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Faculty of Business Administration & Economics
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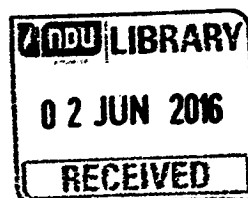
**Risk Tolerance and Behavioral Attitudes: A Case of Lebanese
Institutional Investors**

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**A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of the Master of Business
Administration (M.B.A.)**

**NDU-Lebanon
2016**



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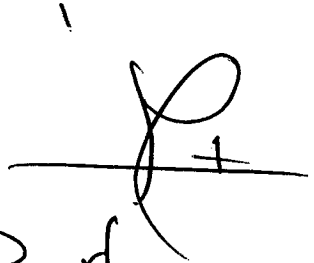
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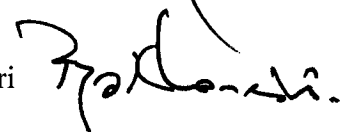
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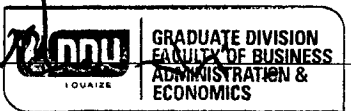
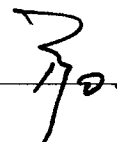
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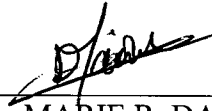


January 22, 2016

DECLARATION

I hereby declare that this thesis is entirely my own work and that it has not been submitted as an exercise for a degree at any other University.

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MARIE R. DAOU

ABSTRACT

Purpose – This research identifies the determinants of the investment risk tolerance of the Lebanese institutional investors and investigates whether the behavioral conduct and the investment personal risk tolerance of the Lebanese institutional investors vary with respect to their demographic characteristics and profiles and other chosen variables. This paper also tries to identify the characteristics that make an investor rational in the decision-making.

Design/methodology/approach – Deductive in nature, this research uses questionnaires collected from 129 Lebanese institutional investors to test three hypotheses related to their risk profile and their investment behavior.

Findings – The findings provide evidence of a positive significant relationship between personal risk tolerance and optimism. Moreover, results reveal that male investors are more risk tolerant than female ones, whereas the results show a positive significant relationship between hindsight bias and risk tolerance. In addition, findings suggest that framing bias increases the likelihood for the investor to be classified as novice investor, while framing and cognitive dissonance biases increase the likelihood of investors to be categorized less rational in their investment decisions. Finally, no variability was found in risk tolerance, overconfidence, and other biases with respect to the investor type and rationality.

Research limitations/implications – Further factors such as personal traits, financial conditions, and life experiences would play an important role in determining the risk tolerance and behavior of the investors but Lebanese investors refuse to reveal such confidential information. On the research level, this paper adds to the small number of studies addressing the behavioral biases and risk tolerance of the investors in the MENA region.

Practical implications – At the practical level, this research attempts to inform the Lebanese institutional investors on the factors that affect their investments decisions which would result in more knowledge about behavioral biases and contribute to a better investment decision-making process.

Originality/value – Studies related to behavioral finance and risk tolerance have generally been conducted in countries with active financial and stock markets. This research tests the traditional finance theories and the behavioral theories in a developing market and shows that the Lebanese investors exhibit bounded rationality.

Keywords – Rational investment decision, Behavioral biases, Risk Tolerance, Lebanese investors

Paper type - Thesis

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Chapter One

Scope of the research

1.1 Research Background and Relevance

Traditional finance theories such as the Efficient Market Theory and Modern Portfolio Theory advocate that investors are rational and base their investment decisions on the accessible information. From this perspective, two key assumptions have arisen. First, market participants behave in a rational way, interpret new information correctly, and know the probability distribution of the market risk thus they make unbiased forecasts. Second, markets are efficient so stock prices reflect all the relevant information in the financial market (Fama, 1998). However, behavioral researchers mainly psychologists, found that the classical financial theories cannot explain some phenomenon of the market and that investment decisions were not entirely rational (Kumaran, 2013). In 1980s, the topic of Behavioral Finance has emerged to explain anomalies and gaps that are still unanswered by the traditional economic and financial models when rational models fail to provide enough explanations (Jurevičienė, and Ivanova, 2013). The contributors to the rise of behavioral finance are the two psychologists Amos Tversky and Daniel Kahneman, who studied how psychology affects people's behavior in financial decisions (Subash, 2012).

From this point of view, the research findings conveyed doubt about the rationality of investor decision-making process and showed that decisions can be influenced by psychological and behavioral factors (Chang, 2008; Weller and Thulin, 2012; Kourtidis *et al.*, 2011). Moreover, the individual investors' investment decision process is based on a combination of demographic factors such as age, gender, education level, income level, personal traits such as risk tolerance emotions and values, and the markets conditions such as the risk-return tradeoff and the related transactions costs (Chitra and Sreedevi, 2011; Young *et al.*, 2012; Chang, 2008; Ferguson *et al.*, 2011).

According to Statman (2005), investors are normal and not rational as defined by standard finance. When individual investors, financial professionals, and academics are faced with uncertainty and are overwhelmed by the amount of information related to investment choices, they are more prone to irrational behavior (Sehgal and

Tripathi, 2009). Some studies report a major relationship between risk tolerance and investments. Keller and Siegrist (2006) found that factors such as financial risk tolerance, level of income have significant positive effects on the willingness to invest in stocks. The influence of these factors makes the decision-making procedure more complex, instead of making it a simple rational process. In addition to that, research also stresses on the behavioral aspects governing individual investors emphasizing on the role of wealth managers and advisors, and on the factors that affect their decisions. Market participants may follow their judgments and preferences and be more subjective in the path of decision-making. Individual investors and professionals are prone to behavioral biases that are categorized into cognitive errors and emotional biases (Pompian, 2006). Number of studies investigated the cognitive biases faced by investors such as overconfidence, optimism thinking, conservatism, confirmation, representativeness, hindsight, anchoring, framing, and belief perseverance focusing on foreign markets (Thaler, 1999; Shefrin, 2000; Clarke and Statman, 2000).

To assess the process of decision-making large investment banks started implementing cognitive psychology of human behavior in the traditional finance models (Park and Sohn, 2013). A decision-maker cannot make a perfect optimal decision. By understanding behavioral biases, risk tolerance, and other factors that influence the investment decision-making, corporations, investment professional, financial advisors, and individuals may be able to improve economic outcome. Once the bias is identified, it is possible to moderate it or adapt to it, to have a closer matching to the rational outcome predicted by traditional finance that in turn serves the improvement portfolio diversification.

Despite the increasing attention on behavioral finance and its effect on the financial markets, risk, and returns, empirical studies in this area are somehow limited in the MENA Region and especially in Lebanon as they mainly focus on the behavioral biases and risk tolerance during the financial crisis in the GCC region. Fares and Khamis (2011) identified the behavioral factors that influence the investors' trading decision at Amman Stock Exchange and found that age, education, access to internet, and the broker play an important role in the investment decision. Abdul Rauf (2014) investigated the behavior of investors in Bahrain before and after the 2008 crisis and found that investors are more cautious in their decisions after their optimism during the crisis. Another study by Moeini (2012) provided empirical

evidence for overconfidence of investors in Dubai Financial Market. Personalities, attitudes, behavior, and values of the people in the MENA countries differ considerably from those of Western countries, which subsequently influence their decision-making processes in various ways. The research question seems to be timely and relevant to evolving markets, such as Lebanon, where investment banks and financial institutions are somehow newly established and are becoming integrated with the global markets. This sector will facilitate the rise of private investor groups. The findings of the study will help in understanding the investors' decision-making process, attitudes toward risk and chosen investment strategies, within Lebanon's unique socio-cultural context. The author hopes that the findings of this study will improve the investment decision-making of the Lebanese institutional investors by recognizing and learning about the biases they are prone to in order to correct their investment behavior.

1.2 Lebanese Institutional Investment Environment

The Lebanese economy is mainly based on the banking sector and is still attracting funds from all over the world despite the political instability and turmoil in the region mainly in Syria and Iraq. The banking sector proved to be resistant to external shocks and consequently has continued in the expansion process. According to Mikhael (2014), the confidence in the Lebanese banking sector has led to an increase in deposits by 10% while the assets increased by 10.9% compared to 2013. Moreover, investors are weighing on the banking sector because tourism, real estate, trade activities, and deficits are deteriorated. The Lebanese regulatory frameworks, upgraded to international standards, are constantly supervised by the external authorities on the liquidity, solvency, and risk assessment levels that are increasingly favorable to wealth creation. Given its financial system that has long been distinguished as a model for the region, Lebanon is trying to establish itself as a regional center for institutional investors, concentrating on this segment in spite of the challenges faced by the country. This sector aims to provide more confidence and guarantee for liquidity providers in order to direct money flows to the country (Khazen, 2015). Furthermore, the opportunities are vast, on the domestic and regional sides. Based on this, the Lebanese are growing their investment finance division to exploit these opportunities. The Lebanese banks are leveraging their

strong regional presence and know-how in the MENA region and its financial markets to offer first-rate investment banking services to private and institutional clients (Bank Audi, 2015). Furthermore, Lebanon includes large number of banks of different sizes and ownerships. The banks are large and small and medium size including commercial, credit and investment, Islamic banks and some of them are foreign or mixed banks. The financial institutions listed in the Lebanese Central Bank are 73 institutions including banks, pension funds and insurance companies and are the major participants in this sector (Banque du Liban, 2015). The investment banking business is managed by expert professionals with extensive experience in local, regional and global financial markets. It is strengthened by large research capabilities covering the MENA debt and equity markets. The investment banking sector covers the following areas: capital markets, mergers and acquisitions, advisory, asset management, and brokerage (Association of banks in Lebanon, 2015). Although Lebanese people prefer to keep their money in form of bank deposits rather than investing them in financial instruments, the growth of this sector motivated individual investors to actively participate in this sector. This in turn increased the trading of investors through the banks and financial institutions; consequently, it increases the value of this study.

1.3 Research aims and questions

Alike other studies, the main objective of this thesis is to identify the behavioral biases explored by investors trading through the Lebanese investment banks and to screen out the potential factors that play an important role in their investments decisions making such as the demographic factors, the bases of information, and their risk profile. Nevertheless, this paper will add to the existing literature in many aspects:

- Investors' psychology and biases vary depending on location, culture, mentality, education, and age a study on the financial behavior faced by investors among the major Lebanese investment banks would be important and interesting as these banks are growing, with an international presence and are increasingly becoming integrated with the international financial markets (Kern, 2012).

- Studies of this nature have been conducted in large economies and foreign stock markets and in the large stock markets of the MENA and Gulf region where in Lebanon the Beirut Stock Exchange is passive and few companies and banks are listed.
- Financial institutions are growing in the Lebanese market and are increasingly attracting Lebanese investors which have limited knowledge about the biases that may affect their decisions. Based on this, this paper investigates the stated subject in the Lebanese banking sector and argues that professional traders might exhibit strong behavioral biases compared to normal investors.

The research hypotheses are detailed in chapter four.

1.4 Thesis Outline

The paper is organized as follows: the next chapter provides a literature review and a discussion of the different theories related to behavioral finance and risk tolerance. The third chapter presents the research methodology, sampling procedures, and data collection tools. Chapter four lists the hypotheses that need to be tested followed by the analysis of the findings. Chapter five summarizes the results and presents some recommendations.

Chapter Two

Theoretical Framework and Literature Review

2.1 Introduction

The literature review grounds the area of interest that is behavioral finance in a conceptual framework. It provides theory base for the topic and presents the published work to increase the relevance of the topic. The literature section proves that the work fits in what has been done previously by others thus increases the significance of the work and aims to find out the gaps that have not been studied yet. Moreover, it presents critical evaluation of the previous work along with an in depth analysis and discussion of the relevant theories related to the problem under study (Hart, 1998). This section highlights the key issues of the research such as the major findings, controversies, evaluation of the different points of view enabling the identification of the major strengths and weaknesses of the topic allowing the detection of the gaps that the paper aims to address and the variables that will be used in order to answer the research questions (Phillips and Pugh, 2005).

2.2 Theoretical Underpinning

This section presents the discussion of the different theories related to the standard finance that assume that investors are rational in their decisions and the theories related to the behavioral finance that assume that investor take irrational decisions.

2.2.1 General Scope of Literature

Finance is defined as the study of how to make the best decisions about raising funds, using and managing resources over time and under risk. Traditional financial theory is based on two key assumptions: (i) market participants behave in a rational way, interpret new information correctly, and know the probability distribution of the market risk thus they make unbiased forecasts and (ii) markets are efficient: in an efficient market the stock prices reflect all the relevant information in the financial market (Fama, 1998). Thus this theory is founded on the efficient market hypothesis (EMH), developed by Eugene Fama on 1970 (Pompian, 2006).

Over the past decades, there have been developments in asset pricing models that focused on asset allocation, on expected return and risk such as the Capital Asset Pricing Models (CAPM) and the Arbitrage Pricing Theory (APT) (Subash, 2012). In parallel, behavioral researchers mainly psychologists, found that the EMH cannot explain some phenomenon of the market and that investment decisions were not entirely rational (Kumaran, 2013). According to Statman (2005), investors are normal and not rational as defined by standard finance. When individual investors, financial professionals, and academics are faced with uncertainty and are overwhelmed by the amount of information related to investment choices, they are more prone to irrational behavior (Sehgal and Tripathi, 2009).

In 1980s, the topic of Behavioral Finance has emerged to explain anomalies and gaps that are still unanswered by the traditional economic and financial models (Jurevičienė, and Ivanova, 2013). Various disciplines such as sociology, anthropology, and psychology used experiments and survey methodologies to support the fact that psychological elements play an important role in the financial decisions (Garcia, 2013). Recent studies in behavioral finance proved that information plays a minor role in the financial decisions (Barberis and Thaler 2003; Shiller 2003). Behavioral scientists argued that people are faced with mental errors in their decisions which are predominantly related to wrong expectations and evaluation of the stock, leading to an irrational judgment (Fuller, 2000). The fathers of Behavioral Finance are the two psychologists Daniel Kahneman and Amos Tversky, who in 1979 developed the Prospect Theory, which apply psychological concept to financial and economic sciences (Shefrin and Statman, 1985). According to the prospect theory, market participants perceive the different selections based on gains and losses relative to a reference point (Lucchesi, Yoshinaga, and De Castro Junior, 2015). Moreover, Kahneman and Tversky (1979 in Shefrin and Statman 1985) found that decision makers use heuristic strategies, whilst Baker (2010) grouped cognitive biases into different categories: heuristic, framing, emotion, and market influence.

Behavioral finance is relatively a new paradigm in finance that focuses on the theories and models that impact the decision-making process of investors by highlighting the influence of the cognitive biases and mental errors (Ricciardi, 2006). Effective decision-making requires the understanding of human nature. More specifically, investors can educate themselves about many biases that will improve

the effectiveness of their decision-making process (Subash, 2012). Some of the market fluctuations were explained by the behavioral finance theory. Shefrin (2000) pointed out that practitioners should recognize their mistakes and understand them in order to take the necessary corrective measures. Another aspect of behavioral finance is to consider the extent to which professional traders are more subject to behavioral biases. Behavioral finance theory showed that it is possible to create a model that can explain the results of the markets using the solid ground of psychology and economics (Thaler, 1999).

2.2.2 Classical Decision Theory

Rational finance and investment decision-making have been the cornerstone of traditional finance since the 1960s. The literature develops the rationality of investors and argues that individuals make logical investment choices. According to the classical decision theory, investors are presented with all the possible alternatives and they select accordingly the optimal solutions to maximize their wealth. The rationality assumptions have been developed within different frameworks. Markowitz (1952) has developed the portfolio theory which assumes that investors make decisions while ignoring which alternative would lead to a better income or return (Jurevičienė, and Ivanova, 2013). Modigliani and Brumberg (1954) developed the lifecycle models that studied how individuals manage their income and consumption especially when they become older in age, while Friedman (1957) established the permanent income theory that showed the rationale behind the average income people expect to receive over a certain period of time. Merton and Samuelson (1969) studied the traditional theory of investment and concluded that individuals aim to maximize utility based on rational expectations using available information (Blume et al., 1982).

Standard finance researchers have been able to develop theories that support the rationality of investors such as the Modern Portfolio Theory (MPT) and the Efficient Market Hypothesis (EMH). At the same time, risk analysis theories and econometric models have also been developed and presented new models like the Arbitrage Pricing Theory (APT), the Capital Asset Pricing Model (CAPM), and the Black-Scholes model for option pricing (Ricciardi, 2008). The complexity of the latter models is huge compared to those of the early pioneers in the field (Biais et al,

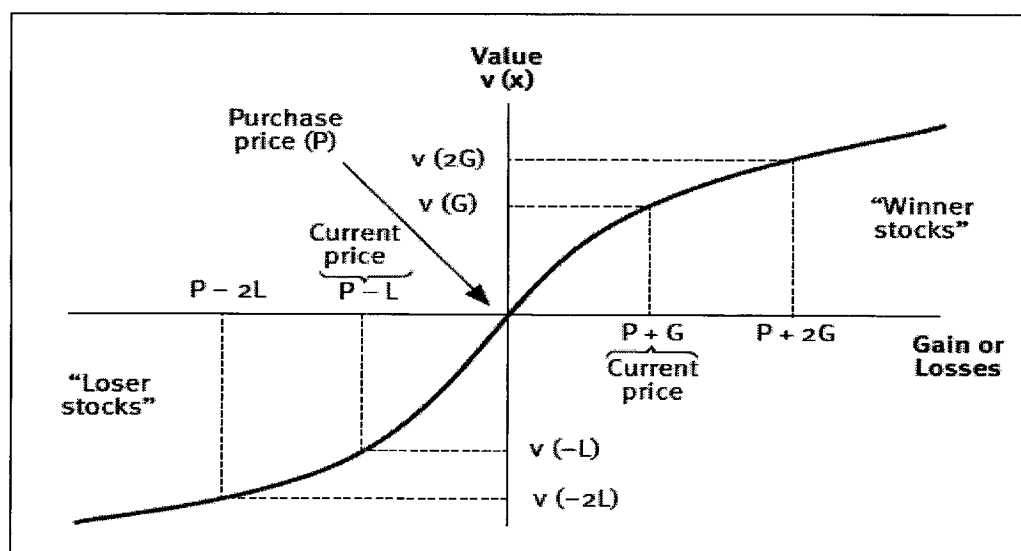
2010). Rationality suggests that all market participants- either firms or individuals- presented with full access to appropriate information are able to predict events without bias (Ricciardi and Simon, 2000). As per Shapira and Venezia (2001) the behavior of individual investors is becoming less relevant. The advocates of the Expected Utility Theory (EUT) - that was developed by Neumann and Morgenstern in 1944 and states that market participants chose one alternative from risky ones in order to maximize the expected benefit- claim that the financial markets are dominated by institutional investors and professionals who are more prone to rational behavior because they are better experienced and informed than individual investors and use more efficient analytical tools. The EUT is concerned with people inclinations toward choices that have uncertain outcomes. It takes into consideration the different risk attitudes of individuals. The expected utility values are calculated by adding the weighted utility values of outcomes (Mongin, 1997).

Fama (1970) developed one of the most important financial theories called the Efficient Market Hypothesis (EMH). According to this theory, in an efficient market the stock prices reflect all the available information and investors cannot earn abnormal returns (Garvey and Murphy, 2006). The EMH is based on three major arguments: (i) investors are rational; (ii) if investors are irrational their trades do not affect prices; (iii) rational arbitrageurs eliminate the influence of irrational arbitrageurs (Subash, 2012). The theory also presented empirical evidence that any new information about a security should be reflected in its price and that prices do not move if there isn't any new information related to them because they must equal the exact value of the stock (Shefrin, 2000). Furthermore, there are three different types of EMH the weak form of efficiency where all past information is incorporated in the market prices but impossible to earn profits based on historical data, the semi strong form of efficiency where it is impossible for investors to earn superior returns using publicly available information that is already incorporated in the prices, and the strong form of efficiency where all information public and private are incorporated in the securities' prices allowing investors to earn superior returns (Subash, 2012).

2.2.3 Prospect Theory

In 1979, Kahneman and Tversky showed evidence about market participants' behavior when it did not follow the assumptions of the expected utility theory. They came up with one of the important concepts in behavioral finance known as the prospect theory. Barberis and Thaler (2003) considered that this theory can capture people's behavior in risky gambles. This theory assimilates the theoretical components of finance with several psychological features. Daniel Kahneman was awarded the Nobel Prize for Economics in 2002 for the prospect theory (Pompian, 2006). The theory was based on two phases: the framing and the evaluation phases. The essence of this theory is that human beings are irrational in assessing risk under uncertainty. It states that investors have tendency to keep losing securities and vice versa (Shefrin and Statman 1985). People are risk averse in gains and risk takers in losses and they place more weight on the perceived outcomes rather than the probable ones. Framing also influence the decision because the same problem can be presented in different ways. The function of the prospect theory is different from that in modern portfolio theory. In modern portfolio theory the wealth maximization is based on the final wealth position while the prospect theory takes gains and losses into account. This explains why people make different choices with identical final wealth levels. Moreover, gains and losses are defined based on a reference point and changes are measured against this reference point (Kahneman and Tversky, 1979). Purchase price of a stock is one of the reference points used by investors. The prospect theory value function is S-shaped and is defined in terms of changes in wealth and not final states. The function is concave in the region of gains and convex in the loss region and it is steepest at the reference point. People compute for each allocation the possible gains and losses and take the allocation with the highest utility. Another property related to the prospect theory is the sub-certainty where each outcome is multiplied by a decision weight and not probabilities in order to measure the influence of events on the attractiveness of an investment.

Figure 1: Prospect theory and the disposition effect



Source: Weber and Camerer, 1998, p. 170.

Another topic associated with the prospect theory is the disposition effect. It is based on the idea that investors are reluctant to realized losses. If an investor is risk averse in the gain domain, he/she will sell the stock to have certain gain and accepts its value. If an investor is risk seeking in the loss domain, he will keep the losing stock arguing that the pain of losing an extra amount is less than the pain of the price recovery. Locke and Mann (2005) found that professional futures traders on the Chicago Mercantile Exchange are affected by the disposition in their trades. Frazzini (2006) showed an under reaction to public news of mutual fund managers. Furthermore, Barber, Lee, Liu and Odean (2007) analyzed the trades in Taiwan Stock Exchange and found proof for disposition effect but there was no evidence for momentum.

2.2.4 Risk Tolerance

Financial risk tolerance should be considered for individual and investment managers. A successful investment strategy involves an effective assessment of the risk which is a key element in the investment decision-making process. Among financial decisions that entail risk, people tend to favor the option that maximizes return with the lowest level of risk. Financial advisors are faced always with the risk return tradeoff thus; they are building a risk profile for each client. The elements of the risk profile are risk tolerance, risk need, risk preference, and risk perception.

According to Cordell (2001), risk tolerance is the amount of uncertainty that one accepts when making a financial decision. People who tend to have a high risk tolerance are willing to engage themselves more in a risky behavior. The term risk aversion which is the contrary of risk tolerance is widely used. The risk tolerance is a purely subjective personal factor but it is blocked by the risk capacity of the investor due to his/her financial withstanding. The amount of risk required to meet a financial goal is the risk need (Grable and Lytton, 1999). Risk preference is the attractiveness of a choice compared to other choices. According to Wachinger et al. (2013), risk perception is cognitive thinking and judgment about the acceptability of risk while risk tolerance is the willingness to take the financial risk. In the decision-making environment, the risk perception is variable specially when influenced by knowledge and experience. Investors might take additional risk in some situation even if they are conservative in order to reach a certain goal or might take risk without knowledge within a planning context using experiential tools (Nobre and Grable, 2015).

Risk tolerance was assumed to be stable and does not change across time and situations. This idea was essential in the Modern Portfolio Theory (MPT) where once risk tolerance was considered a fixed factor in the portfolio selection model. There has been a wide debate about the stability of risk attitudes among the psychologists and the behavioral economists. They argue that risk tolerance is specific: people who exhibit high risk tolerance in some investments may be risk averse in other situations when it comes to gambling (Grable, 2013). According to Yao and Curl (2011), risk tolerance fluctuates; explaining that risk tolerance increases during the period the market is bullish and decreases when the market is bearish. Consequently, investors purchase the stock during the peaks and sell during the troughs. This concept is explained by the projection bias. Actually, investors use the closing price of one period and use it to project the trend in the future which shapes the risk attitudes and skew the risk assessments of the investors. This idea is the reason why financial advisors measure the risk tolerance of their clients on an ongoing basis since market conditions are always changing and consequently risk tolerance changes (Hirshleifer, 2001). It is vital to understand risk tolerance in order to determine the investment suitability. In addition to that, it helps in constructing efficient portfolios with a suitable level of risk and return given the investor's traits and financial conditions. According to Davies and Brooks (2013), risk tolerance is

only stable when considered as a personality feature. According to Wang (1996), it is easy to influence the financial choice in the way the information is presented or framed. Risk tolerance as a stable psychological trait is vulnerable to changes in risk perception. Weber et al. (2013) proved that risk perceptions and investors' behavior changes with the market cycles that are affected by the fear and greed. Guillemette and Nanigian (2014) analyzed the factors that account for variation in risk tolerance using the widely used risk tolerance questionnaire. They found that habit formation which explains why risk tolerance shifts when a sudden decline is experienced, did not account for variation in average monthly risk tolerance, however loss aversion (Prospect Theory) and sentiments proxies accounted for 38.51% and 13.21% respectively in the average monthly risk tolerance. Behavioral finance attempted to explain the variation in risk tolerance. The Prospect theory founded by Tversky and Kahneman in 1979, evaluated the gains and losses from a reference point and showed that the utility function is steeper in the loss domain (Kahneman & Tversky, 1979). Furthermore, Thaler and Johnson (1990) implied that risk aversion vary with time. They found that, individuals should become more risk takers, after experiencing financial gains, and more risk averse when experiencing financial losses. Whereas, investor sentiments explain why risk aversion decreased during period of high sentiments where investors show optimism about future returns. According to Anbar and Eker (2010), there are lots of factors that influence an individual attitude towards risky choices such as the personality traits, demographic and socioeconomic factors, biological temperament, and psychological constructs. Using a logistic regression model, they were able to find that 9% of the variation in financial risk tolerance was explained by the socio demographic variables.

2.2.5 Limits to Arbitrage

Unlike the traditional finance theories which assume that market prices reflect their fair value, behavioral finance stresses on the aspect that the existence of behavioral biases among investors will influence asset prices and returns and consequently limits the arbitrage possibility by preventing rational investors from benefiting from short-term mispricing and in turn allowing prices to return to their equilibrium values (Byrne and Brooks, 2008). According to Barberis and Thaler (2003), there are many issues that cause limits to arbitrage. Arbitrageurs face noise risk when they

did not find a close substitute to hedge their position in the mispriced asset. Uninformed investors cause an increase in the mispricing of assets and arbitrageurs cannot maintain their positions in the face of margin calls. Moreover, one of the issues is related to the costs of the arbitrage positions. Lamont and Thaler (2003) observed the tech companies' stocks and found violations of the law of one price. The market value of the subsidiaries companies surpassed that of the mother company and short selling of the spinout was more difficult consequently they proved that arbitrage does not carry out rational pricing in markets. Another example that supports the principle of limits to arbitrage and proves that if prices diverge arbitrageurs are limited to restore prices to their initial values is the Royal Dutch/ Shell disparity where hedge funds made investments based on this disparity such as the Long Term Capital Management (LTCM) (Thaler, 1999).

2.2.6 Heuristics

In order to explain how people make decisions when faced with complex information, Kahneman and Tversky (1981) identified rules of thumb known as heuristics which are applied to variety of circumstances but in some cases lead to a correct solution. They found that people often use heuristics to simplify the problem solving. Investors find shortcuts for themselves in order to be able to process all the information that is presented to them (Kahneman and Tversky, 1981). They accumulate experiences of doing something and once they are faced with similar condition they use the rule of thumb that they have created. Heuristics allow speeding up the decision-making compared to rationally processing the information but the main drawback is the reliance on past experiences (Shefrin, 2000). Heuristics affects the decision-making under uncertainty in different aspects whether it's related to sports, gambling, or personal finances (Wood, 1992).

In table 1 the author draws on the literature to summarize the characteristics of the different theories related to the decision-making under the classical and behavioral perspectives.

Table 1: Summary of classical and behavioral finance theories

ATTRIBUTES OF DECISION-MAKING THEORIES: FROM THE CLASSICAL TO THE BEHAVIORAL PERSPECTIVE		
<u>CLASSICAL THEORIES</u>	<u>CHARACTERISITCS</u>	<u>REFERENCES</u>
Modern Portfolio Theory (Markowitz 1952)	Portfolio selection is based on risk-return trade-offs	Markowitz, H. (1999). InstituteThe Early History of Portfolio Theory: 1600-1960. <i>Financial Analysts Journal</i> , 55(4), 5-16.
	Securities follow probability rules	
	Investors are rational	
	Investors have access to same information	
Life Cycle Models (Modigliani and Brumberg 1980)	Computation of optimal saving decision	Clarida, R. (1991). Aggregate Stochastic Implications of the Life Cycle Hypothesis. <i>The Quarterly Journal of Economics</i> , 106(3), 851-867.
	Consumption is random walk	
	Saving decision is based on rational behavior	
Permanent Income Theory (Friedman 1957)	Consumption theory	Holmes, J. (1970). A Direct Test of Friedman's Permanent Income Theory. <i>Journal of the American Statistical Association</i> , 65(331), 1159-1162.
	Expected consumption is conditional on the available information	
	Use of objective factors	
Traditional Theory of Investment (Merton and Samuelson 1969)	Optimal portfolio selection	Merton, R. (2006). Paul Samuelson And Financial Economics. <i>The American Economist</i> , 50(2), 9-31.
	Study of age-dependent influences on asset allocation	
	Optimal portfolio is independent of the age of risk averse investors	
Expected Utility Theory (von Neumann and Morgenstern 1944)	Decision-making under uncertainty	Safra, Z., & Segal, U. (2008). Calibration Results for Non-Expected Utility Theories. <i>Econometrica</i> , 76(5), 1143-1166.
	Investors compare expected utility values and consider final wealth levels	
	Assumes rational behavior and risk aversion	
Efficient Market Hypothesis (Fama 1970)	Share prices incorporate all relevant information	Yaes, R., & Bechhoefer, A. (1981). The Efficient Market Hypothesis. <i>Science</i> , 244(4911), 4424.
	Stock markets accurately determine stocks' values	
	Fair value of share prices	
Capital Asset Pricing Model (Sharpe 1964 and Mossin 1966)	Relation between risk and return in pricing assets	Wernerfelt, B. (1985). The Capital Asset Pricing Model and Strategic Planning. <i>Management Science</i> , 31(4).
	Investors are rational and risk averse	
	Pricing depend on rates of return, systematic risk, and market factors	
Arbitrage Pricing Theory (Ross 1976)	Factor risk is important in asset pricing	Gilles , C., & LeRoy, S. (1991). On the Arbitrage Pricing Theory. <i>Economic Theory</i> , 1(3), 213-229.
	Expected returns are based on the weak assumption of the EMH	
	Investors earn risk -free return	

Black Scholes Merton Model (Black, Scholes, and Merton 1973)	Stock prices follow a random walk	Schaefer, S. (1998). Robert Merton, Myron Scholes and the Development of Derivative Pricing. <i>The Scandinavian Journal of Economics</i> , 100(2), 425-445.
	No arbitrage opportunity	
<u>BEHAVIORAL THEORIES</u>	<u>CHARACTERISTICS</u>	<u>REFERENCES</u>
Prospect Theory (Kahneman and Tversky 1979)	Investors frame predicted outcome	Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. <i>Econometrica</i> , 47(2), 263-291.
	Human judgment take heuristic shortcut	
	People weigh gain and losses relatively to a reference point	
	Investors underweight probable outcomes	
Theory of Moral Sentiment (Smith 1759)	No rational economic decision-making	Smith, A. (1759). <i>The Theory of Moral Sentiments</i> . London: Millar
	Focus on pride, shame, insecurity, and egotism	
	Economic interaction depends on emotional and mental interaction	
Behavioral Life-Cycle Theory (Thaler and Shefrin 1998)	Absence of credit rationing	Schooley, D., & Worden, D. (2008). A Behavioral Life-Cycle Approach to Understanding the Wealth Effect: The Influence Of wealth On Spending Depends On The Type Of Wealth And Who Holds It. <i>Business Economics</i> , 43(2), 7-15.
	Components of wealth are nonfungible	
	Wealth is divided into mental accounts	
Regret Theory (Looms & Sugden 1982)	Agents are rational	Quiggin, J. (1990). Stochastic Dominance in Regret Theory. <i>The Review of Economic Studies</i> , 57(3), 503-511.
	Decision is based on expected regret	
	Concept of choice rather than probability	
Theory of Over and Under reaction (DeBondt and Thaler 1985, Barberis and Vishny 1998)	Investors are too quick to see patterns	Schiereck, D., De Bondt, W., & Weber, M. (1999). Contrarian and Momentum Strategies in Germany. <i>Financial Analysts Journal</i> , 55(6), 104-116.
	Excess optimism	
	Underreaction to information	
Cognitive Dissonance Theory (Festinger 1957)	Selective perception and decision-making	Krause, M. (1972). An Analysis of Festinger's Cognitive Dissonance Theory. <i>Philosophy of Science</i> , 39(1), 32-50.
	Prevent investors from acting rationally	
	Delay in selling assets that are not generating returns	
Behavioral Decision Theory (Einhorn and Hogarth 1981)	Trade-offs when people decide between options	Einhorn, H., & Hogarth, R. (1981). Behavioral Decision Theory: Processes Of Judgment
	Consider individuals' current state	

	Depends on task representation and people's goals	And Choice. <i>Annual Reviews Psychology</i> , 53-88.
Availability Theory (Kahneman and Tversky 1973)	People use shortcuts to recall recent information	Tversky, A. & Kahneman, D. (1973). Availability: A heuristic for judging relevancy and Probability. <i>Cognitive Psychology</i> , 4, 207-232.
	Decisions are based on latest information	
	Personal evaluation	
Subjective Expected Utility Theory (Savage 1954)	Under certainty the expected utility is based on subjective probability	Savage, L. (1972). <i>The Foundations of Statistics</i> , 2nd edition. New York: Dover.

2.2.7 Conclusion

Traditional financial theories and behavioral theories were challenged on the empirical and theoretical front. Grossman and Stiglitz (1980) argued that information is costly and consequently efficient markets cannot exist if investors cannot acquire the information. Since people have different risk appetite, they can have various decisions in fundamental areas, this may explain why some investors buy or sell at the same time (Kahneman and Riepe, 1998).

The existent literature criticized the behavioral theories such as Thaler (1999) who talked about the “end of behavioral finance” by arguing that all financial theories need assumptions regarding investor behavior in order to strive to the best assumptions (Byrne and Brooks, 2008). Fama (1998) assessed the behavioral finance theories, and argued that the explanation of the cognitive behavior in financial decision is suitable in certain situations. But he did not deny the fact that behavioral finance theories helped in the explanation of certain market fluctuations. Bloomfield (2006) made an objection regarding incorporating behavioral issues into financial theories which would result in complex outcomes and models. The behavioral models are seen harder than the standard financial models.

On the other side, many behavioral theories are still being developed. Shefrin and Stateman wrote many articles on behavioral portfolio theory (Byrne and Brooks, 2008). According to them, behavioral portfolios are formed by layers that each is allied with an objective. Behavior Decision Theory (BDT) provided models of human behavior and highlighted the role of the bounded rationality which aims to prove the limitations of the rationality because decision makers are limited by their skills, habits, values, unconsciousness (Simon, 1997). Furthermore, Olsen (2001) provided perspectives on BDT: market participants are open to their preferences,

they are satisfiers, they are influenced by the emotions, and the environment can influence the decision-making process.

Effective decision-making requires financial skills and understanding of the human behavior and the tolerance to risk. Consequently, cognitive psychology is important in the decision-making process. After the financial crisis in 2007 there has been a lot of interest in the field of behavioral finance to study the behavior of irrational investors. This emerging ground aims to help investors in educating themselves about the biases they may exhibit and take the necessary steps to improve the process of decision-making (Parikh, 2011).

2.3 Main Body of the Literature

Investors are disposed to various types of behavioral biases especially under uncertainty. In fact, behavioral finance explores how individuals behave and challenges the traditional economic and finance theories that are based on the rationality assumption. Psychologists have focused on the behavioral finance micro that aims to explain the behavior of individuals while they make the financial decision unlike behavioral finance macro that describes market irregularities. Researchers showed that under uncertainty and with the availability of large amount of information investors may face complex decision-making that require more time and effort for analysis. People in that case may adopt a subjective reasoning based on their risk preferences (Pompian, 2006). However, individuals should strive to make good decisions and the knowledge of the behavioral biases can lead to arrive at an optimal decision.

Behavioral biases are numerous, and scholars have tried to classify them under meaningful frameworks. A simple categorization was done by Pompian (2006), where he grouped the biases under two sets: the cognitive errors and the emotional biases. The cognitive errors are related to heuristics and memory errors while emotional biases are related to family, social background and culture. Evidence showed that human beings are affected by the behavioral biases and the awareness is needed to improve the investing results.

2.3.1 Cognitive Biases

Cognitive biases are errors that cause the decision maker to deviate from the rational traditional finance decisions. They can be memory errors, statistical or information – processing errors. These biases are attributed to how the brain perceives information, memories, and the way people make judgments and process the complex calculations or filter information. Cognitive biases can be corrected or modified if understood and logically identified by the individual. These biases are related to faulty reasoning, thus better information and education can lead to correct them. The major cognitive biases are: representativeness, conservatism, availability, hindsight, anchoring, framing, mental accounting, and gambler’s fallacy.

Representativeness Bias

Representativeness bias is a bias in which people classify their past experiences and when confronted with new information they try to fit it in one of their classifications. Any new information is considered as familiar to the investor however; it could be very different which cause information processing errors (Pompian, 2006). People over rely on stereotypes, their investment decisions are based on experiences and do not consider the base probability while they assume that samples are representative of the populations (Shefrin, 2000). Lakonishok, Shleifer, and Vishny (1994) demonstrated that individual investors assess the superficial characteristics of a certain company and relate the good features to the attributes of its stock and unfortunately the outcome is a poor investment (Barberis and Vishny, 1998). Statman, Fisher, and Anginer (2008) duplicated the study of Shefrin and Stateman on 1995 but on a larger sample and they found similar results. The shares of reputable companies that do well are thought that they are good investments; however, these were large companies with low book to market ratios and generate poor returns.

Conservatism Bias

Conservatism bias views that investors integrate new information inadequately or they adhere to their prior beliefs. Studies showed that market participants overweight their beliefs and under react to new information that is presented to them. They are unable to modify or incorporate the new information in a rational

way and modify their beliefs consequently. Montier (2002) viewed that people find it hard to change their positions in the market once new information is presented. Montier presented an evidence that analysts hold their forecasts even when provide with new information, they react slowly to this change. Hirshleifer (2001) tackled the cognitive cost which is related to effort of updating the belief and including new information. He argued that when cognitive cost is high, the new information is less likely to be processed. Grinblatt and Han (2005) explained the momentum in returns. In trading, investors under react to news and they argue that momentum occurs due to slow correction of prices.

Availability Bias

Availability bias is where people tend to use mental shortcuts and guess the probability of a result according to what extent it appears in their life. People tend to recall the more probable events than those they find hard to perceive. According to Sadi, Gholipour, Ghalibaf, and Rostami (2011), investors recall recent events and judge based on them which affect the perception. Pompian (2006) divided the availability bias into four categories: *retrievability* which shows how easy an idea comes to the mind, *categorization* where people classify information based on familiarity and which in turn help them in the search, *narrow range of experience* when people with small experience frame a new experience based on a narrow reference, and *resonance* when people compare the situations to their personal situations and experiences.

Hindsight Bias

Hindsight bias is when people, after the occurrence of a certain event that they have deviated from it, suppose that it was predictable and they knew it. This bias is related to insight and prediction. People follow the right way on the consequences of the event and claim that it was predicted by them. In other terms they restore their predictions after the event (Sadi et al, 2011). This bias allows market participants to unfairly assess securities and take excessive risk on their investments based on their prediction of the outcome and their sense of overconfidence. Monti and Legrenzi (2009) studied the relationships between the investment decision-making of students and financial managers in an Italian bank with the hindsight bias and found evidence

for the degree of risk exposure taken by these investors due to their decisions affected by the hindsight bias.

Anchoring Bias

Anchoring also called adjustment bias is an information processing bias that is related to the conservatism bias. This bias occurs when investors give an importance or overweight the “anchor” that is predetermined by them which deviates them from rationality. Investors stick to their initial estimates when new information is presented to them and place a statistical weight on the anchor. Andersen (2010) showed that anchoring had a role in the prices of the Dow Jones and CAC40 stock indexes. He found that investors’ decision was affected by this bias while applying a trading algorithm to real market data in order to screen out for arbitrage opportunities.

Framing Bias

Framing bias is related to how the presentation of information can influence the decision-making process. The presentation of a situation may also influence the perception of risk of an investor. As explained by the prospect theory, risk taking behavior can be affected by the framing of outcomes and thus investors can be risk takers in the loss domain and risk averse in the gain domain (Byrne and Brooks, 2008). The frame of a decision is related to the formulation undertaken by the individual and to his personal characteristics such as norms, habits. Framing could result in misidentifying the risk of a certain investment and excessive trading (Pompian, 2006).

Mental Accounting Bias

Mental accounting bias is related to how individuals structure their choices (Thaler 1985). Individuals assign wealth into distinct sections without studying the correlation effect between them referred by Thaler to non-fungible accounts (Lucchesi et al, 2015). This bias causes serious problems in assets allocation because investors classify assets arbitrary. According to Statman (2008) each part of the portfolio is related to a specific investment goal thus, investors may choose to invest

in IPOs and emerging stocks to get rich and invest in funds for wealth preservation purpose.

Gambler's Fallacy Bias

Kahneman and Tversky (1971) described this bias as the prediction of reversal in financial markets and more specifically in stock prices. The gambler's fallacy bias arises when investors predict that the trends in the market will reverse and therefore, they undertake contrary positions. As per Odean (1998), investors hold on the losing stocks which they invested in because they believe that these losers will become winners at a future point in time and accordingly investors sell the winning stocks.

Illusion of Control Bias

Illusion of control bias tackles the issue that people found themselves that they control the outcomes while in reality they cannot. Investors put large probability on their success which inflates their confidence. This self-control bias leads investors to ineffectively diversify their portfolios and to excessive trading. Investors fail to action in the chase of their long term goals. The stop loss orders that are viewed as a managing risk techniques allow investors to recognize their losses at a determined time consequently, minimizing the influence of the emotional side on investors (Lucchesi et al, 2015).

2.3.2 Emotional Biases

Emotional biases are the result of feelings, emotions, and attitudes that cause the decision maker to deviate from the rational traditional finance decisions. The social influences and cultural aspect are emotional factors related to human needs as identified by Maslow. In order to satisfy these needs, people avoid pain and seek pleasure by avoiding admitting their mistakes. Emotional biases arise from intuitions, they are uncontrollable by the individual feeling them and result in unreasoned judgments therefore, and they are less easily rectified. The main emotional biases are overconfidence, herding, regret aversion, illusion of control, and cognitive dissonance.

Overconfidence Bias

Overconfidence bias is when investors overestimate their knowledge levels, exaggerate in the accuracy of their information they have, and underestimate risk. Overconfidence bias is mainly attributed to the stock business. Most of the psychological studies have covered a large body of overconfidence. They found that investors overestimate their abilities, think that they have better information, and are smarter than what they are actually (Gervais and Odean, 2001). Greater confidence does not mean the certainty of the judgment. Expert people in a given field perceive that they are making perfect decision and stop acquiring new information (Garcia, 2013). Overconfident people trade too much and Odean (1998) found that these investors realized lower yields compared to the market. This bias can be broken into two subsidiaries (i) the self-enhancing bias where people claim too much for their success (ii) the self-protecting bias where people repudiate their accountability for failures (Benabou and Tirole, 2002). In their study, Barber and Odean (2001) found that men are more overoptimistic than women and they tested the excessive trading of overconfident investors and found that the most active market participants earned pretax returns lower than the market return (S&P) during the same period. Furthermore, a recent study conducted by Fagerstrom (2008) showed that analysts were overconfident about the expected profits of the S&P companies and have exaggerated the realized outcome.

Herding Bias

Herding bias is related to the imitation of action among investors. Investors follow the judgments made by the majority and are influenced by the recommendations of major analysts. People mimic the ideas of a group even if this group could be wrong. An investor follows others because he perceives that other group may have additional information he may not be aware of it. Welch (2000) found that analysts revise their opinions directly after a previous analyst's revision of his point of view. Besides, Economou, Kostakis, and Philippas (2010) explored the availability of the herd bias during the financial crisis of the years 2007-2008 and found evidence in the Portuguese stock markets.

Regret Aversion Bias

Regret aversion bias is an emotional bias where people avoid making a decision due to their fear of the outcome. Shefrin (2002, p.10) stated that “regret is the emotion experienced for not having made the right decision”. In investment decision-making, people avoid the pain associated with bad decisions and the feeling of their responsibility for the loss. Regret aversion cause market participants to hold their positions for a longer period in the view that the market will return positively to their investments. They might not sell a losing stock considering that the share value will increase and after that they regret the fact of having sold it. Investors who have experienced losses might stop trading (Subash, 2012). Error of commission and error of omission are two major dimensions related to the regret bias. Error of commission is the remorse from an action that was taken by the investors where they start questioning their beliefs. Error of omission is the regret from an action that was not taken by the investors and they feel that they have missed an opportunity that was available for them (Pompian, 2006).

Cognitive Dissonance Bias

The cognitive dissonance bias shows that people experience conflicts when they are offered with confirmations that their beliefs are wrong. Under these circumstances, they try to change their attitudes and/or to find new information in order to justify their beliefs and they might create new views to reduce the effect of this bias. Pompian (2006) identified that investors usually select information that confirm their beliefs and support their hypotheses which results in avoiding the whole view of the reality.

Researchers found that investors are also disposed to other biases that influence their decision-making process. From these biases we name the status quo bias where investors maintain their position if they found that nothing lead them to change and by this action they lose to explore new opportunities. Endowment bias is related to how people value the assets, when they need to sell an asset they state a minimum price that exceeds the purchase price at which they are willing to buy (Pompian, 2006). In loss aversion bias market participants prefer to avoid losses than achieving gains and invest in more risky positions to avoid losses. Sadi et al. (2011) studied the escalation of commitment where investors insist on holding the investment even

if there is a clear confirmation regarding their wrong decision and they relate the fact to the costs of investment. Another important body of work maintains the idea that there is a limitation in the mind capacity to process information and regarding this issue investors are seen as satisfiers rather than maximizers of utility. The pioneer of this work is Herbert Simon who developed the bounded rationality notion (Ricciardi, 2008). Sunstein (2003) studied the conformity effect which shows that people tend to follow others even if their ideas are rejected or have been incorrect. Grounded by experimental studies Huber and Seiser (2001) described the congruence bias and found that people stop acquiring information when they formulate a hypothesis or take a decision but when they need to defend their decisions they try to search for more information that they did not anticipate to have them prior to decision-making.

2.4 Others Streams in the Literature

Behavioral finance has been developed in the last decades. Researchers focused on the empirical studies to find evidence and models to explain investor behavior. Academics and scholars studied how perception is affected by luck, superstition, and culture. People who have an external control center believe more in luck than those who got an internal control center. People who have an internal control center believe that they can shape their future. The results of these superstitions affect the decision inefficiently because investors infer the events as they are a consequence of luck (Sadi et al, 2011, and James and Wells, 2002). Rotter (1954), Sundali and Croson (2006), Lauriola, Hart, and Levin (2007) examined the locus of control (LOC). They found that locus of control is related to prediction strategies and that the hot outcome heuristic is allied with the external locus of control. Moreover, Carvajal, Little, Turner and Williams (2009) shed the light on the link between the LOC gambler's fallacy against the hot-outcome. They found that coin-toss predictions are related to the person's epistemology. Individuals with external LOC believe that their life events are determined by chance or an authority figure while individuals with internal LOC believe that their life events are determined by their actions (Kumaran, 2013).

Hoffmann, Shefrin, and Pennings (2010) analyzed how an investor's objectives affect the selection of their portfolios. The study was based on the transaction records of a large number of investors in Netherlands and the data was obtained

from online questionnaires. Their findings support the behavioral approach and conclude that investors who depend on fundamental analysis are risk takers and more overconfident.

Oehler, Rummer, and Wendt (2008) found in their study evidence for home bias. They have analyzed the composition of 102 large funds managed by the largest German fund companies. They suggested possible reasons leading to this behavior such as lower transactions costs, advantage from information asymmetries. Larger funds showed more home bias than smaller sized funds which deviate from the optimal portfolio compositions. They found that private investors prefer local stocks and stocks of companies that are owned by well-known individuals.

An important issue that was studied is the investor sentiment and if it has a potential to affect stock returns. Recent behavioral literature presented evidence that daily returns are affected by the weather in the city of the stock exchange and by the daylight hours (Baker and Wurgler 2006; Gemmill and Thomas 2002; Kumar and Lee 2006; Hirshleifer and Shumway 2003; Tetlock 2007).

Behavioral finance also tackled the IPOs market as these offerings show high returns in the first trading day to indicate that the offering price is undervalued. Loughran and Ritter (2002) used the prospect theory model to calculate the net amount of the money left on the table from the IPO and the gain of the rise in the share price of the company.

Another aspect of behavioral finance is related to the categorization of market participants as experienced, inexperienced, professional investors, arbitrageurs, noise traders, informed traders. Evidence showed that even professional investors display behavioral biases. Hong, Kubik, and Stein (2005) found herding behavior, and disposition effect on mutual fund managers. Furthermore, a large portion of fiduciaries are subject to behavioral biases as per Wood (2006) while Hodgson, Breban, Ford, Streatfield, and Urwin (2000) classified the behavioral biases of investment committees in two payoffs groups: the SleepWell and the SeemsGood. Many factors affect also the behavior of investors in portfolio choices that were explained by the 401(k) plan. Professional investors can make profit at the expense of the investors by using the mistakes of other investors. Investors tend to invest in the high fees funds even if their poor performance is predicted. Individual investors tend to invest in the stock of their employer by underestimating the risk of the employer's stock (Benartzi, 2001). Moradoglu and Harvey (2012), after conducting

experiments on professionals and novices in forecasting stock prices, they found that finance professionals are overconfident. Lusardi and Mitchell (2007) showed that low income individuals seek help from family and friends instead from professional counselor and their decision is influenced by the word of mouth.

A new body of literature examined the social effect on financial decision-making. The studies showed that saving and investment decisions are linked not only to economic variables but also to different factors such as trust, altruism, and social interaction (Cassar and Wydick, 2010).

Besides, extensive research was done to review the ethical decisions in finance. Heuristics and cognitive dissonance biases can lead to unethical facts. Prentice (2007) argued that people can undertake unethical issues out of control due to overconfidence as an example.

2.5 Conclusion

This section introduced the new emerging topic in finance which is the behavioral finance. It has showed the debate between traditional finance theories and the behavioral finance theories. It was clear that investors are subject to various behavioral biases that impact their financial decision-making. Besides, the new literature is focusing to find more evidence on these biases through experiments. Nowadays, the recent body of literature is concentrating on behavioral finance and economics such as saving, financial planning, and financial crisis. This field is still developing and it is using concepts from other disciplines.

Rational theories are based on assumptions that they do not suppose perfect information. Although educational programs and financial education can lead to informed investors that can make rational decisions, however evidence showed that individuals pay attention to their capacity in information processing and depend on their psychological traits and risk tolerance rather than to financial information. Moreover, Bernheim, Garrett, and Maki (2001) showed that financial education can be effective if given to market participants for several years, but they also verified that it could foster overconfidence in them. Yet psychological factors are highly complex and especially those who are involved in the financial behavior, more approaches are needed to be developed to find simple solutions for these complex problems (Haldane, 2012). Financial behavioral aspect supplements the traditional

financial standards. The combination of both fields can improve the rationality of the investors and it may help in predicting returns and what influence them.

The financial behavior patterns of market participants shed the light on the significance and relevance of behavioral finance: “The main difference between traditional and behavioral finances is that the first one does not deal with the questions “why” investors make one or another decision” (Bikas, Jureviciene, Dubinskas, and Novickyte 2013, p.875). The aim of this paper is to complement the studies on behavioral finance and to find evidence of the major behavioral biases in the Lebanese investment banks and to study their risk profiles. After reviewing the literature in this chapter, Chapter 3 will present the appropriate methodology used to answer the research questions after selecting the variables. Then Chapter 4 will summarize the findings, and Chapter 5 will conclude and present some recommendations.

Chapter Three

Methodology

3.1 Introduction

The methodology section presents the steps required to be undertaken in order to address the hypotheses and the research questions. To select the appropriate method for the study, there should be a careful consideration of the research questions and the available methods. The methodology addresses the research design, main variables, data, population, sample, selection procedures, data collection procedures while maintaining the validity and reliability along the paper. It identifies the subjects or participants under study, the measures used, and the procedures in order to answer the research questions. The importance of the methodology section is to determine which type of research design description best fits the study and show how all the major parts of the research such as the methods and sampling designs interact together in order to answer the research questions (Boote and Beile, 2005).

3.2 Philosophical Dimension

A number of philosophical assumptions determining the nature of social science were founded upon the researcher's view of the world. They are conceptualized in the following four categories of assumptions: ontology, epistemology, axiology and methodology (Burrell and Morgan, 1979). Epistemology is concerned with the philosophy of knowledge in other terms how a person comes to know while methodology is the practice of how a person comes to know (Trochim and Donnelly, 2008). Ontology is the study about the nature of existence and the constituents of reality, whereas axiology is related to the value of research (Gray, 1998). Moreover, two approaches exist: the objective approach and the subjective approach. Objective research interprets the data with little or no personal interpretation while subjective research is based on personal interpretation (Burrell and Morgan, 1979). The research philosophy depends on the way the researcher thinks knowledge is created (epistemology); from this perspective there are mainly two major research philosophies: 1) Positivism which argues that reality should be investigated empirically through scientific processes and that the social world exists externally to the researchers. It was the dominant paradigm from the 1930s till 1960s. For positivists, the natural and social worlds operate within strict set of laws and that

natural and human sciences share same logical principles (Gray, 1998), thus positivism aims to explain and predict what happens in the social world by finding relationship through testing hypotheses (Burrell and Morgan, 1979). This position is based on the values of reason, and it focuses on gathering information from direct observations and experiences mainly from survey and experiments tested using quantitative techniques and statistical tools (Flowers, 2009). 2) Other researchers hold the different worldview and they are constructivist. This position was developed by many authors such as Berger and Luekmann's (1967), Crotty (1998), and recently Mertens (2009) and Lincoln, Lynham, and Guba (2011). Phenomenological researchers strive to understand the world in which they live and they develop subjective meanings from their experiences. The goal of their research is based on the participants' view of the situation under study and they look at the complexity of these views. The constructivist believe that the contexts in which people live and work and the cultural settings affect the people's behavior; they use their interpretations to explain and give meaning to their experiences thus they interact with that is being researched (Creswell, 2003). Since the interpretation of social factors and the understanding of the world from each researcher's point of view are contextual, they are not generalizable (Saunders, Lewis and Thornhill, 2007). Moreover, a new paradigm has emerged as an alternative perspective for positivism and constructivism which is the post-positivism. This view is a deterministic philosophy that assigns probabilities to determine the outcomes. Post positivism sheds the light on the use of multiple measures that each have different type of error to get a better understanding of what is happening in reality. The researchers rely on triangulation that is collecting data from different sources in order to make reasonable inferences based on theoretical reasoning and experience-based evidence. But the post –positivists agree with the constructivists on the point that scientists are biased by their cultural experiences (Trochim and Donnelly, 2008). The positivist approach is linked to objectivity and value free observations because positivists believe that reality is objective and singular apart from the researcher; it is based on universal principals and observable facts and that the truth can be found by using the right methods analyzing quantitative data. However, phenomenologists approach is linked to subjectivity and sees that reality is multiple and complex as viewed by the participants in the study due to individuals' actions. It is based on value laden and biased because the researcher interacts with what is

being studied using personal opinion and interpretation of qualitative data (Clarke, 2005). As stated previously, the aim of this research is to prove that investors of the investment banks operating in Lebanon are affected by behavioral biases which reflect the asset allocation of their portfolios as well as their decision-making. The paper will adopt the positivism view underpinned by the realist ontology (objectivity). Positivism has been challenged in the recent decades. In the mental health field, researchers are including patient experiences at the heart of development and they started using subjectivity and triangulation in the medical model (Broom and Willis, 2007). Furthermore, some argues that positivism view is weak at understanding social processes. Moreover, it is known that the phenomenological perspective is directed to describe, interpret, or explain human behavior from the perspective of the person being studied. However, in the physical therapy aspect, few researchers adopts the phenomenological perspectives and according to Shepard, Jensen, Schmoll, Hack, and Gwyer (1993) the physical literature therapy is full with examples of research based on positivism perspective and constructivism is perceived as less credible by researchers. It is also worth to note that most behavioral biases are cognitive biases and some are emotional biases, thus cognitive biases can be understood and corrected by the individual investors which allow the researcher not to investigate the emotions of the investors and support the positivist view. The purpose of the research helps in determining the philosophical perspective. This research does not aim to interpret the behavior of the investors or find answers to why investors show behavioral biases or explain how emotions and social factors lead to behavioral biases among investors; instead it intends to investigate if that investors of the investment banks in Lebanon are affected by the behavioral biases and it explores which biases are common among this type of investors by studying their investments. Thus it will use the outcome of their investment decisions such as gains, losses, positions in stocks in order to prove if they have interpreted the information about stocks and markets in a rational way and to which type of biases they are prone. Therefore, the research assumes that investors show behavioral biases in their investment decision-making that have been already interpreted by the psychologists such as Kahneman and Tversky (1979). Consequently, this research will explore empirically and independently from the investors under study the behavioral biases of the investors of the investment banks in Lebanon.

3.3 Research Approach

An important area in research is the paradigm of enquiry that supports the methodical approach. From here two systematic and logical approaches are identified: the deductive approach and the inductive approach. Deductive reasoning starts with the idea and uses the data collected in order to prove or refute the idea adopted thus it use hypotheses testing whereas inductive reasoning uses data to generate hypotheses (Thorne, 2000). The positivist view is more associated with the deductive reasoning while the phenomenological view is frequently concerned with the inductive approach in order to generate a better understanding for the phenomenon under study (Shepard et al. 1993). In the deductive reasoning, hypotheses testing attempt to find relationships among two or more concepts through empirical observations or experiments. The researcher selects the appropriate theory to the subject under investigation, produce the hypothesis, operationalize the variables, test the theory using the collected data, and then examine if the hypothesis is rejected or not and adopt a new theory if needed. In the inductive reasoning, the researchers study a certain important event that grabbed their attention; they start by collecting data from multiples cases to ensure reliability, then they analyze the data to see if relationships exist among variables and it may be possible to theory building or discovering principles (Gray 1998). The deductive reasoning is also associated with the use of control to ensure validity, uses a highly structured approach that is sometimes inflexible once the data collection has started, and stresses on the objectivity of the research and on the selection of a sufficient sample that represents well the population in order to be able to generalize the findings. Conversely, the inductive reasoning uses a more flexible structure that permits changes in the research as it progresses and is less concerned with the need to generalize the findings maintaining the subjectivity of the researcher in the research process. This research adopts the deductive reasoning. First of all, this approach is more related to the positivist view that is adopted in this research. Next, theories have been developed in this area to support financial behavioral biases such as the Prospect Theory, the limits to arbitrage, the heuristics that contradict the Modern Portfolio Theory, and the Efficient Market Hypothesis. Therefore, the goal of this research is not to collect and analyze complex data in order to explain the investors' biases and try to build a new theory, instead based on the theories

discussed previously it aims to collect and analyze measurable data based on the variables that are operationalized from the different biases like overconfidence, conservatism, representativeness, illusion of control, etc. using statistical procedures in order to prove that the participants under study -in this case the investors- are affected by the different behavioral biases. The results could accept or refute that the investors' investment decisions are shaped by the behavioral biases thus see if the Prospect Theory holds or not. After that, since all the investors from the population cannot be reached a representative sample will be selected and studied. The research also intends to generalize the findings to the entire population that is in this case the investors dealing with all the Lebanese banks.

3.4 Research Design

This section will identify the population under study and the sampling technique used to screen out the participants that will cooperate in the research. Moreover, it chooses the appropriate strategy and methodology to answer the research questions.

3.4.1 Population and Sampling Strategies

Behavioral finance studies the decisions made by all the types of investors that range from private individuals to professionals and covers all the fields of finance such as capital and money market, pensions, and insurance (DeBondt, Forbes, Hamalainen, and Muradoglu, 2010). Each type of investors has its unique characteristics. Kaniel, Saar, and Titman (2008) argued that institutional investors are better informed and rational in their decisions while in contrast individual investors' decisions are driven by their sentiment mainly their cognitive biases. One of the primary aims of the study is to focus on investment bankers and stock brokers in Lebanon in order to find if their investment decisions deviate from rationality. Moreover, this research is interested in more than just the people participating in the study; it aims at generalizing the findings to the population that is all the investors dealing with all the Lebanese investment banks and brokerage firms. Since it is hard to address the study to all the individual investors because it is impossible to reach them all, the research will focus on the institutional investors in Lebanon that are represented in table 2 because they trade on behalf of individual investors. These institutional investors are the investment bankers and the authorized brokers by Banque du

Liban. A sample frame will be created in order to choose a representative sample out of the population. The judgment criteria on which the sample profile is created is based on all the investment banks and stock exchange brokers in Lebanon that are twenty four. The sample profile was created under the assumption that the investment banks and the stock brokers have large trading volumes and capture large number of investors. Each of the banks will randomly select ten brokers or investment bankers under which the study will be undertaken. The random sampling method allows drawing a sample from a population giving an equal chance to every sample of being selected (Trochim and Donnelly, 2008). This will allow having different types of investors participating in the study. Table 2 shows the list of investment banks and stock brokers in Lebanon.

Table 2: List of investment banks operating in Lebanon

INVESTMENT BANKS AND STOCK EXCHANGE BROKERS IN LEBANON
AUDI INVESTMENT BANK S.A.L.
BANQUE DE L'HABITAT S.A.L.
FINANCE BANK S.A.L.
BLOMINVEST BANK S.A.L.
MEDINVESTMENT BANK S.A.L.
CREDIT LIBANAIS INVESTMENT BANK S.A.L.
ARAB INVESTMENT BANK S.A.L.
FRANSA INVEST BANK S.A.L.
BYBLOS INVEST BANK S.A.L.
FFA PRIVATE BANK S.A.L.
BANK OF BEIRUT INVEST S.A.L.
CSCBANK SAL
IBL INVESTMENT BANK S.A.L.
CEDRUS INVEST BANK S.A.L.
BLC INVEST S.A.L.
LiBANK S.A.L. (Levant Investment Bank)
ARAB FINANCE CORPORATION S.A.L.
CREDIT COMMERCIAL ET FONCIER (CC&F) S.A.L.
FIDUS S.A.L.
LCB FINANCE S.A.L.
LIBANO FRANCAISE S.A.L.
MEDITERRANEE INVESTMENT BANK S.A.L. (MIB)
MENA INVEST SAL
MIDDLE EAST CAPITAL GROUP SAL

Source: Association of Banks in Lebanon and Beirut Stock Exchange Retrieved from: <http://www.bse.com.lb/Brokers/ListandAddresses/tabid/93/Default.aspx>
<http://www.abl.org.lb/Banksclassification.aspx?pageID=129&type=Investment>

Major investment banks in Lebanon are founded by the commercial banks. The selection of all investment banks in this study sheds the light on the diversification of the categories of banks. Cedrus Invest Bank, FFA Private Bank, and Arab Investment Bank are categorized under the Delta group that attracts deposits under 200 million USD. Finance Bank SAL is related to the Gamma Group that attracts deposits between 200 and 500 million USD while Arab Investment Bank SAL is classified under the Beta group which attracts deposits between 500 million and 2 billion USD. Other investment banks such as Fransa Invest Bank SAL, Audi Investment Bank SAL and Blominvest Bank SAL are among the Alpha banks that have deposits over 2 billion USD. This diversification can be reflected in the type of investment and investors participating in this study (Banque Audi SAL, 2013).

3.4.2 Strategies and Methodologies

After defining the research approach, the research strategy and method will be chosen to address the research questions stated. As noted earlier, the aim of this research is to identify the behavioral biases of the Lebanese investment bankers and stock exchange brokers and examine the kind of behavioral biases they are more prone to.

Different strategies can be used in social science research. The main strategies are surveys, case studies, experiments, action research, and ethnography. These strategies operate at the empirical level of the research and have appropriate methodology to answer the research questions. Research strategies are associated with the research design. Positivists use experiments, surveys, data analysis based on their objective views of reality and maintaining their aim for generalization, while phenomenologists use case research, ethnography, and action research for theory building through subjective interpretations (Bhattacharjee, 2012). Experimental research tests cause – effect relationships in a controlled setting such as laboratory experiments, surveys are non –experimental designs that measures the variables using statistical analysis, ethnography is an interpretive research strategy that focuses on studying the research phenomenon in its context, and case studies are found in the field of evaluation and are an in depth analysis of a case, program, activity, event, and even individuals (Creswell, 2003). The choice of the research strategy depends on the nature of the problem under study and on the research

approach. Since this research adopts the positivist angle and the deductive approach where competing theories exist, positivist designs such as experiments and surveys are more appropriate. Behavioral finance is a field that brings together finance and psychology and it offers opportunities for experimental studies since it focuses on the human mind. The two psychologists Kahneman and Tversky gave rise to the behavioral finance topic due to their experimental and theoretical work in order to focus on what happens when investors make decisions (Subash, 2012). Cipriani and Guarino (2008) used experimental research to study the herd behavior of financial market professionals by comparing two treatments the uncertainty and the price adjustment. Grou and Tabak (2008) studied the behavioral patterns of investors using eight experiments on students to show that investors exhibit illusion of control and ambiguity bias. However, the experimental research is hard to implement in this research thus it will use the survey strategy in order to answer the research questions. The literature shows that survey research is applicable in the field of behavioral finance. Kumaran (2013) used the investment survey questionnaire in order to investigate if locus of control predicts the hot-outcome effect. Rubaltelli, Pasini, Runiati, Olsen, and Slovic (2010) used survey research and questionnaire method to show how investors' affective reaction towards a certain fund impacts their decision to stop holding the investment. Hoffman and Post (2013) used survey data to present empirical evidence to show that more overconfident investors have reasons to trade. Surveys are highly structured and emphasis on the cautious random selection of samples. Survey strategy is highly associated with the deductive approach and allows the collection of large amount of data from the sample under study and gives the researcher more control over the research process. According to Weaver (1993), survey research combines financial theory with practice. He argues that properly designed surveys serves as a tool to validate empirically the conceptual hypotheses.

Survey is divided in two major categories: the interview and the questionnaire. Interviews are a more personal form of research, where the interviewer interacts and shares assumptions with the respondent. If the researcher is seeking opinions and impressions the interview give the opportunity for follow-up questions, get details on the information collected, allows for direct contact that ensures the validity of the answers and are easier for respondents which can increase the response rate. On the other hand, questionnaire is a method used to gather information about a specific

topic by asking different types of questions. Questionnaires are less costly compared to other methods, and respondents have more time to formulate answers. In questionnaires, the analysis could be unbiased because the researcher is not interfering in the answers of the respondents; his role is to use the data as it is in the statistical analysis. This research will use the questionnaire method to answer the research questions about the behavioral biases seen in the trading of the investors in the Lebanese investment banks. A list of considerations about survey methods were studied in order to select the appropriate method which is the questionnaire. First of all, the population is identified as it is based on the Lebanese investment bankers and stock brokers. The population is considered literate as most of the investors require reading financial information in order to base their investment decisions on. The questionnaires can be distributed through emails, thus it can be considered that there is no geographical constraints compared to the interview where the interviewer requires sometimes going to broad geographical areas in order to get the data for his research. The study is interested in the Lebanese investment bankers and stock exchange brokers hence the respondents can be found. The response rate is always an issue in the survey research and can ruin the well-designed survey. The researcher is collecting around ten questionnaires from each investment bank in Lebanon that have certainly a large database of investors, which make it less hard to find respondents, allowing 240 observations as a total for the study. The questionnaire method is appropriate for this type of research because behavioral biases are numerous and in order to find them in the decision-making of investors large data is needed. Therefore, the questionnaire allows direct and closed-ended questions that can answer the returns of the investors, their gains and losses, the type of information they use in their investment and so on in order to capture if they are affected by behavioral biases. In the interview method, this type and amount of information asked could distort the interviewer leading to inaccurate answers and this take more time in interviews which can be limited in the research. On the other hand, mainly not all investors know about behavioral biases but they might be interested in educating themselves in this topic to ameliorate their decisions. False respondents cannot be avoided in this type of survey but participants who agreed to contribute to the research should provide accurate information. However, mail surveys require a lot of time to send the questionnaire, make the follow-up in order to have responses within the time frame of the research. And at last, since the

research approach is positivist and the researcher looks at generalizing the findings while maintaining objectivity and reliability, questionnaire ensures this objectivity of the research. Unlike interviews the researcher does not interfere in the answers of the respondents, he just arrange the data to analyze them statistically using the computer based tools because the researcher is dealing with factual data and do not decode it according to his interpretation that could be affected by his view of the topic which make the answers less reliable. A well-structured and solid method and meaningful questionnaire reduces the measurement error.

3.4.3 Data Collection Tool

As stated in the previous section, the method chosen is the questionnaire because it is a practical way to reach a large number of investors in order to get insights about their experiences while making their investment decisions. The questionnaire will maintain the confidentiality of the investors. It uses structured questions and is designed to capture data related to investment attitudes including different type of questions such as dichotomous, interval-level questions, and forced Likert scale (agreement scale) questions. The questions focus on the core of the research gathering respondents' interest. The questions are clear, appropriate and sequential. The data gathered in the questionnaire is primary data. Around ten questionnaires will be distributed to each of the investment banks and stock brokerage firms in Lebanon and follow ups will be made regularly to ensure that the responses are available within the time frame of the research. Hard copies of the questionnaire will be distributed to the stock brokers and investment bankers. Incomplete answers in questionnaires will be filtered in order to maintain the assumptions of the statistical methods used.

The questionnaire is divided into four sections. Each section aims to get specific information about the investors and the sections interrelate with each other because investors' choices are affected by many underlying factors that are taken into consideration in the different parts in this questionnaire (Jurevičienė, and Ivanova, 2013).

Background information

The first section establishes the general background of the respondent. It consists of nine questions related to demographic factors such as age, education level, and length of experience in their career. These attributes enable the author to establish specific features of the population and help the researcher split the respondents into certain groups and see how the answers vary between these groups. Furthermore, these demographic variables can hold an influence on the respondents. Age might increase the level of tolerance of the investor and consequently his overconfidence in investment. Age, education and experience level contribute to the understanding of the mechanism of the financial markets and are proxy measures of knowledge (Fares and Khamis, 2011). To evaluate the financial literacy of UAE investors Al-Tamimi and Bin Kalli (2009) relied on demographic information and they found a strong relation. Thus, demographic characteristics and investors' attitudes are highly used to investigate the investment decisions (Pasewark and Riley, 2010). The proper use of demographic information can be significant to the analysis of economic activity. The demographic factors are drivers for investment decisions and if ignored the analysis could be biased. Moreover, the changes in demographic profile of an investor shift his attitudes and preferences which calls for further understanding of their behavior and helps in developing the profile of the investor.

Sources of information

Section two in the questionnaire concerns the different sources of information the respondent use in their investment decisions. The respondents are asked to specify the degree to which they consider each of the nine tools for information (fundamental analysis, technical analysis, intuition, professional advice, media, friends and family, analysts' opinions, financial news, and clients' views). The evaluation of the use of these sources gives insight on how the respondents are influenced by internal and external factors. For example, relying on family opinion and media the investor might follow the herd behavior. However, if the decision is based on intuition, it shows that the investor might be overconfident (Sairafi, Selleby, and Stahl, 2008). Hoffmann et al. (2010), focused on the role of investment strategy to understand the investors' beliefs. They found that investors who rely on intuition have less diversified portfolios and have less complete information while

investors who have more complete information and uses a combination of financial news and fundamental analysis are more experienced and make bold forecasts. Furthermore, the financial decision-making is related to the way the information is presented. Under uncertainty, investors tend to think that other investors have better and important information that they lack and consequently observe the decisions of these investors. They tend to ignore the private information they have and follow the average market opinion seen as a public signal and a better predictor (Fernández, Garcia-Merino, Mayoral, Santos, & Vallelado, 2011).

Investors' profile

Section three in the questionnaire is related to the investor profile. To segment the profile of the investors, personality and risk attitudes information are used (Sahi and Arora, 2012). It includes four questions to capture the investors' risk tolerance, the degree of their ambitions, and to see if they consider their judgments rational. Investors' profile is highly used by financial companies in order to tailor a specific portfolio for them. These companies look at the investors' preferences, risk tolerances and their investment objectives and time horizon (Willis, 2014). Hoffmann, Shefrin, and Pennings (2010) analyzed how differences in investors' investment objectives and strategies impact the portfolio they select and the returns they earn. They found that investors whose objectives are related to speculation have higher turnover, are more risky, and evaluate themselves as advanced investors. Their findings supported the behavioral approach to portfolio theory. The investors' profile explains why investors take different or contradictory decisions when they are presented with identical information. Variables such as intuitive personality, risk propensity, degree of confidence, illusion of control, and level of tolerance for ambiguity play an important role in building the investor's profile and shape how they interpret the information and make decisions accordingly (Fernandez et al., 2011). According to Cavezzali and Rigoni (2012), the asset allocation recommended by professional advisors is influenced by the investor profile, thus; risk attitudes are taken into consideration and have high influences in the portfolio selection. As per Cardin, Eisenberg, and Tibiletti (2013), optimal asset allocation must be tailored to investor's risk profile and gain profiles and it must be changed whenever the risk-gain views change.

On the other hand, the investment decision-making is considered to be dependent on the rationality of the investors. Rational decision-making is limited to some cases where the objectives are clear, unambiguity exists and all information is available. In the real world, rational decision-making is somehow inapplicable because its process is becoming more complex due to uncertainty, inability of the investor to interpret the large amount of information, complex problems in addition to the social, political, and cognitive influences. Investors strive to improve their investment decisions by understanding the different influences and retaining the beneficial ones (Heracleous, 1994). Simon (1997) has developed the bounded rationality that supports the idea that humans are partially rational. He contradicted the argument of rationality of the decision-making that was developed by the classical and neoclassical theories. He argued that people have limited computational abilities and are influenced by their cognitive behavior. Moreover, the decision-making is more complicated as it is affected also by skills, values, and perceptions. More attention is drawn on the emotional side of the decision-making process. From this point of view, theories of rational choice which aims at identifying and investigating the decision biases have been developed (Tversky and Kahneman, 1974). Brundin and Gustafsson (2013) proved that there is an interaction between uncertainty and emotions and that investment decisions are irrational. Kuzmina (2010) divided the investors into three categories: rational, emotional, and noise investors. He found that rational investors use past experiences and present information to make the decisions and maximize return, emotional investors use diverse information sources and are not concerned with other agents in the market while noise traders act randomly. The three groups of investors used different strategies to come up with a subjective view and base their investment strategy on it. According to Keys and Schwartz (2007), investors violate the principles of rationality and base their decisions on their experiences which are not a good assessment to form decisions. For a decision to be rational, it should be serious and evaluate the direct and indirect consequences and considers its effects.

Biases

The fourth section in the questionnaire helps to distinguish investors into behavioral groups based on their biases. It presents fourteen behavioral biases that affect the

investors' investment decision-making. The biases are presented in the form of a statement and the respondents are asked to indicate to which extent they agree on these factors that describe their behavior. The biases are overconfidence, conservatism, availability, hindsight, anchoring, framing, mental accounting, gambler's fallacy, representativeness, herding, regret aversion, illusion of control, cognitive dissonance, and familiarity. The biases considered are both emotional and cognitive biases. These biases were developed by the fathers of behavioral finance Daniel Kahneman and Amos Tversky (Kahneman and Tversky, 1971) and then by Statman and Shefrin (1985), Thaler (1985), and Shefrin (2000). The biases were tested on the empirical and theoretical level. The literature presented evidence of the behavioral biases in decision-making process of investors. Kumaran (2013) investigated the gambler's fallacy in investment decisions and analyzed the investment experience as a determinant factor related to gambler's fallacy heuristics. Rubaltelli et al. (2010) showed how an investor's affective reactions influence their investment decisions. Hoffman and Post (2013) studied the overconfidence of investors and found evidence that more confident investors rely on intuitive judgments and make excessive trading. Additionally, Abdel Rauf (2014) examined the psychological biases affecting the behavior of investors in Bahrain. The major biases taken into consideration are overconfidence, representativeness, loss aversion, regret, and herd behavior. The results showed association between the biases and the investment decision. Furthermore, Andersen (2010) proved that anchoring had a role in the prices stock indexes.

In addition to the above, four questions were added in the questionnaire to test for the reliability of the respondents. Validity checks are used in terms of correlational and predictive validity. The questions are related to the four biases already presented in the fourth section of the questionnaire but are repeated to test if they correlates with the original answers of the respondents. To determine correlational validity an item related to overconfidence will be correlated with an alternative measure designed to detect overconfidence of the investors. The items designed to measure overconfidence would correlate positively with this item. Predictive validity will be tested by correlating the scales designed to measure the types of the investors with an item that measures the way investors use investment information. The argument being that irrational investor and experienced investor would correlate positively

with illusion of control, overconfidence biases. The variables used in the questionnaire are summarized in Table 3.

Table 3: List of variables used in the questionnaire

		VARIABLES	REFERENCES
GENERAL BACKGROUND	GENDER	MALE	Sairafi, K., Selleby, K., & Stahl, T. (2008). <i>Behavioral Finance - The Student Perspective</i> . Jönköping: JÖNKÖPING INTERNATIONAL BUSINESS SCHOOL.
		FEMALE	
	AGE	AGE IN YEARS	Hoffman, A., & Post, T. (2013). How Does Investor Confidence Lead to Trading? Theory and Evidence on the Links between Investor Return Experiences, Confidence, and Investment Beliefs. <i>Network for Studies on Pensions, Aging, and Retirement</i> , 67.
		EMPLOYEE	
	CURRENT POSITION	SUPERVISOR	Hon, T.-Y. (2013). The Behaviour of Small Investors in the Hong Kong Derivatives Markets. <i>Eighth Annual Conference of the Asian Studies Association of Hong Kong, E020</i> . Hong Kong.
		MANAGER	
		SENIOR MANAGER	
	EXPERIENCE	LENGTH OF EXPERIENCE IN YEARS	Hoffman, A., & Post, T. (2013). How Does Investor Confidence Lead to Trading? Theory and Evidence on the Links between Investor Return Experiences, Confidence, and Investment Beliefs. <i>Network for Studies on Pensions, Aging, and Retirement</i> , 67 &
		DOCTORATE	
	EDUCATION LEVEL	MASTER'S	
BACHELOR		Fares, A., & Khamis, F. (2011). Individual Investors' Stock Trading Behavior at Amman Stock Exchange. <i>International Journal of Economics and Finance</i> , 3 (6).	
HIGH SCHOOL			
ELEMENTARY			
CERTIFICATION	TECHNICAL DIPLOMA		
	YES		
	NO		
INFORMATION RESOURCES	BASES FOR INVESTMENT DECISION	FINANCIAL NEWS	
		ANALYSTS	
		INTUITION	Hoffman, A., Shefrin, H., & Pennings, J. (2010). <i>Behavioral Portfolio Analysis of Individual Investors</i> . Maastricht University. Santa Clara University & Sairafi, K., Selby, K., & Stahl, T. (2008). <i>Behavioral Finance - The Student Perspective</i> . Jönköping: JÖNKÖPING INTERNATIONAL BUSINESS SCHOOL.
		PROFESSIONAL ADVICE	
		FUNDAMENTAL ANALYSIS	
		TECHNICAL ANALYSIS	
		MEDIA	
		FAMILY AND FRIENDS	Fares, A., & Khamis, F. (2011). Individual Investors' Stock Trading Behavior at Amman Stock Exchange. <i>International Journal of Economics and Finance</i> , 3 (6).
DEGREE OF AMBITION	NOT AMBITIOUS		
	A BIT AMBITIOUS	Hoffman, A., & Post, T. (2013). How Does Investor Confidence Lead to Trading? Theory and Evidence on the Links between Investor Return Experiences, Confidence, and Investment Beliefs. <i>Network for Studies on Pensions, Aging, and Retirement</i> , 67.	
	MODERATELY AMBITIOUS		
	QUITE AMBITIOUS		
	VERY AMBITIOUS		
TOLERANCE	NOT RISKY		
	VERY DEFENSIVE		
	DEFENSIVE	Hoffman, A., & Post, T. (2013). How Does Investor Confidence Lead to Trading? Theory and Evidence on the Links between Investor Return Experiences, Confidence, and Investment Beliefs. <i>Network for Studies on Pensions, Aging, and Retirement</i> , 67.	
	CAREFUL		
	OFFENSIVE		
	SPECULATIVE		
KIND OF INVESTOR	VERY SPECULATIVE		
	NOVICE	Hoffman, A., & Post, T. (2013). How Does Investor Confidence Lead to Trading? Theory and Evidence on the Links between Investor Return Experiences, Confidence, and Investment Beliefs. <i>Network for Studies on Pensions, Aging, and Retirement</i> , 67.	
	ADVANCED		
RATIONALITY	VERY ADVANCED		
	IRRATIONAL		
	RELATIVELY RATIONAL		
	VERY RATIONAL		
BEHAVIORAL BIASES	OVERCONFIDENCE		Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .
	CONSERVATISM		Damke, B., Eid, W., & Rochman, R. (2014). Which are the Investment Fund Managers in Brazil behavioral investing biases and their characteristics? <i>EAESP - Fundação Getulio Vargas</i> .
	AVAILABILITY		Pompian, M. (2006). <i>Behavioral Finance and Wealth Management: How to Build Optimal Portfolios that Account for Investor Biases</i> . New Jersey: Wiley
	HINDSIGHT		Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .
	ANCHORING		Damke, B., Eid, W., & Rochman, R. (2014). Which are the Investment Fund Managers in Brazil behavioral investing biases and their characteristics? <i>EAESP - Fundação Getulio Vargas</i> .
	FRAMING		Damke, B., Eid, W., & Rochman, R. (2014). Which are the Investment Fund Managers in Brazil behavioral investing biases and their characteristics? <i>EAESP - Fundação Getulio Vargas</i> .
	MENTAL ACCOUNTING		Thaler, R. (1985). Mental accounting and consumer choice. <i>Marketing Science</i> , 4 (3), 199-214.
	GAMBLER'S FALLACY	AGREEMENT SCALE FROM 1 STRONGLY DISAGREE TO 7 STRONGLY AGREE	Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .
	REPRESENTATIVENESS		Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .
	HERDING		Pompian, M. (2006). <i>Behavioral Finance and Wealth Management: How to Build Optimal Portfolios that Account for Investor Biases</i> . New Jersey: Wiley
	REGRET AVERSION		Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .
	ILLUSION OF CONTROL		Chira, I., Adams, M., & Thornton, B. (2008). Behavioral Bias Within The Decision Making Process. <i>Journal of Business & Economics Research</i> , 6 (8).
	COGNITIVE DISSONANCE		Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .
RELIABILITY QUESTIONS	FAMILIARITY		Chira, I., Adams, M., & Thornton, B. (2008). Behavioral Bias Within The Decision Making Process. <i>Journal of Business & Economics Research</i> , 6 (8).
	OVERCONFIDENCE		
	ANCHORING		
	REGRET AVERSION		
	COGNITIVE DISSONANCE		Subash, R. (2012). Role of Behavioral Finance in Portfolio Investment Decisions: Evidence from India. <i>Charles University in Prague</i> .

As previously stated, the aim of this research is to identify the investment behavior of the Lebanese investment bankers and stock exchange brokers and investigate to which kind of biases they are more prone to and explore how the investment objectives and their profile affect their decisions from the behavioral viewpoint. Furthermore, it aims to group the investors based on how rational they see themselves in the decision-making process and discover how this factor lead to a more biased decisions. Accordingly, the questionnaire was designed to take into consideration the factors that affect the investor's investment decisions which are the demographic characteristics, the risk and rationality profiles, and the behavioral biases. The investor style is shaped by his balance between risk and return. The investment profile is linked to the investor's tempers and beliefs and to the demographic traits. Thus, factors such as age, experience, intuition, financial objectives, and investment strategy can play a part in the investment decisions in terms of portfolio selection and hence return on investment and may lead irrational decisions and biased financial decisions because they make investors more prone to the biases.

3.5 Conclusion

This chapter presented the different philosophical paradigms in the social science research that are related to the researcher's view of the world and how the knowledge is acquired. And it founds that the research design and approach are also related to the philosophical assumptions adopted by the researcher. This section of the research has analyzed all the research designs, strategies, and methodologies in order to choose the most appropriate one to answer the research questions of this study while preserving reliability and validity. The author found that to prove if the investments decisions making of investors dealing with the Lebanese investment banks are affected by behavioral biases that confirm the related behavioral theories, the deductive approach along with survey strategy and questionnaires method are best relevant and fit this topic and answer objectively the research questions.

Chapter Four

Analysis

4.1 Introduction

Data analysis is the process of transforming and remodeling data in order to reach a conclusion for a given problem under study. This process supports the researcher to draw conclusions and is vital in structuring the findings from different sources of data collection like in the survey research. Moreover, it helps in acquiring meaningful insights out of huge data and using them in making related critical decisions. Since data analysis helps the researcher in filtering the quantitative and qualitative data, it can help in keeping bias away from the research conclusion (Statistics Canada, 2008). After defining the basic steps in the analytic process that consist of identifying the problem, determining the availability of suitable data, deciding the appropriate method for answering the questions of interest, this section develops answers to research questions through the examination and interpretation of data collected by applying the methods and assessing, summarizing, and communicating the results. The data analysis in this research is based on both descriptive and inferential statistics using the IBM Statistical Package for Social Sciences Software. Descriptive statistics describe and summarize the data in a meaningful way but does not allow the researcher to draw conclusions regarding any hypotheses made. It enables the researcher to present the raw data in a more significant way for a simpler interpretation by using graphs and analyzing distribution and spreads by using the measures of central tendency such as mean, median and mode and the measures of spread such as variance, standard deviation, and kurtosis (Pearson Higher Education, 2009). However, inferential statistics deal with the estimation of parameters and hypotheses testing by using the data collected from samples in order to be able to make generalizations about the population from which the sample was drawn. Therefore, the sample should accurately represent the population (DeCaro, 2003).

4.2 Analysis Framework

Behavioral finance plays a critical role in wealth management where the latter aims to blend the traditional investment theories with the behavioral factors. Portfolio efficiency and risk management are seen from the client goals perspective in order to create an appropriate investment strategy rather than the use of return and standard deviation. Additionally, risk perceptions should be identified specially by the managers in order to identify how their clients perceive the risk whereas the risk aversion is seen as a fear from losses (Nevins, 2004). These concepts increased the need for risk profiling of the individual investors through identifying the risk tolerance of the investors by studying their behavioral biases such as framing, mental accounting, overconfidence, illusion of control, etc. (Brunel, 2003). On the other hand, risk tolerance is related to age and cognitive skills. Mandal and Roe (2014) analyzed how these factors are related to risk tolerance among National Longitudinal Survey of Youth participants. Their findings suggest that older individuals show lower risk tolerance than the young individuals and they found that respondents with the lowest and highest cognitive skills reveal the highest risk tolerance. Since risk attitudes are the basic key that outlines investment, consumption, and choices, it is essential to understand the risk preference changes and the reasons behind these changes. Changes in risk attitudes caused by changes across individuals accompany also changes in personal choices. Risk attitudes change with aging and changes in demography impact also the financial modeling. Risk tolerance is also impacted by demographic factors such as age, gender, and education levels (Li, Baldassi, Johnson, and Weber, 2012). Understanding the individual's willingness and capacity to take risk is an essential part in the financial planning. Portfolio managers spend their time to structure products that take into consideration the appropriate perceptions and preferences of risk of their individual clients. In assessing the risk profile, not only the time horizon and financial goals are important but also the risk tolerance which is the most subjective factor difficult to measure, and related to behavioral finance. According to Anbar and Eker (2010), the methods used to measure financial risk tolerance are: assessing the actual behavior, asking questions about the investment choices, asking investment and subjective questions, asking questions about specific scenarios. Faff et al. (2008) found that financial risk tolerance decreases with age and suggested that there is a non-linear

relationship between risk aversion and age where risk tolerance decreases to a certain point then rises again. Other scholars have opposite findings such as Bommier and Rochet (2006) who found that elderly people hold riskier portfolios compared to younger people. In addition to that, the employment status affects also the risk tolerance. Studies show that employed people have a higher risk tolerance compared to unemployed and entrepreneurs or self-employed have higher risk tolerance among all the other categories of employment. Researchers also found that higher levels of education are associated with higher level of risk tolerance (Faff, Hallahan, & McKenzie, 2011).

The above discussion shows clearly that behavioral biases play a major role in the decision-making of the investors. Rather, the author is studying fourteen behavioral biases that influence people in financial decisions to find out the most dominant of these biases in the Lebanese investors. For this, the author has taken Lebanese investment bankers and stock brokers who are investing in the stock market with the assumption that they do not have much knowledge and expertise about the behavioral biases and hence their investment decision is biased and not rational.

On the basis of the literature review, risk tolerance influences the portfolio selection and allocation preferences among the different investors profile. However, as also observed, that variation in demographic factors, information, and behavioral biases could shape the investment decision thus, the below hypotheses were formulated:

H1: Perception of investment risk tolerance of Lebanese investors varies with demographic variables, bases for decision, profile of the investor, and behavioral biases.

H2: Rationality level of investors is related to investors' demographics (such as age, gender, experience...), sources of information they rely on (such as professional advice, analysts' opinions, fundamental and technical analysis...), profile of the investors, and the behavioral biases.

H3: Type of investors (novice or advanced) is a function of investors' demographics (such as age, gender, experience...), sources of information they rely on (such as professional advice, analysts' opinions, fundamental and technical analysis...), profile of the investors, and other behavioral biases.

Descriptive, relational, and variation tests are conducted in order to answer the objectives of the study:

1. Describe characteristics of investors in Lebanese market sector.
2. Identify the basis of investment decision.
3. Describe the risk attitudes of respondents.
4. Identify the behavioral biases to which the Lebanese investment bankers are prone to.
5. Investigate whether the basis of investment decision vary with respect to gender, age, education, years of experience in investing and in the work.
6. Investigate whether the investment decision-making vary with respect to the profile of the investor.

To explain variations between two variables T-test and Mann-Whitney U-test were used. T-test was used for parametric variables and when there is a small difference in the number of observations for the sub categories. Mann-Whitney U-test was used for non-parametric (on a continuous or ordinal dependent variable) variables and to account for the difference in the number of observations for the sub categories. In order to compare means for more than two variables ANOVA test was used as an extension for the T-test and Kruskal-Wallis test was used as an extension for the Mann-Whitney U-test. For the relational analysis, Pearson correlation is used for the parametric variables and Spearman's Rho correlation is used for the non-parametric variables. The results are presented in the section 4.3.

To answer the first hypothesis, the ordinary least square (OLS) regression model was used in order to estimate which optimal variables build the personal risk tolerance of the investors. The variables age, years of experience in investing or trading, and the years of experience in current position were turned into log variables since they were not normally distributed. This transformation aimed to preserve the assumptions of the OLS in respect for the normality and linearity. As for the second and third hypotheses, binary logistic regression model is used in order to estimate the likelihood of an investor in being rational or very rational and the

likelihood of an investor as being novice or advanced given the values of the explanatory variables.

4.3 Statistical Analysis

Statistical analysis involves collecting and analyzing data from representative samples drawn from a population. It includes the description of data, exploration of relationships, model creation to understand how the data is related to the population, assessment of validity, and prediction of the future by running different scenarios.

4.3.1 Descriptive Analysis

As stated previously, descriptive statistics are used to describe basic features of data such as measures of central tendency and dispersion. The data collected is summarized in descriptive coefficients to simplify the analysis.

There are numerous behavioral biases identified in Behavioral finance literature and each has implications on financial decision-making of the individuals. This research analyzes fourteen biases and shows their effects on the Lebanese investment bankers and traders along with other factors related to the profile of the investor to study their potential effect on the investment decision from the behavioral perspective. The questionnaire was the most appropriate method for this research. It was distributed to the Lebanese investment bankers while assuring the confidentiality of the participants, keeping the questionnaire compact to focus on the core of research while gathering the respondents' interest. The total number of responses collected is 129.

The questionnaire was divided into four sections: background information, sources of information, profile of the investor, and finally biases that influence the portfolio selection.

Background Information

This section is related to the demographic factors of the respondents.

The respondents who filled out the questionnaire were from twenty seven different investment banks and trading companies and hold positions in the four departments related to investment banks: back office operations, treasury management, risk

management, and front office trading desk. The data is summarized in the tables 4 and 5.

Table 4: Firm in which the respondents currently work

AHLI INVESTMENT GROUP
ARAB INVESTMENT BANK
AUDI INVESTMENT BANK
BANK MED
BANK OF BEIRUT INVEST
BANQUE NATIONALE DU CANADA
BBAC
BDL
BEMO BANK
BLC INVEST
BLF INVEST
BLOM INVEST BANK
BYBLOS INVEST BANK
CEDRUS INVEST BANK
CREDIT FINANCIER INVEST
CREDIT LIBANAIS INVESTMENT BANK
FFA PRIVATE BANK
FIDUS
FINANCE AND RISK INSTITUTE
FRANSA INVEST BANK
IBL INVESTMENT BANK
MERRILL LYNCH
ROYAL FOREX TRADING
SGBL

Out of the 129 respondents, 53 currently work in the dealing room (41.1%), 47 operate in the back office (36.4%), 19 respondents work in the treasury management (14.7%), and 10 respondents function in the risk management department (7.8%). The respondents were asked about their education level, their current position, and if they hold a professional certification related to the field of finance and/ or investment. The data in table 6 shows that most of the participants hold a master's degree while all the participants are educated and have at least a bachelor degree. Most of the respondents are employees representing 66.7% of the sample, 33.3% are supervisors, managers and senior managers as shown in table 7. As for the

professional certification, 36.4% hold a professional certification while the remaining 63.6% do not hold a professional certification.

Table 5: Department in which the respondents currently work

	Frequency	Percent
Back Office Operations	47	36.4
Dealing Room	53	41.1
Risk Management	10	7.8
Treasury Management	19	14.7
Total	129	100

Table 6: Education level of the respondent

	Frequency	Percent
Bachelor	46	35.7
Master's	82	63.6
Doctorate	1	0.8

Table 7: Current position of the respondent

	Frequency	Percent
Employee	86	66.7
Supervisor	27	20.9
Manager	10	7.8
Senior Manager	6	4.7

The respondents were from both genders where 81 are male investors (62.8%) and 48 female investors (38.2%). The average age of the respondents is 31.14 years. The younger investor is 21 years old and the older respondent is 82 years old. The age of the participants is not normally distributed and has a kurtosis of 13.94 that proves that the age is not concentrated around the mean. Since experience level is a proxy measure for the knowledge and for the understanding of the financial markets, the respondents were asked also about the years of experience in investing and in their current position. The mean of the experience level in investing and trading (5.76%) was close to the mean of the experience in current position (5.79%). The most experienced investor has 25 years of experience in investing and the least experienced investor has a one year experience in trading. The maximum year of

experience in a current position is 40 years and the minimum is one year. These two variables were also not normally distributed with a kurtosis above 3 (Table 8). To maintain the statistical assumptions in the analysis, the age and experience will be adjusted to be normally distributed by using the log of these variables.

Table 8: Age and years of experience of the respondents

	Age of respondents	Years of experience in investing/trading	Years of experience in current position
Mean	31.14	5.76	5.79
Std. Deviation	7.732	4.772	5.487
Skewness	2.602	1.578	3.013
Kurtosis	13.940	3.301	14.136
Minimum	21	1	1
Maximum	82	25	40

Because age and years of experience are important and critical variables in shaping an investor's decision-making, they were divided into groups. The choice of the brackets aimed to clarify the data and to structure the analysis. The sample profile will be based on these judgment criteria: investors were divided below 30 years old and above 30 years old where participants aged below 30 are considered young investors and above 30 are considered more experienced, below 5 years of experience in trading or investing and above 5 years of experience in investing and trading, investors having 4 years or less experience in their current position are considered novice investors, investors having 5 to 8 years of experience in the current position are considered advanced investors, and investors having above eight years of experience in their current position are considered very advanced investors. Table 9 shows that 69 investors representing 53.5% of the total respondents are below 30 years old and 60 investors are above 30 years old (46.5%).

Table 9: Age of respondents

	Frequency	Percent
Below 30 years of age	69	53.5
Above 30 years of age	60	46.5
Total	129	100

Table 10 illustrates that 57.4% of the participants have below 5 years of experience in investing and 42.6% of the participants have above 5 years of experience in investing. Table 11 shows that 51.2% of the respondents have 4 or less years of experience in their current position and are considered novice investors, 27.9% have 5 to 8 years of experience in their current position and they are considered advance investors, and 20.9% of the respondents have above 8 years of experience in their current position and are considered very advanced investors.

Table 10: Years of experience in investing/trading

	Frequency	Percent
Below 5 years of experience in investing	74	57.4
Above 5 years of experience in investing	55	42.6
Total	129	100

Table 11: Years of experience in current position

	Frequency	Percent
Below or equal to 4 years of experience in current position	66	51.2
Between 5 and 8 years of experience in current position	36	27.9
Above 8 years of experience in current position	27	20.9
Total	129	100

Sources of information

This section in the questionnaire is related to the different sources of information that the respondents rely on to build their investment decision. Investors depend on different bases but they stress on some sources more than others. The choice of these factors in the investment decision gives the researcher insight on the potential biases that might affect the investor.

Table 12: Bases for decision

	Financial News	Analysts	Intuition	Professional Advice	Fundamental Analysis	Technical Analysis	Media	Friends and Family	Client View:
Mean	5.023	4.884	3.899	4.837	5.380	5.225	3.775	2.783	3.89
Std. Deviation	1.476	1.291	1.545	1.357	1.069	1.353	1.655	1.531	1.63
Skewness	-.721	-.666	-.061	-.424	-1.122	-1.205	.166	.585	-.09
Kurtosis	.227	.591	-.573	-.242	1.950	1.594	-.752	-.395	-.71
Minimum	1	1	1	1	1	1	1	1	1
Maximum	7	7	7	7	7	7	7	7	7

The respondents were asked to select a number from a quasi-metric scale ranged from 1 to 7 (where 1 is low consideration and 7 is high consideration) that most likely correspond to the degree each of the nine bases of information is used in their decision-making process. The data shows that these variables are normally distributed and their kurtosis is ranged between -3 and +3. Table 12 illustrates that respondents depend more on fundamental analysis with a mean of 5.38, followed by technical analysis with a mean of 5.22. Financial news, analysts' opinions, and professional advice are also considered in the investment decision with a mean of 5.02, 4.88, and 4.84 respectively. However, the data shows that the respondent do not put much consideration on their intuition, clients' views, media, and the friends and family members where the mean is below 4. The answers were diversified and some investors highly consider some factors and do not consider at all other factors. Since the respondents rely more on the fundamental and technical analysis in their investments they most likely have diversified portfolios and be less affected by biases such as herd behavior that mainly results from imitating the others and overconfidence that comes from intuition.

Profile of the investor

Section three in the questionnaire is related to the profile of the investor in order to study the risk attitudes and personality of the respondents. Portfolio selection is based on the investor's risk tolerance, preferences, and objectives. The respondents were asked to specify the factors that represent their investment strategy.

Table 13: Level of ambition and tolerance

	Ambition	Tolerance to risk
Mean	5.43	4.60
Std. Deviation	1.137	1.121
Skewness	-.446	-.249
Kurtosis	-.129	.066
Minimum	2	2
Maximum	7	7

The participants were requested to indicate from 1 to 7 how ambitious they consider themselves to be where 1 is not ambitious at all and 7 is very ambitious, and they were asked to rate from 1 to 7 their tolerance for investment risk where 1 is not risky at all and 7 is very speculative. The answers are presented in table 13. None of the respondents answered by not ambitious at all and not risky at all and some investors considered themselves very ambitious and some are very speculative. These two variables were normally distributed. The means for these variables are above four, the degree of ambitions of the respondents is equal to 5.43 and the mean of the risk tolerance is equal to 4.6 meaning that the participants are somehow risky and very ambitious.

The participants were also requested to class themselves between novice, advanced or very advanced investors, and if they consider themselves irrational, relatively rational, or very rational. The answers are summarized in tables 14 and 15. The majority of the respondents considered themselves novice and advanced investors with 48.1 % and 48.8% respectively while only 3.1% considered themselves as very advanced investors. None of the respondents is an irrational investor, 82.9% consider themselves relatively rational investors and 17.1% respondents believe that they are very rational investors.

Table 14: Profile of the investor - Type of investor

	Frequency	Percent
Novice Investor	62	48.1
Advanced Investor	63	48.8
Very Advanced Investor	4	3.1
Total	129	100

Table 15: Profile of the investor - Rationality of the investor

	Frequency	Percent
Relatively Rational	107	82.9
Very Rational	22	17.1
Total	129	100

Biases

The fourth section in the questionnaire is related to the factors that influence the investment decision-making and the portfolio selection of the respondents. The behavioral biases were presented in a short statement and the respondents were asked to choose, based on their opinion, a number from 1 to 7 (where 1 is strongly disagree and 7 is strongly agree) that corresponds to which extent each factor summarized in the statement describes their behavior while taking the investment decision. The answers are presented in table 16. The metric data collected in this section is normally distributed with a kurtosis between -3 and +3 and skewness between -1 and +1. Overconfidence, conservatism, availability, hindsight, anchoring, framing, gambler's fallacy, regret aversion, illusion of control, cognitive dissonance, and familiarity biases have a mean ranging between 4 and 5. Mental accounting and representativeness have the higher means of 5.25 and 5.24 respectively, while herding has the lowest mean of 3.31.

Table 16: Behavioral biases

	Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
Overconfidence	4.078	1.539	-.145	-.496	1	7
Conservatism	4.070	1.421	-.407	-.338	1	7
Availability	4.651	1.350	-.714	.349	1	7
Hindsight	4.093	1.394	-.414	-.573	1	7
Anchoring	4.248	1.663	.022	-1.027	1	7
Framing	4.326	1.701	-.503	-.770	1	7
Mental accounting	5.248	1.166	-.228	-.706	3	7
Gambler Fallacy	4.791	1.116	-.296	-.179	2	7
Representativeness	5.240	1.255	-.490	-.284	2	7
Herding	3.310	1.575	.314	-.436	1	7

Regret aversion	4.093	1.617	.005	-.912	1	7
Illusion of control	4.240	1.333	-.030	-.128	1	7
Cognitive dissonance	4.574	1.483	-.299	-.614	1	7
Familiarity	4.589	1.272	-.341	.120	1	7

Some participants did not deny the fact that they are affected by biases and have strongly agreed that they are prone to some behavioral biases. Moreover, some respondents denied the fact that they are affected by certain biases except for mental accounting, gambler's fallacy, and representativeness where the minimum was not equal to one that represents the strongly disagree. Since the average of the responses is greater than 4, this indicates that the respondents have a greater percentage to be affected by the behavioral biases which could impact their investment decision and portfolio selection.

In order to check the reliability of the respondents, four statements were added to the last section in the questionnaire related to overconfidence, anchoring, regret aversion, and cognitive dissonance. The aim of this duplication is to check that the participants understood the statements that were representing the biases and that they were consistent in their answers. In general, the results show that the correlation between the answers on the identical bias were significant at the 99% confidence level. Therefore, the respondents showed to be trustworthy in their answers on the questionnaire and they are prone to the same biases even if they are presented in a different way.

Validity and reliability are essential elements in the valuation of the measures of the construct. The Cronbach's alpha, which is a measure of internal consistency and reliability expressed between 0 and 1, describes to which extent items in a test measure the same concept. The acceptable values range from 0.7 to 0.95 (Tavakol & Dennick, 2011). The Cronbach's alpha for this data collected was measured and it was equal to 0.814 which is acceptable.

4.3.2 Variation Analysis

Variation analysis are used to investigate whether the bases of information vary with respect to the background information and according to the profile of the investor,

and to investigate if the identified biases vary with respect to the respondents' background and risk profile.

In order to test if the factors considered in building the investment decision vary with the gender of the respondents and to explore the differences in their choice, a non-parametric test was done. The results are illustrated in table A1 in the appendix. The results show equal means for all the factors except for the professional advice which differs between male investors and female ones. A Mann-Whitney U-test was conducted to indicate which group relies on professional advice. The mean was higher for female investors and the result was significant at the 1% confidence level signaling that female investors consider the professional advice more than male ones as shown in table 17.

Table 17: Professional advice variation by gender

	Gender Male - Female
Professional advice	Z-Score -2.828**

** Significant at the 1% level

In addition to this, a test was conducted to explore if there is a difference in the choice of the bases for decision between the investors aged below 30 years old and the ones older than 30 years. The results show equal means for both groups as illustrated in table A2.

Moreover, the variance test was done on the four departments in which the participants work in order to find if they count on the same sources of information in the process of making the investment decision. The results show significant variation in the mean at the 1% confidence level in professional advice, technical analysis, fundamental analysis, and friends and family while there is no difference in the mean for the other factors such as the financial news, analysts' opinion, intuition, media, and clients' view. Mann – Whitney U-test was undertaken on the departments to explore which one contributes to the variation in the four factors listed previously. As illustrated in table A4 in the appendix, respondents operating

in the dealing room use fundamental analysis more than respondents operating in treasury management department with a mean equal to 5.66 and the p-value is equal to 0.051 and there is no significant difference in the technical analysis, professional advice, and friends and family. Respondents operating in the dealing room rely less on professional advice and friends and family compared to the respondents working in the risk management departments. The results were significant at the 1% and the 5% confidence levels respectively. There were no significant differences between them in the use of fundamental and technical analysis. As illustrated in table A4, participants who work in the dealing room use fundamental and technical analysis more than participants working in the back office. The p-values were 0.001 and 0.005 respectively for the two factors which are significant at the 5% confidence level. However, the respondents working in the back office operations rely on friends and family opinion more than the dealing room traders and the p-value is equal to 0 which is significant. The results are in parallel to the role of investment banks' departments and operations. Back office operations are related to internal control, data checking, and executing transactions so they do not rely on fundamental and technical analysis in their work as the dealing room, treasury and risk management who combine technical and fundamental analysis in order to see the past price behavior, incorporate tools, try to shape future price movements using the past trends, concentrate on the economy financial drivers, and follow news and data releases (Stanley, 2012). Investors who work in the treasury management have higher means for all the factors used in building the investment decision except for friends and family compared to the respondents working in the back office and the result is only significant for the friends and family opinion which is more considered by the back office employees and the p-value is equal to 0.002 and significant at the 1% confidence level. Table A4 illustrates that participants working in the risk department highly consider the professional advice, fundamental and technical analysis compared to the participants working in the treasury management department and the results were not significant. For the friends and family opinion, the respondents working in the risk department consider more this factor with a p-value equal to 0.019. The same variation analysis was done on the respondents working in the risk management and back office. The results in table A4 show that respondents operating in the risk management rely on professional advice and technical analysis more than the respondents of the back office department with a p-

value of 0.027 and 0.006 respectively. The results were significant at the 5% and the 1% confidence levels respectively. The results show that the participants operating in the risk management department depend on fundamental analysis compared to respondents operating in the back office but the result was not significant.

Furthermore, variation analysis was done to test if the bases for investment decision vary with respect to the log years of experience in investing and trading and with respect to the log of experience in the current position. Since these two variables were not normally distributed as stated in the descriptive statistics section, we transformed into log variables in order to be normally distributed and respect the assumptions of the parametric tests. The results are illustrated in the tables 18 and 19.

Table 18: Bases for information variation by years of experience in investing or trading

Experience in investing		Sum of Squares	df	Mean Square	F	Sig.
Financial News	Between Groups	33.319	21	1.587	.691	.833
	Within Groups	245.611	107	2.295		
	Total	278.930	128			
Analysts	Between Groups	42.665	21	2.032	1.274	.209
	Within Groups	170.591	107	1.594		
	Total	213.256	128			
Intuition	Between Groups	53.045	21	2.526	1.070	.391
	Within Groups	252.645	107	2.361		
	Total	305.690	128			
Professional Advice	Between Groups	30.279	21	1.442	.751	.770
	Within Groups	205.303	107	1.919		
	Total	235.581	128			
Fundamental Analysis	Between Groups	29.965	21	1.427	1.311	.184
	Within Groups	116.423	107	1.088		

Technical Analysis	Total	146.388	128			
	Between Groups	30.264	21	1.441	.755	.766
	Within Groups	204.217	107	1.909		
Media	Total	234.481	128			
	Between Groups	65.247	21	3.107	1.166	.296
	Within Groups	285.233	107	2.666		
Friends and Family	Total	350.481	128			
	Between Groups	51.030	21	2.430	1.045	.419
	Within Groups	248.892	107	2.326		
Client's Views	Total	299.922	128			
	Between Groups	29.405	21	1.400	.479	.973
	Within Groups	313.075	107	2.926		
	Total	342.481	128			

** Significant at the 1% level

* Significant at the 5% level

Table 19: Bases for information variation by years of experience in current position

Experience in position		Sum of Squares	df	Mean Square	F	Sig.
Financial News	Between Groups	41.256	20	2.063	.937	.542
	Within Groups	237.675	108	2.201		
	Total	278.930	128			
Analysts	Between Groups	50.847	20	2.542	1.690*	.046
	Within Groups	162.408	108	1.504		
	Total	213.256	128			
Intuition	Between Groups	70.622	20	3.531	1.622*	.060
	Within Groups	235.068	108	2.177		
	Total	305.690	128			

Professional Advice	Between Groups	28.723	20	1.436	.750	.766
	Within Groups	206.858	108	1.915		
	Total	235.581	128			
Fundamental Analysis	Between Groups	19.186	20	.959	.814	.691
	Within Groups	127.202	108	1.178		
	Total	146.388	128			
Technical Analysis	Between Groups	21.752	20	1.088	.552	.936
	Within Groups	212.728	108	1.970		
	Total	234.481	128			
Media	Between Groups	84.648	20	4.232	1.720*	.041
	Within Groups	265.832	108	2.461		
	Total	350.481	128			
Friends and Family	Between Groups	63.086	20	3.154	1.438	.120
	Within Groups	236.837	108	2.193		
	Total	299.922	128			
Client's Views	Between Groups	52.267	20	2.613	.973	.500
	Within Groups	290.214	108	2.687		
	Total	342.481	128			

** Significant at the 1% level

* Significant at the 5% level

The outcome shows no significant variation in log years of experience in investing/trading and the choice of the sources of information to build the investment decision. However, the variation was significant at the 5% confidence level in analysts' opinion, and media, and intuition at the 10% confidence level in respect to the log experience in the current position. Since the years of the experience in current position were divided into 3 brackets, a t-test was done to detect the variation of these groups of experience in the current position on the choice of analysts' opinion, intuition, and media. The results are illustrated in tables A5 in the appendix. There was a significant variation between the respondents

having 4 or less years of experience in the current position and the respondents with above 8 years of experience in the current position for the intuition factor only where the latter group relies more on intuition and the p-value was equal to 0.023. The difference was not significant between the respondents from 5 to 8 years of experience and the respondents above 8 years of experience in the current position. As for the analysts' opinion, the results are coherent with Gerritsen (2014) who found that analysts' recommendations are unrelated to the target companies, securities, and stock prices and show divergence in opinions, they do not change their recommendations and keep them intact while prices change and may incorporate new information.

Non parametric tests were also done to investigate if the current position of the respondents, their educational level, and if they hold a professional certification lead to a variation in the selection for the bases of the investment decision-making. The results show that the respondents with their different educational levels and positions do not differ in the selection of information. Table A8 in the appendix shows variance in the selection of professional advice, fundamental analysis, and technical analysis between the participants who hold a professional certification and the participants who do not hold a professional certification in finance or investment. Mann – Whitney U-test was undertaken to test the variation between the holder and non-holder of the professional certification in the field of finance and /or investment. The results illustrated in table 20, show that the non-holders of professional certification have higher mean for the professional advice while lower mean for the fundamental and technical analysis. The p-values for professional advice and technical analysis were significant at the 5% confidence level while for fundamental analysis it was significant at the 1% confidence level indicating that the holders of the professional certification use more the fundamental and technical analysis while building their investment decision compared to the respondents who do not hold this professional certification.

Table 20: Bases for information variation by holders and non-holders of professional certification in finance

Hold Professional Certification	
	YES/NO
	Z-Score
Professional advice	-2.443*
Fundamental analysis	-2.752**
Technical analysis	-2.127*

Significant at the 5* and 1** percent levels, respectively

In order to explore the existence of variations in the selection of the factors used in building the investment decision-making between the different profiles of the respondents a t-test was used for the type of investors. The results presented in table A5 illustrate variation in the financial news, professional advice, and the fundamental analysis between the novice and advanced respondents. Advanced investor rely more on financial news with a p-value equal to 0.049 and fundamental analysis with a p-value of 0.025, while novice investors rely more on professional advice and the p-value is equal to 0.018.

Table 21: Bases for information variation by type of investors

	Mean		Mean All	Standard deviation All
	Novice (N=62)	Advanced (N=67)		
Financial news	4.758*	5.268*	5.023	1.148
Analysts' opinion	5.048	4.731	4.884	1.291
Intuition	3.871	3.925	3.899	1.545
Professional advice	5.129*	4.567*	4.837	1.357
Fundamental analysis	5.161*	5.582*	5.380	1.069
Technical analysis	5.032	5.403	5.225	1.353
Media	3.854	3.701	3.775	1.655
Friends and Family	3.016	2.567	2.783	1.531
Clients' views	4	3.791	3.891	1.636

** Significant at the 1% level

* Significant at the 5% level

As for the rationality of the respondents, there was a significant variation at the 5% confidence level in the consideration of the analysts' opinion, financial news, and at the 1% confidence level for the friends and family as sources of information for the investment decision shown in the table 22. The respondents who consider themselves very rational depend on analysts more than the respondents who consider themselves relatively rational, while the latter depend on family and friends' opinion more than the respondents who consider themselves very rational.

Table 22: Bases for information variation by rationality of investors

	Relatively Rational/Very Rational
	Z-Score
Financial news	-2.064*
Analysts' opinion	-2.103*
Intuition	-1.254
Professional advice	-0.254
Fundamental analysis	-1.615
Technical analysis	-1.284
Media	-0.560
Friends and Family	-3.070**
Clients' views	-1.270

** Significant at the 1% level

* Significant at the 5% level

As for the behavioral biases, this section will explore if the respondents' behavior while making their investment decision vary with their background and profile respectively. For the gender, the test shows that male and female investors experience the same biases except for the anchoring bias where the means are not equal. The results are shown in table A9 in the appendix. Mann Whitney test was conducted to explore this variation. The results presented in table 23 illustrate that female investors have a higher mean compared to male investors and the p-value is equal to 0.042 which is significant at the 5% level. Barber and Odean (2001, in Kent and Ricciardi 2014) found that male investors are more overconfident and trade more often compared to female investors. Women trade less and apply the buy and hold approach. Male investors do not consider the wide investment choices and do not focus on their financial decision at a specific point in time (Barber & Odean, 2001). They found that women are in generally more risk averse. However, the results below didn't show any difference in overconfidence between male and female investors.

Table 23: Anchoring bias variation by gender

	Gender Male - Female
	Z-Score
Anchoring	-2.029*

*Significant at the 5% level

Lee et al (2013) studied the behavioral differences between male and female investors and the consequences on their investment performance. They found that mental accounting bias is common on male investors while anchoring, adjustment, and ambiguity effect biases are prevalent in female investors. They were able to confirm that male investors are more risk tolerant than female investors and this is due to the difference of perception of risk and return.

The variation of behavior biases of the respondents was also studied if it varies with respect to the age. The non-parametric test was conducted on the two groups: the participants below than 30 years old and the participants older than 30 years old. The outcome shows variation in the framing and cognitive dissonance bias as presented in table A26 in the appendix. The Mann Whitney U-test illustrates that the respondents aged below 30 years old are more prone to framing and cognitive dissonance compared to the respondents above 30 years old. The p-values for the two biases were equal to zero and 0.015 respectively (table 24). Kudryavtsev et al. (2012) studied if biases correlation coefficients are higher for younger investors (age below 30 years old), but the result was not significant. They concluded that the age of the investors does not affect the consistency of the investment decision-making.

Table 24: Behavioral Biases variation by age brackets

	Age of respondents
	Below 30 years/ Above 30 years
	Z-Score
Framing	-3.938**
Cognitive Dissonance	-2.443*

** Significant at the 1% level

* Significant at the 5% level

In addition to this, the same analysis was undertaken on the departments in which the respondents work in order to detect if the respondents' behavior, while making an investment decision, varies between departments. The results in table A11 in the appendix show variation in overconfidence and herding biases. Further test were done to identify which department contributed to the variation. The results, summarized in the table A12, show that respondents working in the dealing are overconfident compared to the respondents operating in the treasury management department with a p-value of 0.006. There is no significance at the 5% level between the respondents working in the dealing room and in the risk management department. This result was identical to the participants operating in the treasury and risk management departments. The participants working in the dealing room show overconfidence compared to the back office employees and the p-value is equal to 0 with a higher mean. However, the latter are influenced by the herd behavior

compared to the dealing room employees and the p-value is equal to 0.003 and to the treasury management employees and the p-value is equal to 0.001.

The analysis of variance was conducted on the respondents' experience in investing and trading and their experience in the current position. The results presented in tables A13 and A14 in the appendix illustrate significant variation at the 5% confidence level for the framing bias in the experience in investing (p-value 0.032) and at the 1% confidence level for the experience in the current position (p-value 0.002). In order to figure out the age bracket of the investors who are more prone to the framing bias, a t- test was conducted. The results are presented in table 25. The respondents below 5 years of experience in trading or investing show greater mean compared to the respondents above 5 years of experience in investing or trading and the p-value is equal to 0 significant at the 5% level. A similar analysis was done on the brackets of the years of experience in current position. The results presented in table 26 show that participants below 4 years of experience in current position are more affected by the framing bias compared to the respondents between 5 and 8 years of experience in the current position with a p-value equal to 0.002. This result is similar compared to the participants who have above than 8 years of experience in the current position. The variation is not significant between the investors who have between 5 and 8 years of experience in current position and the respondents above 8 years of experience. The results show that the least experienced respondents are affected more by the biases whereas Kudryavtsev, et al (2012) analyzed the correlations of five behavioral biases on the mechanism of stock market decision-making more precisely on market investors. They found that, correlations between the biases do not increase with trading experience, and the lowest correlations were found with the least experienced investors (less than 3 years). The non-experienced traders rely on simplified behavioral techniques and behave inconsistently. The most experienced non-professional investors have low correlation coefficients indicating not necessarily they are rational but have more experience and use set of decision-making rules. They concluded that, more experienced investors and male investors have higher correlation coefficients between biases, while the cross-sectional correlation were positive and highly significant for all categories of investors classified by experience levels, age, and genders.

Table 25: Behavioral biases variation by years of experience in investing/trading in brackets

	Mean		Mean All	Standard deviation All
	Below 5 years (N=74)	Above 5 years (N=55)		
Framing	4.865**	3.600**	4.326	1.701

** Significant at the 1% level

Table 26: Behavioral biases variation by years of experience in current position in brackets

	Z-score		Z-score		Z-score	
	Below or equal to 4 years	Between 5 and years 8 years	Below or equal to 4 years	Above 8 years	Between 5 and years 8 years	Above 8 years
Framing	-3.186**		-4.485**		-1.338	

** Significant at the 1% level

The analysis of variance concerning the behavioral biases of the Lebanese investors was studied on their current position, educational level, and their professional certification. The results are summarized in the tables A15, A16, and A17 in the appendix. There is no variation in behavioral biases between the holders and non-holders of professional certification in finance or investment. The results show significant variation at the 5% and 1% confidence level respectively in the anchoring and framing bias between the different positions of the respondents where the p-values are 0.025 and 0.001 respectively, and a variation in the familiarity bias for the level of education and the p-value is equal to 0.033. Further test were done in order to find which education level is affected by the familiarity bias. The results illustrated in the 27 show that holders of a Master's degree have lower mean compared to the holders of a bachelor degree thus they are less affected by this bias and the result was significant at the 5% level and the p-value was equal to 0.022. It can be assumed that the educational level does not affect the behavioral investment of the respondents. This may be related as well to the results of Huzdik et al. (2014) who found that risk taking in financial decision-making is related to the self-

perception of the knowledge and not to the actual knowledge acquired in the education.

Table 27: Familiarity bias variation by educational level

	Education level Bachelor/Master's
	Z-Score
Familiarity	-2.291*

*Significant at the 5% level

Table 28: Behavioral biases variation by current position of the respondents

	Current Position					
	Employee / Supervisor	Employee / Manager	Employee / Senior Manager	Supervisor / Manager	Supervisor / Senior Manager	Manager / Senior Manager
	Z-Score	Z-Score	Z-Score	Z-Score	Z-Score	Z-Score
Anchoring	-1.376	-2.198*	-1.662	-1.348	-1.970*	-2.163*
Framing	-2.911**	-3.206**	-1.588	-1.134	-0.402	-0.334

** Significant at the 1% level

* Significant at the 5% level

Table 28 shows that employees are more prone to framing bias compared to supervisors and managers and the results were significant at the 1% level, and the results were not significant for the variation between supervisors, managers and senior managers concerning this bias. As for the anchoring bias, there is a significant variation between employees and managers with employees having a greater mean. Supervisors are less affected by the anchoring bias compared to the senior managers with a p-value equal to 0.049, and this bias have a greater effect on the senior managers compared to the managers where the p-value is equal to 0.031 significant at the 5% confidence level. The sub category of senior manager is below 10 observations which cast doubt about the significance of the results but it was reported cautiously for more clarity. Cronqvist and Siegel (2013) analyzed the effect of the environment of the investors on their behavioral biases. They found that the work related experience in finance reduce the tendencies to behavioral biases while education does not. The above results can be explained by the findings of Faff et al.

(2011) who showed that employed people have a higher risk tolerance compared to all other categories of employment status.

In addition to that, the variation analysis related to the factors that influence the investment decision-making and the portfolio selection of the Lebanese investors and traders were tested on the profile of the respondents. Since the answers of the participants were limited to two variables for the type of the investors and for their rationality, t –test was used to study this variation for the type of investor but for the rational a Mann-Whitney U-test was used to account for the number of the responses in this sub category. The results are illustrated in the tables 29 and 30.

Table 29: Behavioral biases variation by type of investors

	Mean		Mean All	Standard deviation All
	Novice (N=62)	Advanced (N=67)		
Overconfidence	3.726*	4.403*	4.078	1.539
Conservatism	4.242	3.91	4.070	1.421
Availability	4.661	4.642	4.651	1.350
Hindsight	3.968	4.209	4.093	1.394
Anchoring	4.371	4.134	4.248	1.663
Framing	4.935**	3.761**	4.326	1.701
Mental Accounting	5.355	5.149	5.248	1.166
Gambler Fallacy	4.613	4.955	4.791	1.116
Representativeness	5.048	5.418	5.240	1.255
Herding	3.565	3.075	3.310	1.575
Regret aversion	3.903	4.269	4.093	1.617
Illusion of control	4.339	4.149	4.240	1.333
Cognitive dissonance	4.806	4.358	4.574	1.483
Familiarity	4.677	4.507	4.589	1.272

** Significant at the 1% level

* Significant at the 5% level

Table 30: Behavioral biases variation by rationality of investors

	Relatively Rational / Very Rational
	Z-Score
Overconfidence	-0.134
Conservatism	-1.281
Availability	-1.077
Hindsight	-0.173
Anchoring	-0.146
Framing	-3.052**
Mental Accounting	-0.556
Gambler Fallacy	-0.786
Representativeness	-1.855
Herding	-2.375*
Regret aversion	-0.06
Illusion of control	-2.703**
Cognitive dissonance	-2.489*
Familiarity	-0.258

** Significant at the 1% level

* Significant at the 5% level

For the type of investors, the result shows significant variation at the 5% confidence level for the overconfidence and at the 1% level for the framing biases where advanced investors are more affected by the overconfidence bias and the novice investors are more affected by the framing bias with a mean equal to 4.94 compared to 3.76 for the advanced investors. The results present that there is a significant variation between the relatively rational and the very rational investors for the framing bias (p-value 0.002), the herding bias (p-value 0.027), the illusion of control bias (p-value 0.001), and the cognitive dissonance bias (p-value 0.005). The means for these biases are greater for the relatively rational respondents compared to the very rational respondents thus they are more affected by these biases. Chen et al (2007) identified in their paper the middle age investors, advanced investors, active investors, experienced investors, and wealthier investors and studied their trading performance, disposition effect, overconfidence, and representativeness biases. Their findings showed that experience does not lead to learned rational behavior and debiasing. The investors still exhibit behavioral biases and did not become better investors due to their experience and age (Chen et al, 2007). Moreover, Kumaran

(2013) found that novice investors adopted the hot-outcome heuristics and were not sensitive to the short and long term trend length of a stock compared to the experienced investors who were sensitive and are affected by the gambler's fallacy bias. The above results are one way or another in accordance with Kumaran's findings.

4.3.3 Relational Analysis

Relational analysis is concerned with exploring the presence and relationships of concepts and make inferences about them. This section will explore the correlation of the respondents' background, the bases of information they use, their profile, and the biases they are prone to in order to investigate the factors that influence their decision-making behavior.

Correlation analysis was done to examine correlations between the variables under study. The results are presented in table 31. Gender is positively and significantly correlated with professional advice. The result is coherent with the variation analysis that showed that women rely on professional advice more than men. Moreover, the gender is negatively and significantly correlated with the tolerance to risk and the type of investor if novice or advanced. It is also positively correlated with the anchoring bias at the 5% confidence level. Educational level is not significantly correlated with the bases of information, the profile of the investor, and the behavioral biases. As for the professional certification, it is significantly correlated with the professional advice, fundamental and technical analysis, but the relation is negative with the professional advice. The professional certification is positively correlated at the 5% confidence level with the type of the investor. There is no significant correlation between the professional certification and the behavioral biases. The results are similar to the findings of Yusof (2015) who studied the financial investment decision-making and risk behaviors of the Malaysian men and women using an ordinal probit regression to identify if earning share impacts the financial decision-making and to explore the factors that affect the risk tolerance of the Malaysian men and women. The results show that women have a lower risk tolerance compared to men while both genders have autonomy in decisions related to financial investments. Moreover, he found that age is a significant factor for the risk tolerance for men only (Yusof, 2015) whereas the results in table A18 in the

appendix doesn't show correlation between investor profile and age, age of experience in current position and trading except for the significance correlation between years of experience investing and type of investor.

Table 31: Correlations (Spearman's Rho) between background information and bases for information, profile of the respondents, behavioral biases

	Gender	Educational level	Professional Certification
<i>Panel A - with bases for information</i>			
Financial news	-0.06	0.079	0.034
Analysts' opinion	0.112	0.089	-0.081
Intuition	0.143	-0.03	-0.029
Professional advice	0.250**	0.082	-0.216*
Fundamental analysis	-0.01	0.168	0.243**
Technical analysis	-0.123	0.141	0.188*
Media	0.059	-0.133	-0.025
Friends and Family	0.042	-0.064	-0.095
Clients' views	0.085	-0.059	0.048
<i>Panel B - with profile of the investor</i>			
Ambition	-0.0481	-0.016	0.004
Tolerance to risk	-0.203*	-0.032	0.123
Type of investor	-0.287**	0.134	0.212*
Rationality of the investor	-0.051	0.101	-0.001
<i>Panel C - with behavioral biases</i>			
Overconfidence	-0.149	0.002	0.133
Conservatism	0.159	0.071	-0.003
Availability	0.123	0.083	0.115
Hindsight	-0.103	-0.023	0.095
Anchoring	0.179*	0.010	0.050
Framing	0.118	-0.135	-0.030
Mental Accounting	0.172	0.060	0.086
Gambler Fallacy	-0.032	-0.005	0.051
Representativeness	-0.028	0.033	-0.004
Herding	0.106	-0.138	-0.040
Regret aversion	-0.003	-0.058	0.076
Illusion of control	-0.040	-0.006	0.040
Cognitive dissonance	0.004	-0.069	0.060

Familiarity	-0.042	-0.179*	-0.047
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** Significant at the 1% level

* Significant at the 5% level

The results do not show a significance correlation between overconfidence and gender, only overconfidence was significantly correlated with type of investor. The findings differ from the finding of Beckmann and Menkhoff (2008) that in their study on overconfidence between genders, where they applied three measures of overconfidence that are the overoptimistic self-assessment, miscalibration, and illusion of control, came up with an interesting finding that women are not less overconfident compared to men. But, they found that women have a lower risk tolerance (Beckmann & Menkhoff, 2008). Concerning the risk tolerance of women, most studies such as Jianakoplos and Bernasek (1998), Sunden and Surette (1998), and Al-Ajmi (2008) have shown that women are more risk averse compared to men. While Schubert et al. (1999) suggested that the financial decision setting affect the gender-risk behavior rather than the risk. Moreover, Beckmann and Menkhoff (2008) analyzed the differences between genders in their behavior towards risk by conducting a survey among professional fund managers. The respondents were familiar with risk, and risk decision under framing. The findings showed that women were more risk averse than men, and female fund managers recoil the competition (Beckmann & Menkhoff, 2008). The results were similar to the findings of Dwyer et al. (2002) who also suggested that women take less risk than men in their investments, and they observed a significant difference in risk taking that is reduced when the financial related investment understanding was involved as a control variable. Based on earlier studies, it is known that men are more confident and overconfident and take higher risks compared to women in the decision-making under risk (Schubert, 2006). The negative and significant correlation for risk tolerance and gender is aligned with the above outcomes.

However, age of the respondents is only significantly correlated with the framing bias signaling that older investors are more affected by the framing bias. Besides, the years of experience in current position and in investing or trading are not significantly correlated with any of the bases of information. However, the experience in investing or trading is positively correlated with the type of investor if

novice or advanced, the result is significant at the 5% confidence level. In addition to this, the years of experience in investing or trading and in the current position are positively correlated with overconfidence and negatively correlated with the herding bias but the results are not significant. These two variables are also negatively and significantly correlated at the 1% level with the framing bias. The results are illustrated in table A18 in the appendix. Hallahan et al (2004) investigated the relationship between demographic factors and tolerance to risk. They found that respondents tend to underestimate their risk tolerance. The investor risk profile is a powerful element in building an appropriate investment portfolio. In addition to that, they found a negative non-linear relationship between age and risk tolerance which contradicts much of the current literature (Hallahan, Faff, & McKenzie, 2004).

The results presented in table 32 indicate that the overconfidence bias is positively and significantly correlated at the 5% confidence level with the type of investor if novice or advanced investor. Moreover, hindsight bias is highly correlated with the tolerance to risk; the result is significant at the 1% confidence level. Anchoring is negatively and significantly correlated with the tolerance to risk of the respondents while herding and illusion of control are negatively correlated with the level of ambition of the respondents. The rationality and the type of investors are significantly negatively correlated with the framing bias at the 1% confidence level. Furthermore, the gambler fallacy and the representativeness biases are positively correlated with the type of investors at the 5% confidence level. The herding, cognitive dissonance, and illusion of control biases are negatively and significantly correlated with the rationality of the respondents. The degree of ambitions of the respondents is highly and positively correlated with the risk tolerance, the type of investor, and the rationality of the respondents.

Table 32: Correlations between profile of the respondents and behavioral biases

	Ambition	Tolerance to risk
<i>Panel A - Pearson Correlation</i>		
Overconfidence	0.119	0.154
Conservatism	-0.043	0.042
Availability	-0.111	-0.009
Hindsight	0.088	0.334**
Anchoring	-0.052	0.177*
Framing	-0.125	-0.059
Mental Accounting	-0.010	-0.080
Gambler Fallacy	-0.058	0.108
Representativeness	0.141	0.040
Herding	-0.214*	-0.014
Regret aversion	-0.047	-0.027
Illusion of control	-0.264**	-0.014
Cognitive dissonance	-0.123	-0.154
Familiarity	0.084	0.028
	Type of investor	Rationality of the investor
<i>Panel B - Spearman's Rho Correlation</i>		
Overconfidence	0.207*	0.012
Conservatism	-0.083	-0.113
Availability	0.002	0.095
Hindsight	0.091	-0.015
Anchoring	-0.072	-0.013
Framing	-0.347**	-0.270**
Mental Accounting	-0.092	0.049
Gambler Fallacy	0.177*	-0.070
Representativeness	0.175*	0.164
Herding	-0.166	-0.210*
Regret aversion	0.112	-0.005
Illusion of control	-0.086	-0.239**
Cognitive dissonance	-0.149	-0.220*
Familiarity	-0.074	-0.023

** Significant at the 1% level

* Significant at the 5% level

Furthermore, the results show that overconfidence bias is negatively correlated with professional advice and financial news at the 5% confidence level and positively correlated with fundamental analysis at the 1% confidence level. Although, studies show that overconfident investors rely on intuition, the correlation is positive but not significant. Conservatism and availability biases are positively and significantly correlated with the bases of information except for the fundamental and technical analysis these results are consistent with the profile of the investors who are conservative in their decision-making because they always lag the update of their analysis. Anchoring is positively correlated at the 5% confidence level with the professional advice, financial news, and analysts' opinion. Framing bias is highly correlated with professional advice, friends and family, media, and analysts' opinion. Moreover, mental accounting is positively correlated with the fundamental analysis at the 5% confidence interval. Gambler's fallacy is correlated at the 1% confidence level with the financial news, intuition, and clients' views. Representativeness is positively correlated with financial news, analysts' opinion at the 1% confidence level and with professional advice and media at the 5% confidence level. Herding is correlated with the media, the client's view and the financial news and the results are significant. Regret aversion is significantly correlated at the 1% confidence level with the financial news, professional advice, intuition, and analysts' opinion and at the 5% level with media. Illusion of control is positively significantly correlated with financial news, analysts' opinion, intuition, professional advice, media, friends and family, and clients' view but not correlated with the fundamental and technical analysis. Cognitive dissonance is positively and significantly correlated with intuition, media, friends and family, and clients' view, however it is negatively correlated with fundamental and technical analysis but the result is not significant. Though, familiarity bias is only correlated with clients' view at the 1% confidence level. The results are illustrated in table A19 in the appendix.

On the other hand, the relational analysis shows that technical analysis is positively correlated at the 1% confidence level with the ambition level of the respondents and their risk tolerance. Financial news is correlated with the type of the respondents and their rationality at the 5% confidence level. Professional advice is negatively correlated at the 5% confidence level with the type of investor if advanced or novice. Besides, fundamental and technical analysis is positively correlated with the

type of investor. Moreover, friends and family are negatively and significantly correlated at the 1% confidence level with the rationality of the investors. The results are showed in table 33.

Table 33: Correlations between profile of the respondents and the bases of information

	Ambition	Tolerance to risk
<i>Panel A - Pearson Correlation</i>		
Financial news	0.138	0.152
Analysts' opinion	0.082	0.006
Intuition	-0.042	0.058
Professional advice	-0.112	-0.089
Fundamental analysis	0.078	0.100
Technical analysis	0.252**	0.306**
Media	-0.048	0.044
Friends and Family	-0.256**	-0.151
Clients' views	-0.038	0.194*
	Type of investor	Rationality of the investor
<i>Panel B - Spearman's Rho Correlation</i>		
Financial news	0.194*	0.182*
Analysts' opinion	-0.083	0.186*
Intuition	0.045	-0.111
Professional advice	-0.176*	0.022
Fundamental analysis	0.193*	0.143
Technical analysis	0.197*	0.114
Media	-0.056	-0.050
Friends and Family	-0.134	-0.271**
Clients' views	-0.060	-0.112

** Significant at the 1% level

* Significant at the 5% level

4.3.4. The Models

In order to test the hypotheses to find the characteristics of the Lebanese investment bankers and stock brokers, the following OLS regression model is set out below:

$$\text{TOLERANCE} = \alpha + \beta_1 \text{AGELOG} + \beta_2 \text{EXPINVLOG} + \beta_3 \text{EXPPOSLOG} + \beta_4 \text{CERTIFICATION} + \beta_5 \text{BID} (\text{professional advice, news, analysts, intuition, fundamental analysis, technical analysis, media, friends, clients}) + \beta_6 \text{AMBITION} + \beta_7 \text{KIND} + \beta_8 \text{RATIONAL} + \beta_9 \text{BIASES} (\text{overconfidence, conservatism, herding, hindsight, familiarity, cognitive dissonance, illusion of control, gambler's fallacy, availability, anchoring, framing, mental accounting, representativeness, regret aversion}) + \varepsilon$$

where:

α = the intercept;

β = the regression coefficients;

ε = the error term;

TOLERANCE = degree of risk taken by the Lebanese investors;

AGELOG = log₁₀ age of the respondents;

EXPINVLOG = log₁₀ years of experience in trading or investing;

EXPPOSLOG = log₁₀ years of experience in the current position;

CERTIFICATION = if respondents are holders or non-holders for a professional certification related to finance or investment

BID = sources of information considered in building the investment decision measured on a scale from 1 to 7

AMBITION = degree of ambitious of the Lebanese investment bankers measured on a scale from 1 to 7.

KIND = type of the investor ranged from novice to very advanced

RATIONAL = self-consideration of the investor ranged from irrational to very rational in the decision-making process

BIASES = factors that influence the portfolio selection

Using the stepwise method, the final model includes four significant independent variables as shown in table 34. The tolerance statistics and variance inflation factors (VIF) calculated for these remaining variables indicate low levels of multi collinearity (Tolerance >0.2 and VIF<10), thus the variances of the estimated regression coefficients were not significantly increased because of collinearity (Neter et al. 1989). There is a minimal difference between R² and adjusted R² signaling that there is no influence for additional variations. Figure A1 in the appendix shows a normally distribution for the residuals, thus the regression analysis assumption is met. The coefficient of determination R² is equal to 42.5% which is an acceptable value. Variations in risk tolerance are 42.5% explained by variations in ambition, hindsight, technical analysis, and gender.

Table 34: Results of the stepwise regression and collinearity diagnostics

	Coefficient estimate	p-value	Tolerance	Variance inflation factor
<i>dependent variable: TOLERANCE TO RISK (all respondents N=129) R=0.652 R²=0.425 adjusted R²= 0.406</i>				
Intercept	0.757	0.170		
Ambition	0.420	0.000	0.921	1.166
Bias: Hindsight	0.248	0.000	0.960	1.042
Bid: Technical analysis	0.194	0.001	0.916	1.091
Gender	-0.334	0.037	0.986	1.014

Table 34 indicates significant positive associations between the tolerance to risk of the respondents and degree of their ambitions and with the variables hindsight and technical analysis. Table 34 also shows that the gender is negatively related to the tolerance to risk. This association is relatively weak compared with the other significant variables with a p-value equal to 0.037. This result is consistent with the literature, where risk tolerance is higher for male investors. Out of the fourteen biases explored, only the hindsight bias was positively significant with the tolerance to risk. Furthermore, respondents who rely on technical analysis exhibit higher tolerance to risk. This is because technical analysis looks at the trends, shows mixed signals, isn't 100% accurate, shows contradiction in analysts' opinion, gives illusions in predictability, and bases the analysis on what already happened in the market which increases the tolerance of the investor. In brief, findings pertaining to risk tolerance of the Lebanese investors are in agreement with those of Biaisi and Weber (2009) who studied the consequences of the behavior of the hindsight-biased of 85 investment bankers in London and Frankfurt on investment and trading. They found that hindsight bias reduces volatility. Hindsight – biased agents have lower performance and the findings were robust and independent from the differences in location, information, experience, and overconfidence. Hindsight-biased investors fail to update their assessment of risk; they form inaccurate beliefs of about asset returns by wrongly estimating the volatilities which lead to suboptimal trades and poor financial performance. Hindsight bias hinders learning about risk (Biaisi & Weber, 2009). Hindsight bias prevents rational processing of information and learning from past experience. Investors fail to remember what was known when the

decision was taken (Hölzl, Kirchler, and Rodler, 2002; Madarasz, 2008). As for the degree of ambition, the results are also consistent with the literature. Lopes et al. (2011) explored the role of subjective well-being that encompasses optimism, life satisfaction, and happiness in the economic growth where tolerance is not the only factor that triggers economic development. They found that optimism of individuals influence the productive use of tolerance and diversity. Optimistic people are more willing to engage in activities that create opportunities and have positive expectations toward the future (Lopes, Jardim da Palma, and Pina e Cunha, 2011). Optimism and hope positively impact individuals' outputs and improve their performance (Luthans, Avolio, Avey, and Norman, 2007). In this context, Ben Mansour et al. (2008) analyzed the link between optimism and risk aversion and estimated the average level of optimism weighted by risk tolerance using a lottery survey and a Bayesian approach through numerical methods. The results showed that pessimism and risk tolerance are positively correlated. They defined optimism as a personal trait leading to an overestimation in the likelihood of occurrence of a good outcome and the underestimation of the occurrence of the bad outcome. They concluded a behavioral correlation between optimism and risk aversion. This is mainly due to the estimation of bad experiences (Ben Mansour, Jouini, Marin, Napp, and Robert, 2008). On the other hand, another study found that optimism and uncertainty diminish with experience and entrepreneurs are more optimistic compared to employees (Fraser and Greene, 2006).

In order to find which characteristics shape the type of investors and their rationality and explore the differences between the novice and advanced investors and the differences between relatively rational and very rational investors, and to find the probability of an investor to be in one of the listed categories, a binomial logistic regression model was constructed as follows:

$$\Pr(Y_i=1|X_i=x_i)=\exp(\beta_0+\beta_1x_i)/(1+\exp(\beta_0+\beta_1x_i))$$

Where $\Pr(Y_i=1|X_i=x_i)$ is the probability of belonging to group i with $i= 0$ or 1 and $X_i(X_1, X_2, X_3, \dots, X_k)$ is the vector of explanatory variables and β are the estimated coefficients. This model compares the probability of being in each $n-1$ categories: advanced investors compared to the base model novice investors, and very rational compared to the reference category relatively rational. Investor segmentation has

been carried out across the world based more often on demographics, investment attitudes, and risk profiles (Durand, Newby, and Sanghani, 2008; Pompian and Longo, 2004). The purpose of investors' segmentation is the study of confidence, control, risk tolerance, and loss variation among the different groups identified. Sahi (2012) studied the Indian investors and segmented them into behavioral groups based on their biases in order to understand their investment preferences, profile and implications in the financial sector. The results presented four segments: novice, competent, cautious anticipator, and efficient planner. Novice investors rely on experts' advice, the competent are confident and rely on experts, the cautious anticipators do not rely on experts, are less confident but have a high self-control, whereas efficient planners have high confidence and self-control and do not consider the professional advice in their investment decision-making (Sahi, 2012).

The following tables 35 and 36 report the results.

Table 35: Nominal Logistic Regression Results

Variable	B	S.E.	OR
	Model 2: Advanced investor (Base= Novice investor)		
Intercept	-3.178	4.680	0.042
GENDER	-.605	.602	0.546
AGEMETRIC	-.092	.087	0.912
EXPERIENCEINVMETRIC	.045	.083	1.046
EXPERIENCEPOSMETRIC	.057	.116	1.058
EDUCATION1	.812	.632	2.253
CERTIFICATION	.713	.622	2.040
BIDNEWS	.557	.322	1.745
BIDANALYSTS	-.392	.317	0.676
BIDINTUITION	.251	.273	1.285
BIDADVICE	-0.682*	.334	0.505
BIDFUNDAMENTAL	.354	.321	1.425
BIDTECHNICAL	-.101	.242	0.904
BIDMEDIA	.012	.245	1.012
BIDFRIENDS	.294	.265	1.342
BIDCLIENT	-.297	.248	0.743
PROFAMBITION	.132	.320	1.141
PROFTOLERANCE	.520	.334	1.682
PORTVALUATION	.019	.221	1.020
PORTRARELY	-.229	.274	0.796

PORTWEIGH	-.167	.273	0.846
PORTACCURATELY	-.045	.251	0.956
PORTDIFFICULT	.127	.222	1.135
PORTFININSTITUTIONS	-0.486*	.227	0.615
PORTDIVIDE	-.043	.258	0.958
PORTLIQUIDATE	.166	.294	1.181
PORTPAST	.353	.247	1.423
PORTTRACK	-.182	.219	0.833
PORTHOLD	.165	.194	1.179
PORTEXCESSIVE	.271	.273	1.131
PORTJUSTIFY	-.279	.213	0.756
PORTBUYING	.042	.263	1.043
PROFRATIONAL1	.625	.888	1.868

-2LL (final model) 112.462

$$\chi^2=66.176, df=32, p<0.001$$

Cox and Snell 40.1%

Nagelkerke 53.5%

Classification accuracy 79.8%

Notes: significant at the *5 level; B are the estimated nominal regression coefficients for the models, SE denotes the standard error, and OR are the odds ratios for the predictors (exponential of the coefficients)

Table 36: Nominal Logistic Regression Results

Variable	B	S.E.	OR
	Model 3: Very rational (Base=relatively rational)		
Intercept	-2.041	7.594	.130
GENDER	-.881	1.008	.414
AGEMETRIC	-.073	.122	.929
EXPERIENCEINVMETRIC	-.065	.145	.937
EXPERIENCEPOSMETRIC	.077	.200	1.080
EDUCATION1	.646	1.000	1.908
CERTIFICATION	-.802	.980	.449
BIDNEWS	.111	.516	1.117
BIDANALYSTS	1.751*	.724	5.758
BIDINTUITION	-.680	.381	.507

BIDADVICE	-.359	.417	.698
BIDFUNDAMENTAL	.592	.687	1.807
BIDTECHNICAL	.036	.478	1.037
BIDMEDIA	.319	.393	1.376
BIDFRIENDS	-.564	.380	.569
BIDCLIENT	-.089	.371	.915
PROFAMBITION	.068	.549	1.070
PROFTOLERANCE	-.508	.606	.601
PORTVALUATION	.239	.370	1.270
PORTRARELY	.240	.339	1.272
PORTWEIGH	.455	.446	1.577
PORTACCURATELY	.282	.480	1.326
PORTDIFFICULT	.290	.376	1.337
PORTFININSTITUTIONS	-0.887*	.414	.412
PORTDIVIDE	-.057	.443	.944
PORTLIQUIDATE	-.279	.449	.757
PORTPAST	-.246	.386	.782
PORTTRACK	.005	.330	1.005
PORTHOLD	-.387	.326	.679
PORTEXCESSIVE	-.381	.513	.683
PORTJUSTIFY	-0.826*	.387	.438
PORTBUYING	.194	.451	1.214
PROFKIND1	.548	1.037	1.730
<hr/>			
-2LL (final model)	65.905		
		$\chi^2=51.931, df=32, p<0.05$	
Cox and Snell	33.1%		
Nagelkerke	55.3%		
Classification accuracy	89.9%		
<hr/>			
Notes: significant at the *5 level; B are the estimated nominal regression coefficients for the models, SE denotes the standard error, and OR are the odds ratios for the predictors (exponential of the coefficients)			

Table 35 shows a significant Chi-square statistic which indicates that the model gives better predictions over the baseline intercept-model only. The extent of improvement over the baseline model is provided by the Pseudo R-Square values. Both Cox and Snell and Nagelkerke R^2 are high (40.1% and 53.5% respectively), therefore this model shows a good fit. There was an approximately 40% relationship

between the type of investor and the explanatory variables. The success of the logistic regression is also assessed by the classification accuracy which shows an overall correct classification percentage of the model equal to 79.8%.

The parameter estimates in table 35 above are relative to the base group Novice investor, thus the model is estimated as follows: advanced investors relative to novice investors. With respect to this model, the null hypothesis is rejected for professional advice and framing with a p-value less than 0.05. The binomial logit estimates for a one unit increase in professional advice and framing scores for investors who consider themselves advance investors relative to novice investors are both negative. In other terms, if the investor wants to rely more on professional advice and framing (an increase by one point each), the binomial log-odds to be an advanced investor relative to novice investor would be expected to decrease by 0.682 and 0.486 unit respectively while holding all other variables in the model constant. Thus, to be considered novice investor would be 0.505 and 0.615 times more likely (Exp B).

The third model presented in table 36 shows a significant Chi-square which indicates that the model gives better predictions over base model. This model shows a good fit with Cox and Snell equal to 33.1% and Nagelkerke equal to 55.3%. The log likelihood ratio is significant at 5% level and it is lower than the value of the log likelihood for the first model which was significant at the 1% level. The classification accuracy of this model is also high and equals 89.9%. Likewise, the second model exhibits a similar behavior for the framing bias. The null hypothesis is rejected for this same variable in addition to the cognitive dissonance bias and analysts' opinion ($p < 0.05$). The binomial logit estimate for a one unit increase in analysts' opinion for investors who consider themselves very rational relative to relatively rational would be expected to increase by 1.751. Thus, the chance to be very rational investor would be 5.758 times more likely. This is not the case for the framing and cognitive dissonance biases where the binomial log-odds to be a very rational investor relative to relatively rational investor would be expected to decrease by 0.887 and 0.826 respectively, and consequently the probability to be a relatively rational investor would be 0.412 and 0.438 times more likely. Rational analysis is blocked by the behavioral finance literature. The functioning of financial markets is also dependent on the financial literacy and rationality of the investors. Data reveals that most of the individuals do not have the basic knowledge to make a

good financial decision. The combination of organized information, investor's motivation, and rationality leads to a better financial decision (Dolan & Stevens, 2013). Dolan and Steven (2013) found that rationality is not common among young investors but the tests accept only the rationality hypothesis for men with a depth experience in the fields of economics and business. According to Ariely (2008), some investors make predictable irrational choices when they rely on mental accounting and on heuristics while others make unpredictable irrational choices that lack any logic in the investment decision-making. The results in the above two models shows that a one unit increase in mental accounting bias decrease the log – odds of being advanced investor and very rational investor. Dolan and Stevens (2013) found that predictable irrationality does not vary with demographic factors but improvements in rationality are common in both genders when they have an in depth study in business or economics. From the same perspective, using a logistic regression model, Anbar and Eker (2010) were able to find that 9% of the variation in financial risk tolerance was explained by the socio demographic variables. The results above did not show any significance for the demographic variables, although for both models for a one unit increase in age or gender the log odds to be very rational investors, or advanced investor decrease. A one unit increase in education increases the log odds to be very rational investors and advanced investors. A one unit increase in the financial certification increases the log odd to be an advance investor but decreases the log odd to be very rational investor. The results are consistent with the findings of Prasad and Mohta (2012) who studied the differences of behavioral biases between genders more specifically the overconfidence and loss aversion biases using structured questionnaire on 128 investors. The results indicated that men are more overconfident than women where women were more loss-averse (Prasad & Mohta, 2012). In addition to that, Huzdik et al. (2014) found difference in risk taking between the actual and assumed knowledge in higher education. Also, risk taking is determined by the self-perception of the own knowledge rather than the actual financial knowledge, risk averse behavior was dominant in the group of people aged between 18 and 25 years old. Furthermore, respondents who showed higher self-confidence in their financial knowledge were also risk averse. They concluded that risk appetite is determined by other factors such as experience, desires, social environment. The results showed also that a one unit increase in the experience in the current position increases the log–odds of

being very rational and advanced investor while a one unit increase in the years of experience in investing or trading decreases the log-odds of being very rational investor and increases the log-odds for being advanced investor but the result is not significant. In addition to that, model 2 shows that each one unit increase in risk tolerance increases the likelihood of the investors to be classified as advanced over novice investor, while model 3 indicates that a one unit increase in risk tolerance decreases the log-odds of being very rational investor but both results are not significant.

4.4 Conclusion

The study aims to identify the behavioral conduct of the Lebanese investment bankers and stock brokers as well as investigating the kind of behavioral biases they are more prone to. This paper considers also the demographic characteristics of the respondents and their potential effect on the investment decisions from the risk profile and the behavioral perspectives. For the aim of the study, a questionnaire was performed and directed to the Lebanese investment bankers and stock brokers from the different banks and investment companies in Lebanon where 129 responses were received. In the analysis of data T-test, ANOVA, Mann-Whitney U-test, Kruskal-Wallis, and correlations tests were used.

In order to answer the hypotheses, three models were built. As for the first hypothesis **H1** and ordinary least square regression was performed to find the factors that lead to variations in the risk tolerance of investors among the demographic factors, the profile of the respondents, and the behavioral biases. The results show high positive significance relationship for the degree of ambition of the investors, hindsight bias, and technical analysis and a negative significance relationship for the gender. These determinants of the risk tolerance have been significant in previous studies. Thus this paper provides a powerful confirmation of these findings. Whereas anchoring bias, which was highly correlated with tolerance to risk, was not considered in the determinants of risk tolerance. Moreover, only gender from the demographic factors was not excluded from the model, which contradicts the previous results that showed that age, and education level impact risk tolerance such as Li et al. (2012), Faff et al. (2008), and Bommier and Rochet (2006).

As for the second and third hypotheses **H2** and **H3** binomial logistic regression was used to test the factors that increase the probability of the respondents to be classified very rational investors over rational investors or advanced investors relative to novice investors. Both models shows good fit with significant log likelihood and acceptable values for Cox and Snell and Nagelkerke. What was interesting about these two models is that they illustrated that demographic variables were not significant in the determination of the type of the investor and its degree of rationality. However, professional advice and framing were found to be significant and negatively related to the type of the investor, a one unit increase in professional advice and framing bias will cause the log-odds to be an advanced investor to decrease. Framing and cognitive biases were also negatively significantly related to the rationality of the investors. Thus, a one unit increase in these biases will cause the log-odds to be a very rational investor relative to relatively rational investors to decrease. Besides, a one unit increase in analysts' opinion will cause the log-odds for the very rational investors to increase compared to the relatively rational investors. What was interesting about the results is that overconfidence bias was not significant in all the three models and not associated with the risk tolerance however, in the second and third model it had a positive coefficient indicating that a one unit increase in overconfidence increases the log-odds for the probability of the investors to be very rational and advanced. But, hindsight bias can make investors overconfident in how certain they are about their judgments. In other words, and as stated in the literature section, due to the sense of overconfidence, market participants take excessive risks and unfairly assess the securities. Moreover, none of the respondents claimed that he is irrational but remarkably the results in Model 2 and 3 shows that as the effect of biases increases, the likelihood that the investor tend to be irrational and novice increases. The results shed the light on the risk tolerance as a major factor in building the investment decision-making as a subjective element. The variation and relational tests proved that educational level is not correlated with the profile of the investor and with the behavioral biases while the higher the work experience and the experience in trading is, the less is the effect of the biases. The findings also showed that overconfidence increases with the years of experience and with the advanced investors. And finally, as the respondents are more affected by behavioral biases they tend to have a greater probability to be less rational in their investment decision-making.

Chapter Five

Conclusions

5.1 Research objectives in discussion

The rationality of the investors' and their risk tolerance in the decision-making has been extensively studied in the literature for the recent past decades. Volatility dominated the financial markets, and market sentiments were observed widely especially during the financial crisis. In this context, the understanding of the irrational behavior deserves more importance as well as the risk tolerance of the investors that increases their confidence in their decisions. The thesis attempted to analyze the investment decision-making behavior of the Lebanese institutional investors by identifying the behavioral biases that influence their decision-making and the factors that impact their risk tolerance. A sample of 129 Lebanese investors was analyzed by performing descriptive, variation, and relational analysis. Linear and binomial logistic regressions were used in order to reveal the perception of the investment risk tolerance of the Lebanese investors and to determine the factors that make a rational investor by relating demographic variables, bases for information, and behavioral biases to the profile of the investors.

Grounded in the Prospect Theory asserting that decision makers and market participants perceive the different selections based on heuristics strategies, framing, and emotions, three regression models were used to uncover these relationships. The behavioral biases used in this study were cognitive and emotional biases. A remarkable number of conclusions were drawn that are presented in the following section.

5.2 Summary of the main findings

The empirical investigations come up with the following conclusions:

First, the research reveals that risk tolerance increases with the degree of ambitions of the investors, their hindsight bias, and the use of technical analysis. The findings related to risk tolerance are in agreement with those of Biais and Weber (2009), Madarasz (2008), Monti and Legrenzi (2009), and Lopes et al. (2011). In addition to

that, consistent with the literature, this study finds evidence that male investors are more risk tolerant compared to female ones who, in turn, are considered risk averse. It can be assumed that the degree of risk exposure taken by Lebanese investors is affected by the hindsight bias and their degree of optimism. Interestingly, overconfidence bias was excluded from the model but the hindsight bias fosters the sense of overconfidence of the investors.

Second, the findings indicate that as long as investors rely on professional advice and framing bias the likelihood to be classified as novice investors increases. Framing influence the decision-making because the same problem can be presented in different ways. Moreover, the frame of a decision results in misidentifying the risk of a certain investment. Hence, it can be stated that advanced investors are better informed and experienced compared to novice investors (Pompian, 2006; Hong et al. 2005).

Third, a further finding of this study is that behavioral biases lead to irrational investment decision-making and judgment. This is consistent with similar findings in the investment field (Sehgal and Tripathi, 2009; Fuller, 2000; Subash, 2012). Furthermore, the findings indicate that when investors' decision is affected by framing and cognitive dissonance, the probability to be less rational investors increases. However, it shows that very rational investors build their investment decision on analysts' views compared to relatively rational investors. Table 37 shows a summary of the research questions and the results.

Table 37: Summary of findings

Hypothesis	Objectives	Statistical tool used	Findings
H1: Perception of investment risk tolerance of Lebanese investors varies with demographic variables, bases for decision, profile of the investor, and behavioral biases.	1. Find the factors that influence the risk tolerance of Lebanese investors.	Ordinary Least Squares Regression	1. Risk tolerance varies with gender, degree of ambition, hindsight bias, and technical analysis.
	2. Investigate if behavioral biases affect the investment risk tolerance.		2. Risk tolerance as a subjective element is an important factor in the investment decision-making.
H2: Rationality level of investors is related to investors' demographics (such as age, gender, experience...), sources of information they rely on (such as professional advice, analysts' opinions, fundamental and technical analysis...), profile of the investors, and the behavioral biases.	1. Identify the factors that could make an investor relatively rational or very rational in the investment decision-making process.	Binomial Logistic Regression	1. Analysts' opinion and framing and cognitive dissonance biases are the significant factors with negative coefficients for the biases.
	2. Investigate whether investors who considered themselves rational are really not affected by the behavioral biases.		2. If investors rely more on framing and cognitive dissonance biases, the higher the likelihood to be considered less rational investors. 3. If investors depend on analysts' views, the higher the likelihood be considered very rational investors.
H3: Type of investors (novice or advanced) is a function of investors' demographics (such as age, gender, experience...), sources of information they rely on (such as professional advice, analysts' opinions, fundamental and technical analysis...), profile of the investors, and other behavioral biases.	1. Identify the factor that could make an investor novice or advanced in the investment decision making.	Binomial Logistic Regression	1. Professional advice and framing bias are the significant factors with negative coefficients.
	2. Investigate whether the investment decision-making vary with respect to the type of the investor.		2. If investors rely more on professional advice and framing bias, the higher the likelihood to be novice investors.

The results support the Prospect Theory and prove that Lebanese investors are affected by the cognitive and emotional behavioral biases and mental errors. Hindsight, framing, and cognitive dissonance cause deviation from the rational traditional investment decisions. Better education and information can lead to correct the cognitive biases.

5.3 Research limitations

The main limitation of the study is the access to data where the Lebanese investors were reluctant to fill in the questionnaire studying their investment behavior. Before reading and answering the questionnaire, they believed that they will be revealing information about their investments and other confidential information that were not

even requested in the questionnaire. But after reading the questionnaire and understanding the purpose of the research this limitation was mitigated, although the sample could be greater than 129 respondents.

The study did not look at the personality traits and other factors such as family background, household conditions, financial conditions, and life experiences that could also impact the investment behavior. In addition to that, the study overlooked the social and cultural aspects of the Lebanese investors that might also have implications on the investments.

To overcome the state of mind that might influence the attitude of the respondents while answering the questionnaire, the questions used attempted to ask participants about what they did in the past. Moreover, additional tests warranted the validity of the results.

5.4 Theoretical and practical implications

This study explored the Lebanese investors' behavior, where it particularly focused on the Lebanese institutional investors. As Lebanese banks are leveraging their strong presence in the region and are growing their investment banking business to provide superior services for their institutional and private clients, this study could have implications in the financial sector. From the theoretical perspective, the findings of the research confirmed that investors are not always rational in their investment decisions and are influenced by behavioral biases which add to the work of the behavioral scholars and shed the light on the Prospect theory. Investors show opportunistic or irrational investment decision-making process. Furthermore, this study, alike other studies, showed that investors' psychology and profile vary depending on age, experience, gender, optimism, available information, and biases which increase the need to assess the risk profile of the investor and is a powerful tool in building the appropriate investment portfolio. Furthermore, this paper adds to the small number of studies addressing behavioral issues and risk tolerance of the Lebanese institutional investors. In fact, studies of this nature have been conducted in large economies and stock markets and in the large stock markets in the Gulf and MENA regions.

The findings of the study would be useful to the investment and wealth managers and to the financial advisors. It will improve the financial literacy of the Lebanese investors and help them in identify their biases and try to correct their mistakes committed in their investments particularly the sector is still in his growing phase. The results also help in classifying the investors into different profiles which help the financial advisors and managers to find a suitable portfolio for each profile. The results imply that investment advisors must consider personal characteristics and individual risk tolerance, amongst other factors, when giving investment advice to private investors. This study also contributes to the general knowledge of behavioral finance by providing results and relations about financial risk tolerance, demographics, and behavioral biases.

5.5 Potential future research

The results in the study are indicative and confirmative. However, the findings do open to various research opportunities. From the research perspective, behavioral finance presents opportunities for experimental studies to focus on the rationale behind the finance and economic decisions. This research gathered fourteen behavioral biases and studied the risk tolerance of the investors. Each bias could be studied alone on the Lebanese investors using multiple variables to add dimensions to the analysis. Moreover, experimental settings could be produced where subjects could be provided a certain scenario related to a bias and to be given a knowledge session and find out after days if the scenario is repeated if they will be aware about the bias.

It would be of interest for future research on the role of the investment risk tolerance in Lebanon to investigate how it affected the investments of the Lebanese investors especially if it boosts their overconfidence. The risk tolerance could be divided into different categories and compared the different investment outcomes of each group by using a discriminant analysis.

5.6 Final remarks

The main recommendation for investors is to make a periodic review about their investment decisions which increases the awareness on behavioral finance. The greater the awareness is the better the market efficiency. The author hopes that the

findings of this study help the fund managers and the investors to educate and train themselves to manage their portfolios effectively.

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APPENDIX A

Table A1: Non – parametric test between gender and bases for investment decision

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Financial News as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.498	Retain the null hypothesis.
2	The distribution of Analysts as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.204	Retain the null hypothesis.
3	The distribution of Intuition as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.105	Retain the null hypothesis.
4	The distribution of Professional Advice as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.005	Reject the null hypothesis.
5	The distribution of Fundamental Analysis as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.907	Retain the null hypothesis.
6	The distribution of Technical Analysis as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.163	Retain the null hypothesis.
7	The distribution of Media as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.504	Retain the null hypothesis.
8	The distribution of Friends and Family as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.634	Retain the null hypothesis.
9	The distribution of Client's Views as factor considered in building investment decision is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.336	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A2: Non – parametric test between age and bases for investment decision

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Financial News as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.086	Retain the null hypothesis.
2	The distribution of Analysts as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.673	Retain the null hypothesis.
3	The distribution of Intuition as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.302	Retain the null hypothesis.
4	The distribution of Professional Advice as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.414	Retain the null hypothesis.
5	The distribution of Fundamental Analysis as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.797	Retain the null hypothesis.
6	The distribution of Technical Analysis as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.430	Retain the null hypothesis.
7	The distribution of Media as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.694	Retain the null hypothesis.
8	The distribution of Friends and Family as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.638	Retain the null hypothesis.
9	The distribution of Client's Views as factor considered in building investment decision is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.276	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A3: Non – parametric test between department and bases for investment decision

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Financial News as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.543	Retain the null hypothesis.
2	The distribution of Analysts as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.299	Retain the null hypothesis.
3	The distribution of Intuition as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.738	Retain the null hypothesis.
4	The distribution of Professional Advice as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.010	Reject the null hypothesis.
5	The distribution of Fundamental Analysis as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.008	Reject the null hypothesis.
6	The distribution of Technical Analysis as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.010	Reject the null hypothesis.
7	The distribution of Media as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.158	Retain the null hypothesis.
8	The distribution of Friends and Family as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
9	The distribution of Clients Views as factor considered in building investment decision is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.832	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A4: Bases for information variation by departments

	Departments					
	Dealing Room - Treasury Management	Dealing Room - Risk Management	Dealing Room - Back office operations	Treasury Management - Back office operations	Treasury Management - Risk Management	Risk Managemen - Back offic operations
	Z-Score	Z-Score	Z-Score	Z-Score	Z-Score	Z-Score
Professional advice	-1.420	-3.201**	-1.720	-0.153	-1.813	-2.207*
Fundamental analysis	-1.952	-0.566	-3.261**	-0.605	-1.004	-1.580
Technical analysis	-0.764	-0.737	-2.801**	-1.264	-1.340	-2.774**
Friends and Family	-0.659	-2.469*	-3.685**	-3.073**	-2.393*	0.160

** Significant at the 1% level

* Significant at the 5% level

Table A5: Bases for information variation by years of experience brackets in current position

	Mean		Mean		Mean		Mean All	Standard deviation All
	Below or equal to 4 years (N=66)	Between 5 and years 8 years (N=36)	Below or equal to 4 years (N=66)	Above 8 years (N=27)	Between 5 and years 8 years (N=36)	Above 8 years (N=27)		
Analysts' opinion	4.770	5.030	4.770	4.960	5.030	4.900	4.884	1.291
Intuition	3.650	3.970	3.650*	4.410*	3.970	4.410	3.899	1.545
Media	3.710	4.000	3.710	3.630	4.000	3.630	3.775	1.655

* Significant at the 5%
level

Table A6: Non parametric test between bases of information and current position

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Financial News as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.518	Retain the null hypothesis.
2	The distribution of Analysts as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.910	Retain the null hypothesis.
3	The distribution of Intuition as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.228	Retain the null hypothesis.
4	The distribution of Professional Advice as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.171	Retain the null hypothesis.
5	The distribution of Fundamental Analysis as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.553	Retain the null hypothesis.
6	The distribution of Technical Analysis as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.378	Retain the null hypothesis.
7	The distribution of Media as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.561	Retain the null hypothesis.
8	The distribution of Friends and Family as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.495	Retain the null hypothesis.
9	The distribution of Client's Views as factor considered in building investment decision is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.358	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A7: Non parametric test between bases of information and education**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Financial News as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.560	Retain the null hypothesis.
2	The distribution of Analysts as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.409	Retain the null hypothesis.
3	The distribution of Intuition as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.752	Retain the null hypothesis.
4	The distribution of Professional Advice as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.
5	The distribution of Fundamental Analysis as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.154	Retain the null hypothesis.
6	The distribution of Technical Analysis as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.258	Retain the null hypothesis.
7	The distribution of Media as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.309	Retain the null hypothesis.
8	The distribution of Friends and Family as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.698	Retain the null hypothesis.
9	The distribution of Clients Views as factor considered in building investment decision is the same across categories of Education level of the respondent.	Independent-Samples Kruskal-Wallis Test	.269	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A8: Non parametric test between bases of information and professional certification**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Financial News as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.700	Retain the null hypothesis.
2	The distribution of Analysts as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.362	Retain the null hypothesis.
3	The distribution of Intuition as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.740	Retain the null hypothesis.
4	The distribution of Professional Advice as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.015	Reject the null hypothesis.
5	The distribution of Fundamental Analysis as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.006	Reject the null hypothesis.
6	The distribution of Technical Analysis as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.033	Reject the null hypothesis.
7	The distribution of Media as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.779	Retain the null hypothesis.
8	The distribution of Friends and Family as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.282	Retain the null hypothesis.
9	The distribution of Client's Views as factor considered in building investment decision is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.585	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A9: Non- parametric test between biases and gender

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Portfolio analysis - Overconfidence is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.092	Retain the null hypothesis.
2	The distribution of Portfolio analysis - Conservatism is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.072	Retain the null hypothesis.
3	The distribution of Portfolio analysis - Availability is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.164	Retain the null hypothesis.
4	The distribution of Portfolio analysis - Hindsight is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.244	Retain the null hypothesis.
5	The distribution of Portfolio analysis - Anchoring is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.042	Reject the null hypothesis.
6	The distribution of Portfolio analysis - Framing is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.182	Retain the null hypothesis.
7	The distribution of Portfolio analysis - Mental accounting is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.051	Retain the null hypothesis.
8	The distribution of Portfolio analysis - Gambler Fallacy is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.720	Retain the null hypothesis.
9	The distribution of Portfolio analysis - Representativeness is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.756	Retain the null hypothesis.
10	The distribution of Portfolio analysis - Herding is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.231	Retain the null hypothesis.
11	The distribution of Portfolio analysis - Regret aversion is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.972	Retain the null hypothesis.
12	The distribution of Portfolio analysis - Illusion of control is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.649	Retain the null hypothesis.
13	The distribution of Portfolio analysis - Cognitive dissonance is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.968	Retain the null hypothesis.
14	The distribution of Portfolio analysis - Familiarity is the same across categories of Gender of respondents.	Independent-Samples Mann-Whitney U Test	.638	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A10: Non-parametric test between biases and age

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Portfolio analysis - Overconfidence is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.912	Retain the null hypothesis.
2	The distribution of Portfolio analysis - Conservatism is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.692	Retain the null hypothesis.
3	The distribution of Portfolio analysis - Availability is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.450	Retain the null hypothesis.
4	The distribution of Portfolio analysis - Hindsight is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.727	Retain the null hypothesis.
5	The distribution of Portfolio analysis - Anchoring is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.351	Retain the null hypothesis.
6	The distribution of Portfolio analysis - Framing is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
7	The distribution of Portfolio analysis - Mental accounting is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.737	Retain the null hypothesis.
8	The distribution of Portfolio analysis - Gambler Fallacy is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.901	Retain the null hypothesis.
9	The distribution of Portfolio analysis - Representativeness is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.836	Retain the null hypothesis.
10	The distribution of Portfolio analysis - Herding is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.268	Retain the null hypothesis.
11	The distribution of Portfolio analysis - Regret aversion is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.966	Retain the null hypothesis.
12	The distribution of Portfolio analysis - Illusion of control is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.812	Retain the null hypothesis.
13	The distribution of Portfolio analysis - Cognitive dissonance is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.015	Reject the null hypothesis.
14	The distribution of Portfolio analysis - Familiarity is the same across categories of Age of respondents - Ordinal in brackets.	Independent-Samples Mann-Whitney U Test	.861	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A11: Non-parametric test between biases and department

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Portfolio analysis - Overconfidence is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
2	The distribution of Portfolio analysis - Conservatism is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.478	Retain the null hypothesis.
3	The distribution of Portfolio analysis - Availability is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.676	Retain the null hypothesis.
4	The distribution of Portfolio analysis - Hindsight is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.859	Retain the null hypothesis.
5	The distribution of Portfolio analysis - Anchoring is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.216	Retain the null hypothesis.
6	The distribution of Portfolio analysis - Framing is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.113	Retain the null hypothesis.
7	The distribution of Portfolio analysis - Mental accounting is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.398	Retain the null hypothesis.
8	The distribution of Portfolio analysis - Gambler Fallacy is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.304	Retain the null hypothesis.
9	The distribution of Portfolio analysis - Representativeness is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.392	Retain the null hypothesis.
10	The distribution of Portfolio analysis - Herding is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.003	Reject the null hypothesis.
11	The distribution of Portfolio analysis - Regret aversion is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.983	Retain the null hypothesis.
12	The distribution of Portfolio analysis - Illusion of control is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.541	Retain the null hypothesis.
13	The distribution of Portfolio analysis - Cognitive dissonance is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.064	Retain the null hypothesis.
14	The distribution of Portfolio analysis - Familiarity is the same across categories of Four departments of respondents.	Independent-Samples Kruskal-Wallis Test	.688	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A12: Behavioral biases variation by departments

	Departments					
	Dealing Room - Treasury Management	Dealing Room - Risk Management	Dealing Room - Back office operations	Treasury Management - Back office operations	Treasury Management - Risk Management	Risk Management - Back office operations
	Z-Score	Z-Score	Z-Score	Z-Score	Z-Score	Z-Score
Overconfidence	-2.753**	-0.797	-3.982**	-0.668	-0.856	-1.312
Herding	-1.209	-0.500	-2.969**	-3.286**	-0.963	-0.899

** Significant at the 1%
level

Table A13: Behavioral biases variation by years of experience in investing or trading

Experience in investing		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	40.430	21	1.925	.784	.733
	Within Groups	262.795	107	2.456		
	Total	303.225	128			
Conservatism	Between Groups	19.581	21	.932	.418	.988
	Within Groups	238.792	107	2.232		
	Total	258.372	128			
Availability	Between Groups	44.824	21	2.134	1.212	.257
	Within Groups	188.479	107	1.761		
	Total	233.302	128			
Hindsight	Between Groups	28.029	21	1.335	.647	.874
	Within Groups	220.855	107	2.064		
	Total	248.884	128			
Anchoring	Between Groups	46.449	21	2.212	.769	.750

	Within Groups	307.613	107	2.875		
	Total	354.062	128			
Framing	Between Groups	95.206	21	4.534	1.763*	.032
	Within Groups	275.120	107	2.571		
	Total	370.326	128			
Mental accounting	Between Groups	41.157	21	1.960	1.578	.068
	Within Groups	132.905	107	1.242		
	Total	174.062	128			
Gambler Fallacy	Between Groups	26.863	21	1.279	1.033	.432
	Within Groups	132.486	107	1.238		
	Total	159.349	128			
Representativeness	Between Groups	31.412	21	1.496	.941	.541
	Within Groups	170.138	107	1.590		
	Total	201.550	128			
Herding	Between Groups	61.185	21	2.914	1.216	.253
	Within Groups	256.412	107	2.396		
	Total	317.597	128			
Regret aversion	Between Groups	66.440	21	3.164	1.261	.219
	Within Groups	268.444	107	2.509		
	Total	334.884	128			
Illusion of control	Between Groups	27.509	21	1.310	.701	.824
	Within Groups	200.042	107	1.870		
	Total	227.550	128			
Cognitive dissonance	Between Groups	32.407	21	1.543	.663	.860
	Within Groups	249.143	107	2.328		
	Total	281.550	128			

Familiarity	Between Groups	11.258	21	.536	.293	.999
	Within Groups	195.967	107	1.831		
	Total	207.225	128			

** Significant at the 1% level

* Significant at the 5% level

Table A14: Behavioral biases variation by years of experience in current position

Experience in current position		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	24.555	20	1.228	.476	.971
	Within Groups	278.670	108	2.580		
	Total	303.225	128			
Conservatism	Between Groups	22.488	20	1.124	.515	.955
	Within Groups	235.884	108	2.184		
	Total	258.372	128			
Availability	Between Groups	45.955	20	2.298	1.325	.179
	Within Groups	187.348	108	1.735		
	Total	233.302	128			
Hindsight	Between Groups	25.556	20	1.278	.618	.892
	Within Groups	223.327	108	2.068		
	Total	248.884	128			
Anchoring	Between Groups	48.041	20	2.402	.848	.651
	Within Groups	306.021	108	2.834		
	Total	354.062	128			
Framing	Between Groups	115.395	20	5.770	2.444*	.002
	Within Groups	254.930	108	2.360		
	Total	370.326	128			

Mental accounting	Between Groups	30.316	20	1.516	1.139	.323
	Within Groups	143.746	108	1.331		
	Total	174.062	128			
Gambler Fallacy	Between Groups	33.022	20	1.651	1.412	.133
	Within Groups	126.326	108	1.170		
	Total	159.349	128			
Representativen ess	Between Groups	17.851	20	.893	.525	.950
	Within Groups	183.700	108	1.701		
	Total	201.550	128			
Herding	Between Groups	44.438	20	2.222	.878	.614
	Within Groups	273.158	108	2.529		
	Total	317.597	128			
Regret aversion	Between Groups	48.157	20	2.408	.907	.579
	Within Groups	286.727	108	2.655		
	Total	334.884	128			
Illusion of control	Between Groups	25.595	20	1.280	.684	.834
	Within Groups	201.955	108	1.870		
	Total	227.550	128			
Cognitive dissonance	Between Groups	31.864	20	1.593	.689	.829
	Within Groups	249.687	108	2.312		
	Total	281.550	128			
Familiarity	Between Groups	13.790	20	.690	.385	.992
	Within Groups	193.434	108	1.791		
	Total	207.225	128			

** Significant at the 1% level

* Significant at the 5% level

Table A15: Non-parametric test between behavioral biases and current position

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Portfolio analysis - Overconfidence is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.129	Retain the null hypothesis.
2	The distribution of Portfolio analysis - Conservatism is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.807	Retain the null hypothesis.
3	The distribution of Portfolio analysis - Availability is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.121	Retain the null hypothesis.
4	The distribution of Portfolio analysis - Hindsight is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.363	Retain the null hypothesis.
5	The distribution of Portfolio analysis - Anchoring is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.025	Reject the null hypothesis.
6	The distribution of Portfolio analysis - Framing is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.001	Reject the null hypothesis.
7	The distribution of Portfolio analysis - Mental accounting is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.325	Retain the null hypothesis.
8	The distribution of Portfolio analysis - Gambler Fallacy is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.122	Retain the null hypothesis.
9	The distribution of Portfolio analysis - Representativeness is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.240	Retain the null hypothesis.
10	The distribution of Portfolio analysis - Herding is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.058	Retain the null hypothesis.
11	The distribution of Portfolio analysis - Regret aversion is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.052	Retain the null hypothesis.
12	The distribution of Portfolio analysis - Illusion of control is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.462	Retain the null hypothesis.
13	The distribution of Portfolio analysis - Cognitive dissonance is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.148	Retain the null hypothesis.
14	The distribution of Portfolio analysis - Familiarity is the same across categories of Current position of the respondent.	Independent-Samples Kruskal-Wallis Test	.113	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A16: Non-parametric test between behavioral biases and educational level

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Portfolio analysis - Overconfidence is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.389	Retain the null hypothesis.
2	The distribution of Portfolio analysis - Conservatism is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.669	Retain the null hypothesis.
3	The distribution of Portfolio analysis - Availability is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.200	Retain the null hypothesis.
4	The distribution of Portfolio analysis - Hindsight is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.634	Retain the null hypothesis.
5	The distribution of Portfolio analysis - Anchoring is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.361	Retain the null hypothesis.
6	The distribution of Portfolio analysis - Framing is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.124	Retain the null hypothesis.
7	The distribution of Portfolio analysis - Mental accounting is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.332	Retain the null hypothesis.
8	The distribution of Portfolio analysis - Gambler Fallacy is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.668	Retain the null hypothesis.
9	The distribution of Portfolio analysis - Representativeness is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.769	Retain the null hypothesis.
10	The distribution of Portfolio analysis - Herding is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.139	Retain the null hypothesis.
11	The distribution of Portfolio analysis - Regret aversion is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.613	Retain the null hypothesis.
12	The distribution of Portfolio analysis - Illusion of control is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.277	Retain the null hypothesis.
13	The distribution of Portfolio analysis - Cognitive dissonance is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.691	Retain the null hypothesis.
14	The distribution of Portfolio analysis - Familiarity is the same across categories of Education level (below or above Masters).	Independent-Samples Kruskal-Wallis Test	.033	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A17: Non-parametric test between behavioral biases and the presence of professional certification

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Portfolio analysis - Overconfidence is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.132	Retain the null hypothesis.
2	The distribution of Portfolio analysis - Conservatism is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.976	Retain the null hypothesis.
3	The distribution of Portfolio analysis - Availability is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.194	Retain the null hypothesis.
4	The distribution of Portfolio analysis - Hindsight is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.281	Retain the null hypothesis.
5	The distribution of Portfolio analysis - Anchoring is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.569	Retain the null hypothesis.
6	The distribution of Portfolio analysis - Framing is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.732	Retain the null hypothesis.
7	The distribution of Portfolio analysis - Mental accounting is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.330	Retain the null hypothesis.
8	The distribution of Portfolio analysis - Gambler Fallacy is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.561	Retain the null hypothesis.
9	The distribution of Portfolio analysis - Representativeness is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.962	Retain the null hypothesis.
10	The distribution of Portfolio analysis - Herding is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.652	Retain the null hypothesis.
11	The distribution of Portfolio analysis - Regret aversion is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.388	Retain the null hypothesis.
12	The distribution of Portfolio analysis - Illusion of control is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.649	Retain the null hypothesis.
13	The distribution of Portfolio analysis - Cognitive dissonance is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.495	Retain the null hypothesis.
14	The distribution of Portfolio analysis - Familiarity is the same across categories of Professional certification.	Independent-Samples Mann-Whitney U Test	.592	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table A18: Correlations (Pearson) between background information and bases for information, profile of the respondents, behavioral biases

	Age of the respondents	Years of experience in investing	Years of experience in current position
<i>Panel A - with bases for information</i>			
Financial news	0.154	0.139	0.160
Analysts' opinion	0.063	0.058	0.099
Intuition	0.074	0.098	0.138
Professional advice	0.022	-0.042	0.069
Fundamental analysis	0.055	0.164	0.012
Technical analysis	0.011	0.062	0.007
Media	-0.035	0.036	-0.003
Friends and Family	0.045	-0.009	0.077
Clients' views	-0.078	0.017	-0.018
<i>Panel B - with profile of the investor</i>			
Ambition	-0.122	-0.025	-0.027
Tolerance to risk	-0.106	0.067	-0.027
Type of investor	0.118	0.222*	0.159
Rationality of the investor	0.120	0.101	0.127
<i>Panel C - with behavioral biases</i>			
Overconfidence	0.045	0.168	0.010
Conservatism	-0.017	0.075	-0.024
Availability	0.099	0.115	0.079
Hindsight	-0.011	0.078	-0.045
Anchoring	-0.128	-0.153	-0.079
Framing	0.295**	0.308**	0.337**
Mental Accounting	-0.062	-0.085	-0.110
Gambler Fallacy	-0.068	0.081	0.002
Representativeness	0.040	0.048	0.106
Herding	-0.089	-0.132	-0.085
Regret aversion	0.047	0.057	0.106
Illusion of control	-0.014	0.018	-0.063
Cognitive dissonance	-0.075	0.001	0.002
Familiarity	0.073	0.069	0.080

** Significant at the 1% level

* Significant at the 5% level

Table A19: Correlations (Pearson) between bases for information and behavioral biases

	Financial news	Analysts' opinion	Intuition	Professional advice	Fundamental analysis	Technical analysis	Media	Friends and Family	Client view
Overconfidence	0.223*	0.012	0.154	-0.188*	0.253**	0.112	-0.131	-0.016	0.0
Conservatism	0.212*	0.354**	0.391**	0.322**	0.142	0.016	0.199*	0.287**	0.37
Availability	0.482**	0.470**	0.402**	0.267**	0.033	-0.059	0.335**	0.235**	0.38
Hindsight	0.143	0.123	0.342**	-0.033	-0.013	-0.119	0.250**	0.222*	0.40
Anchoring	0.201*	0.203*	0.058	0.195*	0.052	-0.126	0.117	0.107	0.0
Framing	0.022	0.199*	0.001	0.192*	0.039	-0.066	0.173*	0.180*	0.1
Mental Accounting	0.047	0.061	-0.094	0.060	0.218*	0.073	0.078	0.013	0.0
Gambler Fallacy	0.259**	0.140	0.318**	0.163	0.159	0.000	0.144	0.046	0.27
Representativeness	0.263**	0.230**	0.053	0.188*	0.100	0.111	0.207*	-0.005	0.1
Herding	0.182*	0.133	0.141	0.170	-0.006	-0.040	0.213*	0.148	0.2
Regret aversion	0.372**	0.248**	0.369**	0.235**	0.147	0.001	0.177*	0.087	0.1
Illusion of control	0.255**	0.175*	0.334**	0.255**	0.045	-0.065	0.393**	0.382**	0.44
Cognitive dissonance	-0.067	0.011	0.209*	-0.085	-0.055	-0.143	0.222*	0.255**	0.20
Familiarity	0.055	0.071	0.166	0.128	-0.005	-0.019	0.123	0.066	0.26

** Significant at the 1% level

* Significant at the 5% level

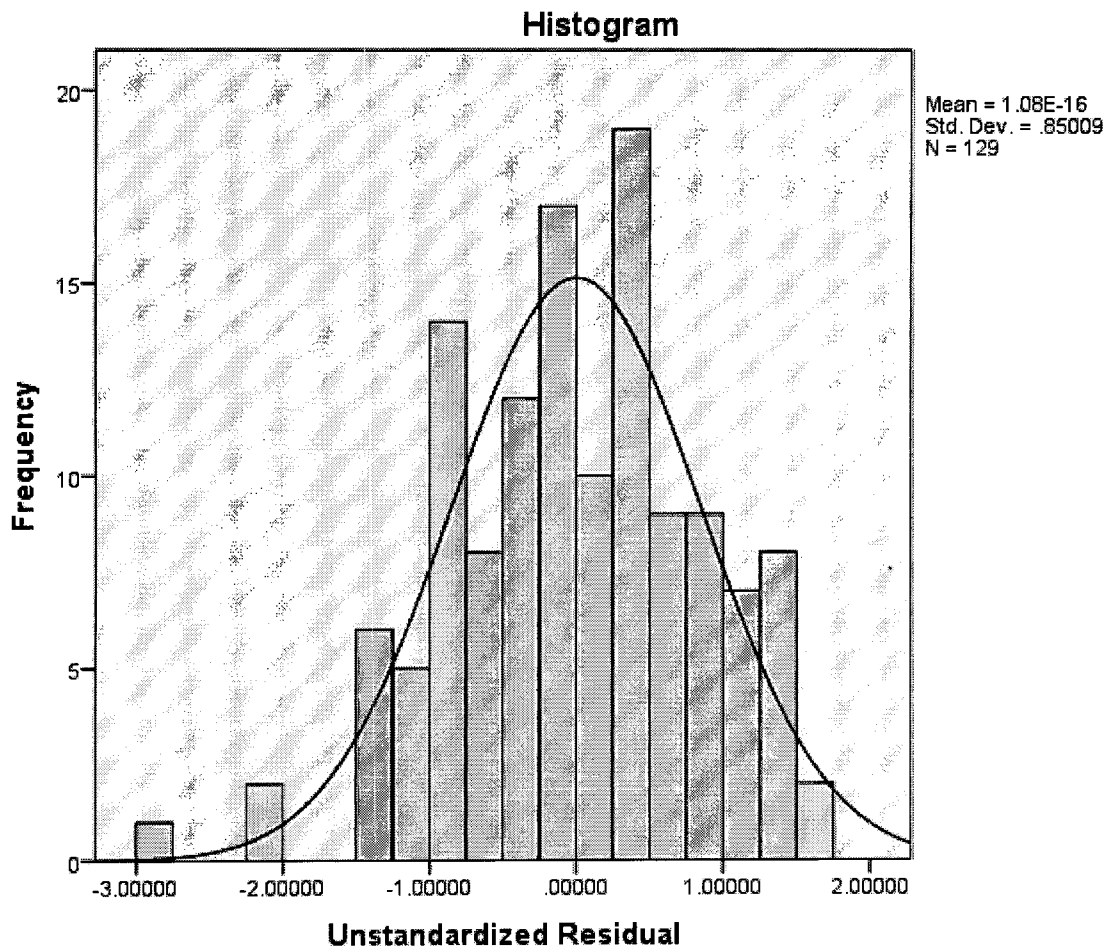
Figure A1: Residual plot of the residual from the OLS regression

Table A20: Operationalization of the variables

Type	Code	Variable
Demographic variables	GENDER	Male or Female
	AGEMETRIC	Age of the respondents
	EXPERIENCEINVMETRIC	Years of experience in investing or trading
	EXPERIENCEPOSMETRIC	Years of experience in current position
	EDUCATION1	Holders of Bachelor or Master's degree
	CERTIFICATION	Holders or non-holders of financial certification
Bases for information	BIDNEWS	Financial news
	BIDANALYSTS	Analysts' opinion
	BIDINTUITION	Intuition
	BIDADVICE	Professional advice
	BIDFUNDAMENTAL	Fundamental analysis
	BIDTECHNICAL	Technical analysis
	BIDMEDIA	Media
	BIDFRIENDS	Friends and Family
Profile of the investor	BIDCLIENT	Clients' views
	PROFAMBITION	Degree of ambition
	PROFTOLERANCE	Personal investment risk tolerance
	PROFKIND1	type of investor: novice, advanced
Behavioral biases	PROFRATIONAL1	Degree of rationality: relatively rational, very rational
	PORTVALUATION	Overconfidence
	PORTRARELY	Conservatism
	PORTWEIGH	Availability
	PORTACCURATELY	Hindsight
	PORTDIFFICULT	Anchoring
	PORTFININSTITUTIONS	Framing
	PORTDIVIDE	Mental accounting
	PORTLIQUIDATE	Gambler's Fallacy
	PORTPAST	Representativeness
	PORTTRACK	Herding
	PORTHOLD	Regret aversion
	PORTEXCESSIVE	Illusion of control
PORTJUSTIFY	Cognitive dissonance	
PORTBUYING	Familiarity	

APPENDIX B QUESTIONNAIRE

SERIAL #

Thank you for taking time to complete this questionnaire which aims at identifying the type of possible biases that could impact your decision-making process as an investor. Your opinion is vital for the success of this research and will be treated in the strictest confidence within the ethical code of practice for field research at the Faculty of Business Administration and Economics at Notre Dame University - Louaize; thus the information gathered will solely be used to compile statistics. No data about you as an individual will be disclosed in any published results.

Definition of Behavioral Finance

Behavioral finance focuses on the cognitive biases and mental errors that impact the decision making process of investors. It highlights the fact that effective decision making requires the understanding of human nature.

ADMINISTRATION ONLY

SECTION 1 – BACKGROUND INFORMATION

Please tick next to the case that best describes you or fill-in the space provided

- 1.01. Gender Male Female
- 1.02. Age (please provide your age in years) _____
- 1.03. Company (in which you currently work) _____
- 1.04. Department (in which you currently work) _____
- 1.05. Years of experience in investing/trading (Please provide the number of years) _____
- 1.06. Years of experience in the current position (Please provide the number of years) _____
- 1.07. Current position Employee Supervisor Manager Senior Manager
- 1.08. Education Doctorate Master's Bachelor High School Elementary
- 1.09. Professional Certification in finance/investment Yes No

SECTION 2 – BASES FOR INVESTMENT DECISION

Which of the factors below is most considered in building your investment decision? Please circle the number that most likely correspond to the degree each of the source of information below is used in your decision (from 1 to 7, where 1- low consideration to 7- high consideration)

2.01. Financial news	Low consideration	1	2	3	4	5	6	7	High consideration
2.02. Analysts	Low consideration	1	2	3	4	5	6	7	High consideration
2.03. Intuition	Low consideration	1	2	3	4	5	6	7	High consideration
2.04. Professional advice	Low consideration	1	2	3	4	5	6	7	High consideration
2.05. Fundamental analysis	Low consideration	1	2	3	4	5	6	7	High consideration
2.06. Technical analysis	Low consideration	1	2	3	4	5	6	7	High consideration
2.07. Media	Low consideration	1	2	3	4	5	6	7	High consideration
2.08. Friends and Family	Low consideration	1	2	3	4	5	6	7	High consideration
2.09. Clients' views	Low consideration	1	2	3	4	5	6	7	High consideration
2.10. Others (Please specify)									

SECTION 3 – PROFILE OF THE INVESTOR

Which of the factors below is most dominant in your investment strategy? Please circle or tick the option that mostly represents your regular investment strategy

- 3.01. How ambitious do you consider yourself to be? Not ambitious at all 1 2 3 4 5 6 7 Very ambitious
- 3.02. What is your general personal tolerance for investment risk? Not risky at all 1 2 3 4 5 6 7 Very speculative
- 3.03. What kind of investor do you consider yourself to be? A novice investor An advanced investor A very advanced investor
- 3.04. How rational do you consider yourself to be in your investment? (logical reason vs. intuition) Irrational Relatively rational Very Rational

SECTION 4 – FACTORS THAT INFLUENCE YOUR INVESTMENT DECISION MAKING AND THE PORTFOLIO SELECTION. Please consider your behavior while making an investment decision. By circling the number that most likely correspond to your opinion, please indicate the extent to which the following factors describe your agreement (from 1 to 7, where 1- strongly disagree to 7- strongly agree)

3.01. You go ahead and purchase a stock even if your valuation is different from that made by market players	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.02. You rarely change your investment decision	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.03. Weigh your judgment on recent information	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.04. Can accurately predict certain events	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.05. Difficult to you to sell an asset for a price lower than you paid	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.06. Financial institutions recommendations are more trustful than smaller institutions	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.07. You divide your investment into a safe portfolio and a speculative portfolio	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.08. You liquidate a position in a stock if its pattern is being up for a series of trading sessions	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.09. You consider past performance of an investment before investing in it	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.10. You track someone's investment strategy and buy and sell same stocks at the same time	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.11. You hold losing stock for too long hoping for reversal	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.12. You make an excessive trading in a stock that returned in a gain the first time you have invested in it	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.13. Your mind tries to justify mistakes committed while making investment decisions	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.14. You believe that buying the stock of your preferable sector is a good investment	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.15. You feel that you can predict future stock prices better than others	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.16. You use stop losses in your trades	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.17. You put off an investment decision expecting favorable information release related to the share	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
3.18. You change your opinion immediately once you hear views from a famous analyst that conflict yours regarding a stock	Strongly disagree	1	2	3	4	5	6	7	Strongly agree

Please scan the completed questionnaire and e-mail it to: mrdaou03@ndu.edu.lb If you have any comments or concerns about this questionnaire, please contact Dr. Elie Menassa, Dean of the Faculty of Business Administration and Economics at Notre Dame University – Louaize and supervisor of this research – Email: emenassa@ndu.edu.lb - Thank you for your cooperation!