-.486	.629
	General optimism	.009	.009	.134	.945	.349
	Portfolio Optimism	-.005	.006	-.123	-.853	.397

a. Dependent Variable: Return

Correlations													
		Gender	Major	Age	portfolio Value	Return	Sharpe ratio	No of trades	ce Average	Risk	Time Spent	General optimism	Portfolio Optimism
Gender	Pearson Correlatio	1	.124	-.015	.281*	.042	.096	-.146	-.186	-.308**	-.116	-.260**	-.302**
	Sig. (2-tailed)		.220	.880	.005	.679	.347	.148	.066	.002	.253	.009	.002
	N	99	99	99	99	99	99	99	99	99	99	99	99
Major	Pearson Correlatio	.124	1	.009	.058	-.059	.026	-.070	-.083	-.143	-.078	-.036	-.071
	Sig. (2-tailed)	.220		.933	.569	.562	.801	.490	.412	.159	.443	.727	.484
	N	99	99	99	99	99	99	99	99	99	99	99	99
Age	Pearson Correlatio	-.015	.009	1	.115	.183	.120	.116	-.035	.003	.035	-.019	-.097
	Sig. (2-tailed)	.880	.933		.259	.069	.239	.253	.732	.973	.734	.851	.339
	N	99	99	99	99	99	99	99	99	99	99	99	99
portfolio Value	Pearson Correlatio	.281**	.058	.115	1	.455**	.597**	-.275**	.010	-.085	.013	-.078	-.159
	Sig. (2-tailed)	.005	.569	.259		.000	.000	.006	.922	.405	.899	.442	.115
	N	99	99	99	99	99	99	99	99	99	99	99	99
Return	Pearson Correlatio	.042	-.059	.183	.455**	1	.486**	.118	.209*	-.023	.126	.086	-.084
	Sig. (2-tailed)	.679	.562	.069	.000		.000	.245	.038	.820	.214	.395	.409
	N	99	99	99	99	99	99	99	99	99	99	99	99
Sharpe ratio	Pearson Correlatio	.096	.026	.120	.597**	.486**	1	-.246*	.028	-.109	.092	.098	.007
	Sig. (2-tailed)	.347	.801	.239	.000	.000		.014	.780	.284	.368	.333	.943
	N	99	99	99	99	99	99	99	99	99	99	99	99
No of trades	Pearson Correlatio	-.146	-.070	.116	-.275**	.118	-.246*	1	.058	.106	-.028	-.245*	-.106
	Sig. (2-tailed)	.148	.490	.253	.006	.245	.014		.565	.297	.787	.015	.297
	N	99	99	99	99	99	99	99	99	99	99	99	99
Confidence Average	Pearson Correlatio	-.186	-.083	-.035	.010	.209*	.028	.058	1	.220*	.139	.153	.360**
	Sig. (2-tailed)	.066	.412	.732	.922	.038	.780	.565		.029	.171	.130	.000
	N	99	99	99	99	99	99	99	99	99	99	99	99
Risk	Pearson Correlatio	-.308**	-.143	.003	-.085	-.023	-.109	.106	.220*	1	.196	-.072	.245*
	Sig. (2-tailed)	.002	.159	.973	.405	.820	.284	.297	.029		.052	.478	.014
	N	99	99	99	99	99	99	99	99	99	99	99	99
Time Spent	Pearson Correlatio	-.116	-.078	.035	.013	.126	.092	-.028	.139	.196	1	.024	.247*
	Sig. (2-tailed)	.253	.443	.734	.899	.214	.368	.787	.171	.052		.811	.014
	N	99	99	99	99	99	99	99	99	99	99	99	99
General optimism	Pearson Correlatio	-.260**	-.036	-.019	-.078	.086	.098	-.245*	.153	-.072	.024	1	.379**
	Sig. (2-tailed)	.009	.727	.851	.442	.395	.333	.015	.130	.478	.811		.000
	N	99	99	99	99	99	99	99	99	99	99	99	99
Portfolio Optimism	Pearson Correlatio	-.302**	-.071	-.097	-.159	-.084	.007	-.106	.360**	.245*	.247*	.379**	1
	Sig. (2-tailed)	.002	.484	.339	.115	.409	.943	.297	.000	.014	.014	.000	
	N	99	99	99	99	99	99	99	99	99	99	99	99

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix 3

Research studies in Behavioral Finance

Authors	Title	Date	Journal	objective	Methodology	Result	limitations
1 Alexanra Bernasek and Stephanie Shwiff	Gender , Risk and Retirement	2001	Journal of economic Issues	Whether gender affects the percentage of an individual defined contribution pension assets invested in stocks	The data used in the paper came from survey of faculty employed at 5 universities in Colorado. It was collected by survey conducted in spring 2000	Results showed that men who have spouses or partners who are willing to take at least average risk for average return take greater risk in the allocation of their defined contribution pensions than men whose spouses are unwilling to take any risks.	NA
2 Anli Suresh	Understanding Behavioral Finance through Biases and Traits of Traders	Jul 2013	Journal of Finance and Management	Understanding behavioral Finance through biases and traits of traders in a way to fill the void and explore the relationship among these factors	Literature review that focuses on behavioral biases and traits	The conclusion is that understanding various behavioral key biases and traits can help individual take sound financial decisions and in turn make him a better trader/investor	Further studies are required on how individual understand the risks associated with trading and investing before the start of their financial decision
3 Bimal Jaiswal and Naela Kamil	Gender Behavioral Finance and the Investment Decision	December 2012	Business Review	The objective is to investigate whether gender plays a role in investment decision making and to find the extent to which men and women are influenced by behavioral finance.	The research study employs both secondary and primary data. The data was collected from salaried investors with the help of a structured questionnaires, the Study employs non probabilistic sampling method. The final sample size was 161 from a wide cross section. Chi squared test has been used. The sample was collected in December 2008 from the city of Lucknow	Women tend to be more conservative in their risk taking behaviors. Women are more likely to invest for income objective rather growth. Men are more aggressive and aim for growth	NA
4 Bob Jones	Behavioral Finance	2012	The Journal of Portfolio Management	Techniques on how to overcome behavioral biases	focusing on studies examining techniques to overcome biases in behavioral finance	NA	

5	Brad M. Barber and Terrance Odean	Boys will be boys : gender, Overconfidence and Common stock investment	February 2001	Journal of Economics	The paper provides a selective review of recent work in behavioral finance	Using account data for over 35000 households from a large discount brokerage to analyze the common stock investments of men and women from February 1991-January 1997		NA
6	Daniela Beckman and Lukas Menkhoff	Will women be Women: Analyzing the Gender Differences among financial Experts	February 2008	Discussion Paper		Analyzing survey responses of 649 fund managers in the US, Germany, Italy and Thailand.	Results showed than women are more risk averse, and they are slightly showing low levels of overconfidence.	
7	Daren Duxbury	Behavioral Finance: Insights from experiments II: Biases , moods and emotions	September 2015	Review of behavioral Finance, Emerald Insight	To further review the insights provided by experimental studies examining financial decisions and market behavior	focusing on studies examining explicitly or with direct implications for facts observed in behavioral finance	Experimental methods make further significant contributions to the behavioral finance literature and improve the understanding of the financial Markets.	NA
8	David Nawrocki and Fred Viole	Behavioral Finance in Financial Market Theory , utility theory , portfolio theory and the necessary statistics : A review	March 2014	Journal of Behavioral and Experimental Finance	The purpose of the paper is to suggest a path toward an integrated behavioral finance theory using utility theory and portfolio theory	Focusing on applications to integrate behavioral finance to the theory of financial market.	Partial moments statistics provides the needed quantitative measures for the study of utility theory in non equilibrium markets	NA
9	Dawn Borton	Women and Financial Services: Some directions for future research	1995	International Journal of Bank Marketing	The aim of the article has been to highlight the relationship between financial service providers and women.	Literature Review	Financial institutions target men more than women in their advertising strategies as well as in the services they provide	Further research in the area of women discrimination in financial institutions should be considered.
10	Egidijus Bikas , Daiva Jureviciene, Petras Dubinskas , Lina Novickyte	Behavioral Finance: The Emergence and Development Trends	2012	Procedia Social and behavioral Sciences , Elsevier Science	The article aims to analyze the research of non professional investors' financial behavior in a historical theoretical Perspective	Exploring the behavioral finance of non professional investors.	Behavioral finance is based on research of human and social recognition and emotional tolerance studies to identify and understand incoming economic decisions	NA
11	Geoffrey Williams	Some Determinants of the socially Responsible Investment Decision : A Cross Country	December 2007	Journal of behavioral Finance	Generating a model of investor choice to analyze socially responsible	Extensive Survey of Individual Stakeholder attitudes toward CSR published annually. 1000 respondents are	There is evidence from 5 countries that a significant portion of investors consider a	It's useful to conduct more research into the behavioral aspects of SRI and

	Study				investment SRI	examined each year. In this study the results of year 2003 was analyzed with focus on only 5 countries.	company's social and environmental behavior when making investment decisions	investigating the determinants of investor types.
12	James Thomas kunnanatt and Mithu Emiline	Investment Strategies and gender: A study of emerging Patterns In India	December 2012	Journal of gender Studies	The study is to investigate the investment behavior of suburban and rural investors in India with a particular interest in observable differences in the approach to men and women in term of attitudes to risk and goals	Sample of investors (74) are interviewed and they were selected from the client list held by the largest investment services firm in Cochin City in India. The sample was stratified according to the gender and then it was further categorized	findings show that generally no significant differences by gender in terms of investment orientation of suburban/rural investors in India	According to the consultants interviewed those in the sample lag behind their metropolitan counterparts in India, if they gain the knowledge and experience they might have shown differential investment orientation.
13	James Felton, Bryan Gibson & David M. Sanbonmatsu	Preference for Risk in Investing as a function of trait Optimism and Gender.	June 2010	Journal of behavior Finance	Examining the role of gender and optimism on the riskiness of Investment choices	Experiment using StockTrak.93 business Students were experimented. The number of transactions were tackled as well as value of the portfolios, as well as the risk	Results suggest that 1) Gender differences in investment decisions is due to males optimism 2) optimism may lead to different behavioral tendencies	Results might be different than the real world because participants my act differently in real world so it's somehow difficult to generalize the results
14	Jay R Ritter	Behavioral Finance	2003	Pacific Basin Finance Journal	The article provides a brief introduction to behavioral finance	literature review on the two blocks of behavioral Finance	Behavioral finance is not a separate displace by itself however a part of mainstream finance	NA
15	Judy F, Graham Edward J, Stendardi, Jr Joan K. Myers Mark J.Graham	Gender differences in investment strategies: An Information Processing Perspective	2002	International Journal of Bank Marketing	Identifying the underlying reasons behind the gender differences in investment decisions.		There is evidence to suggest that gender differences in information processing play a significant role in mediating investor perceptions of risk	Cross cultural approach should be tackled , Studies should investigate the differences in the performance of funds managed by women vs. Men
16	Kevin Lee, Scott Miller , Nicole Velasques and Christi Wann	The effect of Investor Bias and Gender on Portfolio Performance and Risk	2013	International Journal of Business and Finance Research	Determining the behavioral factors that males and females exhibit when making	Experiment using StockTrak: 84 finance and accounting major students were experimented. The data collected from	* Males and Females exhibit different behavioral biases *Evidence that males are more	The study covers only one semester which prevent the isolation of

					investment decisions	their portfolios were as follows : Sharpe Ratio , Alpha , Holding period	risk tolerant than females.	any business cycles
17	Malabika Deo and Vijayalakshmi Sundar	Gender Difference: Investment Behavior and Risk Taking	September 2015	Journal of Indian Management	Finding out whether there exist difference in investment choice as well as risk level between men and women	Structural questionnaire survey of 200 investors from Pondicherry under convenient sampling technique. The Mann Whitney Rank sum and Chi Square tests have been applied for the data analysis	The study revealed that men are more active investors than women, also men in the sample reported higher Financial Risk Tolerance. Women also seem not to tolerate uncertain investments.	NA
18	Massimo Massa and Andrei Simonov	Behavioral Biases and Investment	2005	Oxford Journal	The paper investigates the way investors react to prior gains/losses. Examining investor reactions to different definitions of gains and d losses. Investigate how gains and losses in one category of wealth affect holdings in other categories.	Data was collected from different sources one of them is from the Swedish security register center as well as the national social insurance Board	Evidence show that previous gains increase investor risk taking while previous losses reduce it.	NA
19	Meir Statman	Behavioral finance: Finance with Normal People	March 2014	Borsa Istanbul Review , Elsevier	The article offers an outline of behavioral finance as a solid structure that incorporates parts of standard finance, replaces others and includes bridges between theory, evidence and practice	Literature review on behavioral finance and how it is integrated with the standard finance	Behavioral Finance expands the domain of finance beyond portfolios, asset pricing, and market efficiency.	NA
20	Richard H Thaler and Werner F.M De Bondt	Financial Decision Making in Markets and Firms: A behavioral Perspective	1991	Elsevier Science	The paper provides a selective review of recent work in behavioral finance	Focusing on studies that show deficiencies in some financial Theories	Systematic review of evidence was provided to proof that behavioral factors matter outside the laboratory even when a lot of money is at stake	NA
21	Rita Martenson	Are men better investors than women? Gender	December 2007	Journal of Financial Services	This paper reviews prior studies on	The data analyzed in the study come from the Swedish	Men are more profit oriented and more	More research

		differences in mutual fund and pension investments		Marketing	gender differences for financial consumers.	PPM and from survey sent to a nationally representative sample of consumers.	motivated to make financial investments than women are.	needs to be conducted to explain what trigger this gender differences.
22	Robert Faff, Daniel Mulino, and Daniel Chai	On the linkage between financial Risk Tolerance and Risk aversion: Evidence from a Psychometrically-Validated Survey versus an online Lottery Choice Experiment.	2008	Journal of Financial Research	The paper explores the linkage between two related concepts describing an individual's attitude towards risk and risk aversion	This was conducted using survey data and latter data from a lottery experiment	The key finding is: that the 2 approaches to analyzing decision making under uncertainty are strongly aligned. FRT and Risk aversion are strongly aligned. Also the study finds that women tend to be more risk averse than males	NA
23	Robert J Shiller	From Efficient Markets theory to Behavioral Finance	2003	Journal of Economic Perspectives	Evidence that collaboration between behavioral finance and Financial Theories explains many of the anomalies and inefficiencies in the Financial Markets	Exploring studies that relate financial theories with behavioral Finance	Collaboration between fundamental finance and behavioral finance has led to a profound deepening of knowledge of financial Markets.	In further research, it is important to consider the demonstrated weaknesses of efficient markets theory.
24	Ryan Wood & Judith Lynne Ziachkowsky	Attitudes and trading behavior of stock market investors : A segmentation Approach	June 2010	Journal of behavior Finance	Identifying and characterizing segments of individual investors based on their shared investing attitudes and behavior.	1) long-term and shorter investment horizons 2) Stability versus volatility 3) Risk attitude 4) Personalization loss 5) Confidence 6) Control	The cluster segmentation Analysis identified four main segments of investors: 1) Risk tolerant traders 2) confident traders 3) loss averse traders 4) Conservative long-term Investors.	1)Further research should be conducted to validate the findings 2) The actual trading history of each segment was only investigated descriptively
25	Seth L Elan and Malinda K Goodrich	Behavioral Patterns and Pitfalls of US Investors	August 2010	library of Congress	the goal of the paper is to identify common investment mistakes and to provide insights into how investors make the initial decision to invest and why some are reluctant to invest at all.	The report is a companion piece to an annotated bibliography on the subject of behavioral characteristics of US investors.	Findings suggest that investors need streamlined , transparent investment disclosures. Investment professionals should take into account the findings of behavioral finance when they advise clients and monitor their accounts	NA
26	Shalini Kalra Sahi	Neuro-finance and Investment behavior	2012	Studies in economics and Finance	purpose of the paper is to present a	the academic literature pertinent to the domain of	Neurofinance tries to relate the brain	Neurofinance research is done in

				"Emerald Insight"	review as well as a synthesis of the extant literature in the field of neuro-finance	neuro-fiance was reviewed to provide an integrated portrayal of this field	processes to the investment behavior.	laboratory setup, so the responses of participants might vary when they are in real natural settings. Also certain amount of expertise if required to conduct such tests and to interpret the results.
27	Shalini Karla Sahi , Ashok Partap Arora & Nand Dhameji	An explanatory Inquiry into the psychological Biases in Financial Investment Behavior	May 2013	Journal of behavior Finance	Identifying the beliefs and attitudes of individual investors with regard to financial investment decisions making	qualitative personal interview approach in India , the sample was composed of 23 males and 7 females	Certain behavioral tendencies were exhibited from the interviews as Follows: Tendency to prefer known risk over unknown Risk, tendency to make investment based on information easily available, Safe play tendency, tendency to invest differently based on income, tendency to invest in familiar securities, confidence on own ability, rely on family and friends, averse to losses, tendency to feel regret, trend following tendency. Summary of findings: 1) Affective influence and emotions 2) psychological motives 3) Information processing strategies	1) The snowball sampling has limitations in its own 2) Surveys on a large sample should have been conducted with the interviews. 3) interviews and surveys could be conducted across countries to provide comparative assessment

28	Suzan K Hayes	Exploring Investor Decisions in a behavioral finance framework	2010		Increasing awareness and understanding of Individual decision making biases and providing FCS professionals with strategies to improve c	Exploring studies that involve understanding behavioral biases in behavioral finance	Extending the Knowledge base of education professionals with an overview of behavioral finance and a description of decision making biases	
29	Urvi Neelakantan	Estimation and Impact of gender differences in Risk Tolerance	January 2010	Western Economic Association International	This paper provides numerical estimates of the distribution of risk tolerance for men and women.	The estimates were conducted using a theoretical framework that estimate the distribution of risk tolerance	Results show that women tend to be less risk tolerant than men.	The sample was restricted to older Americans and previous research show that age could affect risk preferences. A more comprehensive look at the factors that affect earnings , risk aversion and wealth accumulation is left for future research
30	Vicki L , Bogan David R and Just Chekitan S Dev	Team gender diversity and investment decision making behavior	2013	Review of behavioral Finance, Emerald Insight	Investigating whether the gender composition of a fund management team influences investment decision making behavior	Experimental economics approach, to examine the relationship between gender diversity and investment decisions. Teams of four persons each were given the task of making investment portfolio management decisions	The paper finds evidence that a male presence increases the probability of selecting a higher risk investment. Also having a male presence can increase loss aversion	NA
31	Yu Zhang and Xiaosong Zheng	A study of the Investment Behavior Based on Behavioral Finance.	2015	European Journal of Business and Economics	Presenting the literature as theoretical solutions to the market anomalies of the traditional market theories	The paper analyses quantitative data to conduct descriptive study. A survey questionnaire with predetermined questions implemented is applied to study the behavior of Chinese investors from 20 sales departments. Another study involved Stratified random sampling method was used, 100 survey questionnaires were given out.	Obvious conservative biases was encountered as well as self-attribution bias and loss aversion	NA

Appendix 4

Tables

Table (1): Descriptive Statistics of the Sample

Age
Return
No of trades
Time Spent

This table provides descriptive statistics that summarize the sample data that was used in the project, the average returns for the while sample is 2.4% and the Average Number of trades is 74 trades

Table (2): Age groups

Age	Frequency	Percent
Valid 19.00	5	5.1
20.00	23	23.2
21.00	42	42.4
22.00	19	19.2
23.00	9	9.1
24.00	1	1.0
Total	99	100.0

Table (3): Major

	Frequency	Percent
Valid Business	76	76.8
Other	23	23.2
Total	99	100.0

Table (4): Gender

	Frequency	Percent
Valid Male	32	32.3
Female	67	67.7
Total	99	100.0

Table (5): Descriptive statistics for portfolio Returns broken down to three samples: Male, female and full sample.

	Male Portfolio Returns	Female Portfolio Returns	Full Sample
Mean	0.0213	0.0254	0.0240
Standard deviation	0.0479	0.0453	0.0460
Maximum	0.2300	0.1900	0.2300
Minimum	0.0000	0.0000	0.0000

Table (6): Model 1

	Males		Females		Full Sample	
	Beta	Sig	Beta	Sig	Beta	Sig
Constant	-0.042	.573	-0.034	.401	-0.028	.380
Confidence	.214	.309	.303**	.019	.275**	.012
Risk Attitude	.101	.611	-.034	.788	-.019	.859
General Optimism	.135	.479	.115	.398	.129	.237
Portfolio Optimism	-.395*	.076	-.112	.410	-.227*	.053
Sample Size	32		67		99	
R-Square	0.122		0.099		0.088	

*This table shows the results of an OLS regression that regresses portfolio returns on behavioral biases. The regression is broken down into three sample, males, females and the fill sample. ***, ** and * denotes significance at 1%, 5% and 10% respectively.*

Table (7): Model 2

	Males		Females		Full Sample	
	Beta	Sig	Beta	Sig	Beta	Sig
Intercept	-0.398	.035	-0.099	.437	-0.205	.044
Gender					.106	.340
Major	.059	.761	-.100	.435	-.045	.653
Age	.307*	.094	.072	.563	.157	.115
No. of Trades	.326	.130	.059	.645	.126	.230
Time spent	.124	.521	.144	.272	.153	.138
Confidence	.177	.401	.266**	.046	.260**	.016
Risk Attitude	.063	.761	-.065	.629	-.031	.779
General Optimism	.299	.171	.134	.349	.184	.109
Portfolio Optimism	-.332	.145	-.123	.397	-.220*	.067
Sample Size	32		67		99	

R-Square	0.319	0.137	0.159
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*This table shows the results of an OLS regression that regresses portfolio returns on behavioral biases but adding the other variables under measurement. ***, ** and * denotes significance at 1%, 5% and 10% respectively.*

Table (8): Model 3

Full Sample		
	Beta	Sig
Constant	4.544	.012
Gender	-.294***	.003
Major	-.106	.281
Age	-.000	.998
Sample Size	99	
R-Square	0.106	

*This table shows the results of an OLS regression that regresses Risk attitude on three demographic variables: Gender, Major and Age. ***, ** and * denotes significance at 1%, 5% and 10% respectively.*

Table 9: Top performers in the stock Track Simulation

Final Stock-Trak Rank	Gender	Final Portfolio Value	Return	Sharpe Ratio
1	Male	613447.1	0.23	2.52
2	Female	593304.3	0.19	1.12
3	Female	589226.5	0.18	1.28
4	Female	573016.9	0.15	1.61
5	Female	577055.8	0.15	0.6
6	Male	571459.7	0.14	0.51
7	Female	562363.8	0.12	1.61
8	Female	556547.3	0.11	4.25
9	Female	557294.5	0.11	1.07
10	Female	532752.9	0.07	4.31
11	Male	536787.0	0.07	0.59
12	Female	527632.4	0.06	1.29
13	Male	529304.9	0.06	2
14	Female	526059.3	0.05	2.02
15	Male	524931.6	0.05	3.14

This table summarizes the performance of the first 15 students based on their portfolio balances, the gender, return and sharpe ratio are also reported along side the final portfolio Value