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THE IMPACT OF BEHAVIORAL FACTORS ON THE INVESTMENT DECISION-MAKING OF PORTFOLIO MANAGERS IN EUROPE

DOCTORAL THESIS

Submitted for the Scientific Doctor's Degree (Ph.D.) in Social Sciences

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LIST OF ABBREVIATIONS

AUM	Asset Under Management
CAPM	Capital Asset Pricing Model
CF	Cash Flow
CFA	Confirmatory Factor Analysis
CSE	Colombo Stock Exchange
DCF	discounted cash flow model
DDM	Dividend Discount Model
EFA	Exploratory Factor Analysis
EMH	Efficient Market Hypothesis
EPS	Earning Per Share
EUT	Expected Utility Theory
GGM	Gordon Growth Model
GLM	General Linear Model
KMO	Kaiser-Meyer Olkin Measure
MPT	Modern Portfolio Theory
UN	United Nations
PER	Price Earning Ratio
PV	Present Value
SEM	Structural Equation Modeling
SEU	Subjective Expected Utility
VAR	Variance

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SUMMARY

In contrast to the conventional academic finance theories - like the Modern Portfolio Theory and the Efficient Market Hypothesis - Behavioral Finance endeavors to bridge the gap between finance and psychology. Behavioral Finance analyses the cognitive factors and emotional issues that impact the decision-making process of investors and consequently, the investment performance. The decision-making by individual investors is usually based on their age, education, income, AUM and other demographic factors. The impact of behavioral aspects of investing, however, often are ignored. This dissertation seeks to find the influence of certain identified behavioral finance concepts including: Heuristic Theory, Self-Control, Price Anchoring, Herding, Mental Accounting, Overconfidence, Prospect Theory, Regret Aversion, and Representativeness on the decision-making process and their impact on the investment performance of Portfolio Managers in Europe.

The main objective of this study is exploring the behavioral factors influencing professional investors, namely Portfolio Managers. Furthermore, the relations between these factors and investment performance are also examined. As there are limited studies about behavioral finance and their influence on Portfolio Managers in Europe, this study is expected to contribute significantly to the development of this field. The study begins with the existing theories in behavioral finance, based on which, hypotheses are proposed. Then, these hypotheses are tested through the questionnaires distributed to Portfolio Managers in Europe. Moreover, semi-structured interviews with eleven Portfolio Managers are conducted to have deeper understanding of these behaviors.

This research also attempts to determine the correlation between these behavioral factors and investment performance. Among the behavioral factors mentioned before, only five factors influence the investment performance of Portfolio Managers in Europe: Price Anchoring, Availability, Mental Accounting, Overconfidence and Loss Aversion. Mental Accounting was found to have the most significant positive impact on investment performance, while Overconfidence and Loss Aversion had a more minor positive effect on investment performance. In contrast, Price Anchoring has a negative impact on the investment performance of Portfolio Managers.

Key words: Behavioral Finance, Decision-making, Investment Decisions, Portfolio Managers, Structural Equation Modeling

JEL Code: G1, G11, G4, G40, G41

INTRODUCTION

Topicality and Actuality

The economic system relies heavily on financial resources and transactions, and economic efficiency relies in part on efficient financial markets. The stock market is defined as the market where shares of publicly traded companies are bought and sold, the stock market measures the total value of all publicly traded companies. Typically, the stock market and economic performance coincide and therefore the financial markets are of great importance for the economy.[1]

The most conventional academic finance theories are referred to as traditional finance using models in which investors are rational and making rational decisions regarding a stock purchase or sale. If the traditional finance theories like the Modern Portfolio Theory (MPT) [2] and the Efficient Market Hypothesis (EMH)[3] really hold, how can than market anomalies, like the DotCom-Bubble, January-Effect, the Financial Crisis in 2008 or even the Bitcoin-Mania, be explained?[4] Behavioral Finance endeavors to bridge the gap between finance and psychology analyses the factors which can impact the decision-making process of individuals. The topic of behavioral finance and the decision-making process of investors occurs already in the early 1980's, but is still highly relevant for the stock markets worldwide, even in at present. More recently, during the COVID-19 crisis some of the most volatile days on the stock market shocked the financial world. A lot of this can be connected to human emotion, since human decisions are based 80% of emotions. Accordingly, behavioral rules can be formulated to professionally stabilize one's own portfolio and perfectly position it for a market recovery, making behavioral finance more relevant than ever before.

The groundbreaking research of psychologists Daniel Kahneman and Amos Tversky in the early 1980s, and the psychological research that has built on it over the last nearly four decades, have revealed astonishing insights into the intricate workings of the human mind. Behavioral finance research has uncovered widespread, deeply rooted, unconscious biases and heuristics

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[1] Shaw, E. (1993). Financial Deepening in Economic Development. *Economic Journal*, 84 (333), pp. 227-228.

[2] Markowitz, H. (1952). Portfolio Selection. *Journal of Finance*, 7 (1), pp. 77-91.

[3] Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25 (2), pp. 383-417.

[4] De Grauwe, P., and Grimaldi, M. (2004). Bubbles and Crashes in a Behavioral Finance Model. *CESifo Working Paper Series* No. 1194 Riksbank Working Paper No. 164/Riksbank Research Paper Series No. 7.

in human decision-making and opened up a whole new perspective on why we behave the way we do. These insights originated in psychology but are highly relevant to the world of finance that Kahneman was awarded the Nobel Prize in Economics. Together with the most recent Nobel Prize winners Robert Shiller (in 2013) and Richard Thaler (in 2017), a total of now six Nobel Prizes for behavioral science have now been given.[5] The resulting work represents an entirely new field of work called behavioral finance and underlines the importance of behavioral finance in the past but even more so in the future.

In general, it can be seen that individual and institutional investors differ in terms of both size and characteristics and therefore differ quite significantly in terms of the impact on behavior.[6] Moreover, institutional and individual investors vary in their risk attitudes, time range and profit purposes.[7]

Other researchers, such as Fisher and Statman (2002) or Otchere and Chan (2003), argued that institutional investors are affected by behavioral biases in the same way as retail investors and that these biases influence both investor groups equally.[8][9] However, institutional investors are assumed to behave rationally as they invest more effort and time in their investment decisions and are able to make more adequate investment decisions through faster learning.[10][11]

Given these facts, it seems impossible to claim that institutional investors behave in a fully rational way. The aim of this study is therefore to investigate the factors that influence the decision-making and investment outcomes of Portfolio Managers and to fill some important gaps in the field of behavioral finance in Europe.

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[5] Nobel Prizes won by following research in the years in the broad topic of behavioral finance: Herbet Simon (1978), Gary Becker (1992), Daniel Kahneman (2002), Amos Tversky Smith (2002), Robert Shiller (2013) and Richard Thaler (2017).

[6] Schmeling, M. (2007). Institutional and individual sentiment: smart money and noise trader risk? *International Journal of Forecasting*, 23 (1), pp. 127-145.

[7] George, G., Wiklund, J., and Zahra, S.A. (2005). Ownership and the internationalization of small firms. *Journal of Management*, 31 (2), pp. 210-233.

[8] Otchere, I., and Chan, J. (2003). Short-term overreaction in the Hong Kong stock market: can a contrarian trading strategy beat the market? *Journal of Behavioral Finance*, 4 (4), pp. 157-171.

[9] Fisher, K., and Statman, M. (2002). Blowing bubbles. *Journal of Psychology and Financial Markets*, 3 (1), pp. 53-65.

[10] Chang, C., Chen, H., and Jiang, Z. (2012). Portfolio performance in relation to Herding behavior in the Taiwan stock market. *Emerging Markets Finance & Trade*, 48 (4), pp. 82-104.

[11] Keim, D., and Madhavan, A. (1995). Anatomy of the trading process empirical evidence on the behavior of institutional traders. *Journal of Financial Economics*, 37 (3), pp. 371-398.

The theses for defense are called

1. Professional investors – namely Portfolio Managers – do not suffer from any behavioral factors, because they act fully rational.
2. Personal determinates of Portfolio Managers, like the gender, net income, work experience, do not have any influence on the decision-making process.
3. Checking the different behavioral factors, no one has a significant influence on the investment performance.

Research Object

Behavior of Portfolio Managers of mutual equity funds in Europe.

Research Subject

Behavioral factors having an impact on the investment decision-making process of Portfolio Managers.

Research Problem

In the business world, millions of decisions are made every minute around the world. Investment decisions are no exception to this statement. Behavioral factors that influence the decision-making process in the world of investing are manifold. One type of these factors is related to the psychological compositions of investors, which is responsible for their financial behavior. The behavioral factors that influence investment decisions are diverse, but the research studies mainly focus on private investors. Therefore, there is a need for additional studies in this area to fill the theoretical gap. For professional investors, namely Portfolio Managers, no studies have been conducted out in Europe so far due to access difficulties. As such, this will be the first study attempting to unravel the behavioral factors behind the investment decision-making process of Portfolio Managers, thus decisively filling the theoretical as well practical research gap.

Research Aim

The aim of the research is to develop a model to determine and investigate the behavioral factors that influence the investment decision-making process of the Portfolio Managers in order to reduce the impact of behavioral factors and ultimately improve investment performance.

Tasks of the promotional work to achieve the research objective

1. Conduct and explore an extensive literature review of the theories of traditional finance, namely Efficient Market Theory, and behavioral finance to capture the state of research and identify research gaps requiring further scientific investigation.
2. Construct a causal model to analyze and compare the impact of behavioral finance factors on Portfolio Manager's decision-making and performance, including intervening variables and contextual variables.
3. Analyze and interpret empirically gathered data, applying both descriptive and inferential statistical procedures.
4. Combine and compare the results with previous research and the different kind of views. Understand the correlation between behavioral factors, decision-making process and investment performance.
5. Based on both the qualitative (expert interviews) and quantitative (questionnaires) survey research results, the research questions about Portfolio Managers in Europe must be answered.
6. Derive the behavior of Portfolio Managers to improve their investment performance and the independence of their behavioral factors.
7. Develop conclusions as well as comprehensive suggestions for Portfolio Managers, investment companies, research discipline and for further researchers.

Research questions

From the analyses in the topic relevance section, the following research questions arise:

1. Do Portfolio Managers suffer from behavioral factors such as unprofessional investors and what are the major behavioral factors influencing the decision-making process of Portfolio Managers in Europe?
2. Can personal determinants, like the gender, net income, work experience, influence the decision-making and the investment performance of Portfolio Managers?

Research hypotheses

Based on these two research questions, the basic hypothesis is proposed as follows:

H_B: *The main behavioral finance factors have a significant influence on the decision - making and consequently, on the investment performance of Portfolio Managers at the European stock market.*

Consequently, more detailed sub-hypotheses need to be formulated in the course of this investigation. Therefore, the nine different behavioral biases are tested, if they have an impact on the investment performance of the Portfolio Managers in Europe as seen in the sub-hypotheses (**H_1**, **H_2**, …, **H_9**). As behavioral factor may differ between the individual investors, following hypothesis is to be tested:

H_{10}: *The behavioral factors and their influence on the investment decisions are not different within the Portfolio Managers and their various characteristics - namely gender, age, education, work experience, AUM or net income.*

Consequently, more detailed sub-hypotheses need to be formulated in the course of this investigation.

Theoretical novelty

1. Development and detailed structuring of a structural equation modeling of behavioral factors impacting the decision-making process and the investment performance of Portfolio Managers in Europe.
2. The conceptual model explaining the relationship between behavioral factors, decision-making, personal determinants and the investment performance.
3. Empirical approval of the impact of varying degrees of behavioral factors affecting the decision-making process and the investment performance of Portfolio Managers.

Practical novelty

4. Identification and provision of an empirically confirmed framework for training initiatives for investors - private as well as institutional - based on the investigated and corroborated major behavioral factors, identified as the constitutional elements of the decision-making process.

Structure of the thesis

The thesis is divided into three chapters.

The first chapter reviews the relevant literature of traditional as well as behavioral finance. The evolution of behavioral finance will be shown through different traditional financial theories and their limitations in this chapter. Consequently, this chapter opens with a review of approaches that underpin traditional finance and their limitations. Secondly, an empirical review of the various behavioral factors, their effects on investor decisions and performances based on previous research and literature will then be tackled.

In chapter two, the current situation of Portfolio Managers in Europe and their decision-making process as well their investment performance are explained and analyzed. Moreover, the research model is defined using the theoretical background from chapter one and the own experience. Moreover, this chapter explains the research design of the study and the methods used to collect and analyze data. It starts by discussing the choice of research design by comparing it with other types. It then continues with respondents selection using a stratified sampling technique to have a representative sample of Portfolio Managers. Data collection methods, namely the self-completion questionnaire and semi-structured interviews, are also reviewed, followed by explaining the questionnaire design and the measurements. Significantly, this chapter shows how the analysis is carried out once findings are obtained. Moreover, this chapter will highlight the applied statistical techniques.

In the last chapter, the data analyses and results from the various different methods and draws together give an overall outcome. The data background of the expert interviews and the questionnaire were described to have an overview of the surveyed sample. Then, the results of factor analysis, Cronbach's Alpha test for measurement reliability, impact levels of behavioral factors, as well as correlations among behavioral factors and investment performance identified by structural equation modeling are presented, analyzed and interpreted and finally, the research hypotheses were tested. Moreover, a framework for training initiatives for investors based on the investigated and corroborated major behavioral factors, are developed.

Finally, conclusions and suggestions are presented and interpreted being in accordance with the hypotheses and the research questions.

Research methods

The research methods are based on four major steps. The first step is the quantitative research as expert interviews with the purpose to define the behavioral finance factors and decision-making processes of portfolio managers, build knowledge on the status quo of Portfolio Managers in Europe. Therefore, eleven experts are interviewed in semi-structured interviews. The data is collected via video calls and is analyzed by protocols with remarks. The second step is to develop a dependency model with the combination of the literature research and the results of expert interviews. The third step is quantitative research in the form of questionnaires. The purpose is to test the dependency model, namely the SEM, and confirm or falsify the research hypothesis. Over 152 Portfolio Managers are surveyed by questionnaires, and those collected data are tested with statistical analysis, correlation, and regression analysis as well the factor

analysis. Finally, with the help of the data analysis, the research questions and hypotheses are answered and tested, and this step ends with the final research results.

Research limitations

The thesis mainly focuses on the impact on the decision-making process and investment performance of Portfolio Managers and does not address the overall effect of the decision-making process within an investment company. It is centered on the individual performance and decision-making of a Portfolio Manager. The aim, strategy, and goal of the investment company, where the Portfolio Manager is working, is not considered. Perhaps Portfolio Managers will behave differently if they are freelancers or managing their own money and not their clients' capital.

Another major limitation of this work is relatively obvious, and that is the limitation to the geographic region of Europe. This thesis will focus on the European continent without Russia, Turkey, Kazakhstan, Georgia, Azerbaijan, Ukraine, and Belarus.

One other central limitation of the study is the fact that it aims to investigate professional investor behavioral patterns using questionnaires. Making financial decisions can be demanding for several reasons, possibly pushing many into making irrational decisions at one point or the other. To overcome this problem to an extent, many questions attempted to make the respondents admit mistakes they have made in the past and during their careers as Portfolio Managers. Howbeit while fulfilling the questionnaire, the same person is likely to be more relaxed and in a different emotional atmosphere, hence deciding to give answers, which may put him or her across in different light, particularly in those questions that present hypothetical circumstances.

Approbation of the research results

The development of this dissertation was guided by regular presentation and discussion of the results within the scientific community through the following international scientific conferences and publications:

a) Conferences

1. Koehn, M. and Cekuls, A. (2019), **A behavioral finance explanation of speculative bubbles: evidence from the bitcoin price development,** New Challenges of Economic and Business Development 2019 - 16.-18.05.2019, Riga (Latvia).

2. Cekuls, A. and Koehn, M. (2019), **Bitcoin and Stock Market Indices: Analysis of Volatility's Clusters during the Bitcoin Bubble based on the Dynamic Conditional Correlation Model,** New Challenges of Economic and Business Development - 2019 - 6.-18.05.2019, Riga (Latvia).
3. Koehn, M. (2020), **The impact of behavioral finance and traditional finance theories on the investment decision-making process,** 78th Annual Scientific Conference of the University of Latvia at the session at the session Impact of Globalization to National Economies and Business Development - 2020 - 23.01.2020, Riga (Latvia).
4. Koehn, M. (2021), **European Portfolio Managers and Behavioral Finance: A Structural Equation Modeling Approach,** CER Comparative European Research, 16th International Scientific Conference for PhD students of EU countries, 25.-27.12.2021, London (UK).
5. Koehn, M. (2021), **Behavioral Finance in the European Capital Markets: An Evidence through Ethnography and Semi-Structured Interviews of European Portfolio Managers**, CER Comparative European Research, 16th International Scientific Conference for PhD students of EU countries, 25.-27.12.2021, London (UK).
6. Koehn, M. (2021), **Investment Performance and investment Decision-Making of European Portfoliomanagers in Contrast to their Gender**, International Masaryk Conference for Ph.D. Students and Young Researchers, Vol. XII, 20.-22.12.2021, Brno (Czech).
7. Koehn, M. (2022), **Portfolio Managers and Behavioural Finance in Europe: Evidence from a Structural Equation Modelling Approach**, 80th International Scientific Conference of the UL in January – March 2022, Riga (Latvia).

b) Publications

1. Koehn, M. and Valls, P. (2017). **Speculative bubbles and contagion: Analysis of volatility's clusters during the DotCom bubble based on the dynamic conditional correlation model**. Cogent Economics & Finance (indexed in Scopus). Vol. 5 (1), pp 1-28.

2. Koehn, M. and Cekuls, A. (2019). **A behavioral finance explanation of speculative bubbles: evidence from the bitcoin price development**, Conference Proceedings: New Challenges of Economic and Business Development - 2019 (included in the Web of Science Conference Proceedings Citation Index), 2019, pp. 782-800, Riga (Latvia).
3. Cekuls, A. and Koehn, M. (2019). **Bitcoin and Stock Market Indices: Analysis of Volatility's Clusters during the Bitcoin Bubble based on the Dynamic Conditional Correlation Model**, Conference Proceedings: New Challenges of Economic and Business Development – 2019 (included in the Web of Science Conference Proceedings Citation Index), 16.-18.05.2019, pp. 159-170, Riga (Latvia).
4. Koehn, M. (2021). **European Portfolio Managers and Behavioral Finance: A Structural Equation Modeling Approach**, in CER Comparative European Research, 16th International Scientific Conference for PhD students of EU countries (indexed by EJBAS database), 2021, pp. 66-70. ISBN 978-1-7399378-0-5
5. Koehn, M. (2021). **Behavioral Finance in the European Capital Markets: An Evidence through Ethnography and Semi-Structured Interviews of European Portfolio Managers**, in CER Comparative European Research, 16th International Scientific Conference for PhD students of EU countries (indexed by EJBAS database), 2021, pp. 62-65. ISBN 978-1-7399378-0-5
6. Koehn, M. (2021). **Investment Performance and investment Decision-Making of European Portfoliomanagers in Contrast to their Gender**, International Masaryk Conference for Ph.D. Students and Young Researchers (indexed in Scopus), Vol. XII, pp. 329-337. ISBN 978-80-87952-35-1

1 THEORETICAL FOUNDATIONS OF TRADITIONAL FINANCE AND THE EMERGENCE OF BEHAVIORAL FINANCE

1.1 Introduction and framework of the literature review

The first chapter of this thesis reviews the relevant literatures of traditional as well as behavioral finance. It is commonly accepted that knowledge does not happen instantly, it passes through various stages of evolution. This statement stands true for behavioral finance also. Therefore, in this chapter, the progressions in behavioral finance are shown through different traditional theories of finance, as seen in **Figure 1.1**.

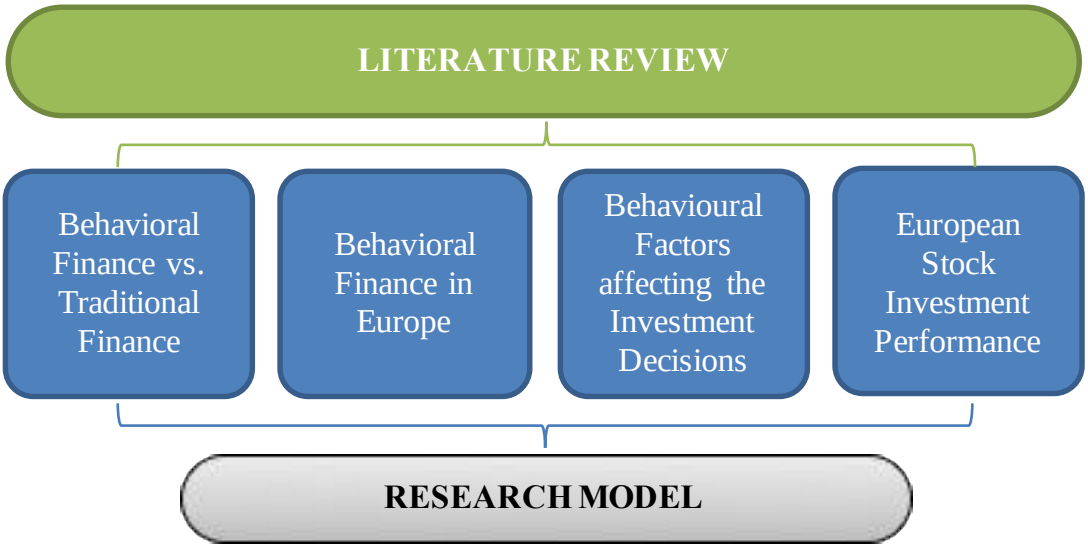

Figure 1.1. **Framework of the literature review**

Source: Author's creation

Consequently, this chapter opens with a review of theories that underpin the traditional finance and their limitations. Secondly, a review of the various behavioral factors, and their effects on investor decisions and performances based on previous research and literature will then be tackled. The framework for the literature review and the path to the research model is shown above.

1.2 The theories of traditional finance

Finance can be broadly described as the art and science of decision-making involving money in various contexts. Finance is studied so that human is able to allocate their limited resources over time in times of uncertainty. Within the traditional theory of finance, there are two crucial aspects:

First, perfectly rational behavior of market agents. A rational investor is the one who always (i) updates his beliefs, if there are any new pieces of information; (ii) makes normatively acceptable decisions.[12]

Second, existence of Efficient Markets. Assumption of EMH that all the significant details are shown in stock market prices wholly and instantaneously. When this assumption holds true, the prices are correct, and opportunity for excess returns does not exist. Since the emergence of EMH, lot of emphasis has been put on multiple advanced asset pricing models, their testing and development.[13]

A study conducted by Subrahmanyam (2007) groups main paradigms of finance: i) Portfolio allocation is determined by expected risk and return; ii) Asset pricing models based on risk; iii) The pricing of contingent claims; iv) The theory of Modigliani-Miller and its advancements by agency theory.[14]

There is a critical assumption about wealth and value of people that they act rationally while deciding on any financial aspect. Although the models remodeled the field of research in finance, the theories still have not answered many gaps. For instance, what is investors motive behind trade, and other than risk, what are the reasons for fluctuation in returns of a stock?

Psychological researchers have found irrational manner in investors behavior when it comes to deciding on economic decisions. Especially if money is involved, then people often behave in unusual and odd ways during the decision-making process. The reason behind that is that cognitive errors as well as extreme emotions can let investors making a bad - irrational - investment decision.

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[12] Thaler, C. (2005). Overconfidence vs. Market Efficiency in the National Football League. *NBER Working Papers* 11270.

[13] Fama, E. (1970): Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25 (2), pp. 383-417.

[14] Subrahmanyam, A. (2007). Behavioral Finance: A Review and Synthesis. *European Financial Management*, 14 (1), pp. 12-29.

In a study conducted by Shiller (2002), author has stated that various models such as CAPM, EMH, and other traditional financial theories can predict and explain changes in certain events. However, academic research has found some exceptions in the behaviors, which were not explained by traditional theories. One famous example is the January Effect. This effect deals with the abnormalities of the financial market, as the security prices increases in the first month every year without any particular reasons.[15]

The following table, see **Table 1.1.,** presents the timeline for the progressions of financial theories and the main related research.

Table 1.1. **Timeline of the neoclassical finance**[16]

Author(s)	**Issue (s)**	**Findings**
Markowitz (1952)	Selection of portfolio	Portfolio selection, being the fundamental step, requires observation and experience. Followed by getting the relevant ideas about the future performances of an available security and lastly ends with portfolio selection.
Modigliani and Miller (1958)	The theory of investment, cost of raising capital, corporate finance	This theory setup the foundations for valuation of a company and assumes that company's leverage is irrelevant, in a world full of uncertainty.
Sharpe (1964)	Capital asset prices	The linear relationship exists between the expected returns and the standard deviation of the return for efficient combinations of risky assets in an equilibrium.
Lintner (1965)	Prices of security, risk involved, and	This research shows the circumstance when stock are held long or short in deciding optimal

[15] Rozeff, M., and Kinney, W. (1976). Capital Market Seasonality: The case of stock returns. *Journal of Financial Economics*, 3 (4), pp. 379 - 402.

[16] Table made by the author. Markowitz (1952), Modigliani, and Miller (1958), Sharpe (1964), Lintner (1965), Fama (1965), Black and Scholes (1973), Jensen and Meckling (1976), Fama and French (1993), Subrahmanyam (2010).

	gains from diversification.	portfolio, and the positive or negative returns associated with it.
Fama (1965)	Efficient market hypothesis	Actual stock price should be same as its intrinsic value, and should follow a random walk process.
Black and Scholes (1973)	Option pricing (Black-Scholes Theory)	The construction of a mathematical model about derivative investment instruments that provides a calculation of the price of a European-style option. The study also shows that option has a exclusive price provided the risk of the security and its expected return
Jensen and Meckling (1976)	Capital structure	The findings of agency cost theory puts emphasis that the optimal capital structure mix is determined by reducing the costs arising from the conflict between the involved parties.
Fama and French (1993)	Asset pricing	Classification of the main dimensions for the stock market: an overall market factor, factors linked to the firm size of a stock and its book-to-market equity ratio.
Subrahmanyam (2010)	CAPM and extensions	Classification of more than 50 variables that have been used in additions to the CAPM.

Source: Author's creation

The traditional theory of finance and its theoretical frame consists of multiple financial constructs such as EUT, CAPM and the MPT.[17] Nevertheless, in the following sections, it is mainly focused on the Efficient Market Hypothesis because it has shaped the traditional finance for decades.

[17] The Expected Utility Theory is based on following researchers: Schoemaker (1980), Bernoulli (1738), Bentham (1789), Mill (1861), and Sidgwick (1907). Whereas the Capital Asset Pricing Model is based on Sharpe (1964); Lintner (1965) and Mossin (1966). Lastly, the Modern Portfolio Theory is founded by Markowitz (1952).

1.2.1 The Efficient Market Hypothesis and the three form of market efficiency

"An efficient market is defined as a market where there are large numbers of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value" Fama (1965)

For more than 5 decades, the EMH has been a central framework for finance, but as well one of the most analyzed and criticized likewise. Fama (1970) determined in a market which is considered to be efficient, the prices of security fully reflect all available information. Therefore, it would be impractical for any investor to have excess returns consistently based on currently available information. Consequently, the central assumption is that financial markets are efficient. The EMH became sensational in the 70s, and many theoretical as well as empirical research tries to underpin the main hypothesis of efficient markets. The theoretical framework of Efficient market Hypothesis is based on following premises:

1) Investors act rationally and security prices are therefore rational.
2) If some investors act irrationally, their trades are random and the total amount of transactions should cancel out the irrationally without influencing the security prices.
3) The rational arbitragers can reduce the impact of irrational investors on the market.

The empirical evidence from the 1970s fell into two main categories. On the one hand, the security price should promptly and completely react to any fresh news. On the other hand, a company's stock price should not move whilst there is no fresh news about that specific company. As Shleifer and Vishny (1997) points out, non-reaction to non-information.[18]

[18] Shleifer, A., and Vishny, R. (1997). The limits of arbitrage. *Journal of Finance*, 52 (1), pp. 35-55.

Consequently, the central hypothesis of the EMH is that whenever new information occurs about a company, this information is directly included in the assets price of that company. As the random walk theory holds, this new information cannot be used to forecast future price moves. There are 2 different types of information: public as well as private. In the next section, the different version of market efficiency will be explained:[19]

1) The weak market efficiency

The market is said to be having weak form of efficiency when the information is linked to past data. Investors think the stock price includes every known publicly available data such as prices of stocks, volume of trade or, for instance, financial statements for previous years. Consequently, in this environment, a market is efficient if everyone has access to those data. Even the historical data would be of no use to an analyst, as past prices always represent current prices. There is no opportunity for abnormal profits, and therefore, what is the advantage of those historical data to an investor?

2) The semi-strong market efficiency

Sem-strong market efficiency is the situation when all the information which is publicly available is reflected in financial assets' prices. Accordingly, investors are not able to pick an undervalued security. Consequently, abnormal profits would be out of reach of individual investor.

One assumption of that form of efficiency is that everyone has the access to all current news and data available. Thus, market prices are already reflecting all currently available data, including balance sheets, income statements, revenue growth, dividends, earnings, etc.

3) The strong market efficiency

The main assumption of this form of market efficiency is that even with an earlier access to private information, no investor would make higher profits. On the basis of performance of professional investment managers, one can conclude that the present situation of financial markets clearly depicts the weak and semi-strong forms of market efficiency, and market cannot be completely efficient in the strong structure. Therefore, the prices of security reflect all the publicly available information, and thus earning abnormal gains by using private information is out of question. Finally, a share price movement because of new

[19] Fama, E. (1965). The Behavior of Stock-Market Prices. *Journal of Business*, 38 (1), pp. 34-105.

occurred information is immediate and unbiased. Therefore, an investor is not able to benefit from new arose information about a company.

1.2.2 Problems and limitations with EMH

The main three criticisms of the Efficient Market Hypothesis are following:

First of all, the EMH implies that every available data should be perceived by every investor in a similar way. Nevertheless, the numerous procedures for defining and evaluating stock prices raise validity issue of the EMH. For instance, if an investor is looking for market opportunities which are undervalued while another investor is looking for high growth potential stocks, they have a different risk-profile and expectation about the same stock. Therefore, they will evaluate the fair value of that stock differently. Consequently, it is difficult to determine the worth of a stock when market is efficient, since stocks are value individually by different investors. This holds as well with one of the most substantial assumptions made by the EMH: investors are acting perfectly rational and can value securities rationally.[20]

Secondly, the efficient market hypothesis assumes that if the EFH holds, that no individual investor can achieve higher profits than a different one with the same invested capital. Therefore, only the same returns can be achieved with equal possession of information. In other words, if one investor is successful and makes profits, then the whole universe of investors will make those profits as well. Even if some investors are acting irrational, rational investors either neutralize or arbitrage their trading activities by their rational behavior.[21]

Thirdly, no investor should ever be in the position to outperform the market. This is imperative that the best investment alternative is to invest all of one ‘s investment capitals into one single index fund, which would be volatile with the overall level of profit abilities or losses of the underlying companies.

Another basic assumption of the EMH is that the investors have a clearly defined subjective utility function, which they will maximize.

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[20] Tseng, K. (2006). Behavioral Finance, Bounded Rationality, Neuro-Finance, and Traditional Finance. *Investment Management and Financial Innovations*, 3 (4), pp. 7-18.

[21] Shleifer, A., and Vishny, R. (1997). The limits of arbitrage. *Journal of Finance*, 52 (1), pp. 35-55.

Those three main problems discussed above have directed to several restrictions, namely: bounded rationality and their limits of subjective utility function, and as well as the limits of arbitrage. In the following, those limitations will be more discussed.

Limits of arbitrage within the EMH

The EMH implies that whenever a publicly traded stock is mispriced, rational traders seek opportunity of low risk profit from it.[22] The low-risk chance of a small gain occurs through the tool of arbitrage. Arbitrage is a practice of gaining profits from a price difference between two markets, where the underlying company is the same.

Arbitrage is a sort of investment which does not incur any cost and produce risk free profits by taking advantage of mispricing of various securities. For instance, suppose due to irrational trading of an investor which is known as noise trader, the price of security stands below its equilibrium price. In that case, rational investors will take a long position while going short for another stock with similar characteristics. Arbitrage is the mechanism that should guarantee the validity of the law of one price. Arbitrage plays a critical role in maintaining market efficiency, since it is because of arbitrage process that security values are equal to the current market prices. Arbitrage requires assumption of risk and cost. Due to this, the effectiveness of arbitrage in eliminating certain security mispricing is limited. In the traditional finance paradigm, arbitrage should be riskless and opportunities for arbitrage cannot exist. However, a lot of evidence have been found to support the opposite.[23] In fact, arbitrage is considered as risky and should be limited. There are circumstances where arbitrage opportunities exist but do not immediately disappear. This is known as the limitation of arbitrage.

The limit to arbitrage theory explains why rational investors cannot simply correct the deviations in mispriced stock prices, at least not quickly.[24] Mispricing in stocks arises due to shocks in the demand of individual investors. Irrationality and demand shocks are inspired by psychological factors that generate anomalies with overpriced stocks. According to theory of

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[22] Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25 (2), pp. 383-417.

[23] For instance: Harris and Gunel (1986), pp. 851-860; Delon et al. (1990), pp. 703-738.; Shleife, and Vishny (1997), pp. 35-55; Froot and Dabora (1999), pp- 189-216; Wurgler and Zhurarskaya (2002), pp-583-608; Lamont, and Thaler (2003), pp. 227-268.

[24] Shleifer, A., and Vishny, R. (1997). The limits of arbitrage. *Journal of Finance*, 52 (1), pp. 35-55.

limited arbitrage, it is considered that if the deviations in stock prices are caused by the irrational behavior of the investor, even the rational investor will be able to do anything about it.[25]

The three main constraints of limited arbitrage are risk of the company, costs of transaction, and noise trader risk. Noise traders - a source of risk beyond systematic and unsystematic risk - do not usually trade based on analyzing data. In a scenario where most of the investors are noise traders and act together, they make the similar kind of systematic error at or around the same time. This will increase mispricing of the securities and hence more risk is produced for all the market participants. Nevertheless, the risk factors and involving costs create a limit to arbitrage. Consequently, stock prices will not be corrected, at least not quickly. Due to limitations to arbitrage, such inconsistencies can persist over time and creates an opportunity.

One of the central debates in financial economics is if arbitragers are constrained in their arbitrage activities. Supporters of the EMH, such as Friedman (1954) and Fama (1965), argue that arbitrage is nearly unlimited and should, therefore, lead to efficient asset prices.[26]
On the opposite hand, the growing literature on limits to arbitrage showed that mispricing continues in equilibrium for long periods since arbitrageurs have to bear costs as well as risks and thus are constrained in their arbitrage activities.[27] Over the last decades, many cross-sectional assets price anomalies have been classified and identified by financial researchers. The majority of the empirical anomalies have resulted from uncompleted arbitrage.[28]

Bounded rationality by Simon (1957)

EMH assumes, that individual investors are considered perfectly rational. In his view, investors use various stock price evaluation tools and analytics to make the right decision on time. This utopian situation can be contradicted, however, as many anomalies are taking place in the stock markets that are contrary to this assumption.

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[25] Gromb, D., and Vayanos, D. (2010). Limits of Arbitrage: The State of the Theory. A*nnual Review of Financial Economics*, 2 (1), pp. 251-275.

[26] Friedman, M (1954). Essays in Positive Economics. *Economic Journal*, 64 (256), pp. 796–799.

[27] DeLong, J. B., Shleifer, A., Summers, L.H., and Waldmann, R.J., (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98 (4), pp. 703 -738.

[28] Shleifer, A. and Vishny, R. (1997). The limits of arbitrage. *Journal of Finance*, 52 (1), pp. 35-55.

Rationality of individuals in decision making is bounded. It is restricted by the cognitive limitations of each individual, the availability of information, the limited time window for decision making, or personal circumstances. It was Herbert A. Simon who introduced bounded rationality in 1957, which was supposed to be an alternative model for the mathematical approaches used for decision-making in economics and other associated disciplines. According to Simon, instead of following strict optimization rules, mental shortcuts and rules of thumb heuristics are used by economic agents in decision making.[29]

Simon (1997) defines bounded rationality as following: *"The term bounded rationality is used to designate rational choice that takes into account the cognitive limitations of the decision-maker, limitations of both knowledge and computational capacity. Bounded rationality is a central theme in the behavioral approach to economics, which is deeply concerned with the ways in which the actual decision-making process influences the decisions that are reached."*[30]

Situations happen to be complex and individuals act this way because they have difficulty processing and calculating the expected utility of each alternative action. Likewise, Bounded rationality was introduced by Daniel Kahneman in 2003 as a model to succeed some of the shortcomings of rational-agent models in economic literature.[31]

The limits of the subjective utility function

When, in the stock market the concept of bounded rationality is applied, the EMH has to be modified to become more reasonable and practical. Subjective expected utility theory serves as the theoretical basis of the EMH. It consists of the following core statements:[32]

1. The decision maker has a well-defined utility function to reflect possible future events. A cardinal number can be assigned to it.
2. The participant is aware of all the available options and he must and can choose.

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[29] Simon, H. (1957). *Models of man*. New York: John Wiley and Sons, Inc.

[30] Simon, H. (1997) Models of Bounded Rationality, Behavioral Economics and Business Organization, Cambridge: *The MIT Press*.

[31] Kahneman, D. (2003). Maps of Bounded Rationality: Psychology for Behavioral Economics. *American Economic Review*, 93 (5), pp. 1449-1475.

[32] Simon, H. (1983) Alternative visions of rationality, *Chapter 5 in Simon, H.A., Reason in Human Affairs, Stanford: Stanford University Press*, pp. 97-113.

3. Events are divided into future groups by the decision maker. He can assign a compatible joint probability distribution to these groups.
4. The expected value will be increased by the decision maker in his utility function.

In standard finance, the subjective utility belongs to the common tools to make investment decisions. Before decisions are made regarding a particular investment, there are individuals, who measure their own advantage according to the mathematical modelling of the desired utility and place it in dependence on the information available about the situations of the market. Consequently, the subjective expected utility (SEU) function provides the theoretical and mathematical foundation used to analyze decisions under uncertainty. Uncertainty about the future is represented in the SEU model by a certain number of possible world scenarios, which are statistically considered to be incidents that are exclusive and thoroughgoing. Possible consequences are represented by a combination of branches (like a decision tree).
Between the 1950s and the1960s, this model had a radical effect on social science and statistical decision theory. By supplementing the computational basis, the SEU model is the root of a broad range of social and economic approaches assumed by rational choices. For instance, the emergence of Bayesian methods of statistical inference, the emergence of game theory in micro economics or the application of decision analysis in engineering. In addition, the SEU model is also the basis for the emergence of expectation utility-based models for optimizing the portfolio and competitive equilibria in financial markets.

Nevertheless, taking a decision, is still not a technical process which can be done by robots. Human beings make those decisions. Consequently, the SEU facade began to crumble in the late 1970s. A considerable body of research on decision behavior has shown that individuals show a number of foreseeable heuristics and biases which are not consistent with SEU theory. Finally, in 2002 various theoretical evidences have been provided which confirms that Capital Asset Pricing Model, EMH, and other conventional theories of finance are able to predict and explain certain events. Nevertheless, academics also started to find anomalies and behaviors, which these traditional theories could not explain.[33] Nevertheless, there were also scientists who began to find inconsistencies and behavioral patterns that could not be explained by these traditional theories. In this way, something developed that complemented existing theories and

[33] Shiller, R. (1999). Human Behavior and the Efficiency of the Financial System. *NBER Working Paper No*. w6375.

the standards of traditional finance. Many financial economists started to believe that stock prices are at the minimum foreseeable in parts. A new generation of economists took this as an opportunity to emphasize psychological and behavioral elements in determination of stock prices. They believed that prices of stocks can reasonably be predicted based on the patterns of past stock price and certain fundamental metrics of valuation. [34]

Considered as the foundation of contemporary financial theory, the EMH was the dominant and most widely accepted investment theory from the early 1960s to the mid-1990s.

1.3 Origin and definition of behavioral finance

Behavioral finance is relatively a recent approach which focuses on combining behavioral and cognitive psychological theory with traditional finance and economics. Its goal is to explain why market participants make improvable or wrong and, therefore, irrational financial decisions.[35] Consequently, psychology, sociology and finance form together the framework of behavioral finance as shown in **Figure 1.2**.

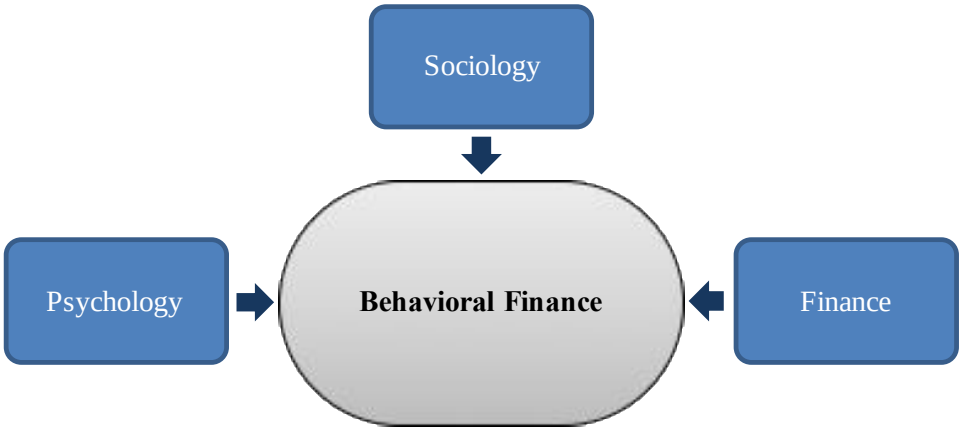

Figure 1.2. **Concept of behavioral finance**[36]

Source: Author's creation

Behavioral economics was officially founded by Daniel Kahneman and Amos Tversky in 1979 with their work on prospect theory and how individuals approach economic risk, even though

[34] Malkiel, B. (2003). The Efficient Market Hypothesis and Its Critics. *Journal of Economic*, 17 (1), pp. 59-82.

[35] Shefrin, H. (2000). *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*. Financial Management Association Survey and Synthesis Series.

[36] Figure created by the author.

economists have been studying financial behavior for centuries.[37] Based on their work, Richard Thaler started working in this field and authored various books and papers and has become one of the most famous name in the field.[38]

The origin of behavioral finance as a disciple date back to 1982, when Kahneman, Slovic and Tversky published their book *"Judgement under uncertainty"*, where the authors showed various behavior patterns that impact investment decisions.[39]

In 2002 Kahneman and Tversky won a Nobel Memorial Prize in Economics. 15 years later, Thaler also won the Nobel Memorial Prize. Thaler can be seen as the founder of the behavioral finance.

In the view of Barberis and Thaler (2003), behavioral finance argues that the deviations from the fundamental value of a stock are caused by the presence of traders who are not entirely rational. There are strategies to correct those mispricing, but they are too costly and risky. Therefore, the mispricing remains.[40]

According to Sewell (2011) behavioral finance studies the impact of psychology on the behavior of investors and the consequent effects of investor's decisions on financial markets. when investors make decisions guided by emotions or intuitions, this describes exactly what behavioral finance studies.[41]

Shefrin (2000) identifies the theory of behavioral finance as a field of study which deals with the impact of psychology on the behavior of market participants.[42]

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[37] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science*, 185 (4157), pp. 1124-1131.

[38] Thaler, R. (1981). An Economic Theory of Self-Control. Journal of Political Economy, 89 (2), pp. 392-406.

[39] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science*, 185 (4157), pp. 1124-1131.

[40] Barberis, N., and Thaler, R. (2002). A Survey of Behavioral Finance. *NBER Working Papers*, No. 9222

[41] Sewell, M. (2011). History of the Efficient Market Hypothesis. *Department of Computer Science University College London*, No. 11/ 04, pp. 1-14.

[42] Shefrin, H. (2000). *Beyond Greed and fear: Understanding Behavior Finance and psychology of investing*. Boston, USA: Harvard Business School Press.

This thesis focuses on studying the effect of behavioral factors on the investment decision process. Therefore, the following part will focus on various definitions and specifications of these behavioral biases.

1.4 Theoretical framework of the different behavioral factors

In this chapter, the nine different behavioral factors and their theories are explained and analyzed. This subchapter will focus on various definitions and specifications of these behavioral biases, which can have an effect on the behavioral factors on the investment decision process.

Heuristics theory

Heuristics derive from the ancient Greek word ευρίσκω (which means to discover) and imply to gain knowledge or a favorable outcome through intelligent guessing rather than through set formulas. Those rules of thumb are simple experience-based problem-solving techniques which explains how financial decisions are made by investors, especially in complicated and unpredictable environments where decision-making is quite tricky.[43]

Tversky and Kahneman (1981) distinguished the impact of human heuristics on the decision-making process. Human beings tend to adopt heuristics that reduce complicated problem-solving to simpler methods of judgement. The heuristic decision-making process involves an investor evaluating the alternatives for himself, usually through trial and error, which consequently leads to formation of rules of thumb. By gaining experience by doing something, these experiences give an impression of how something works. This process leads to formation of some rules of thumb that can then be used in a similar situation. This phenomenon is known as the use of heuristics.[44][45]

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[43] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science,* 185 (4157), pp. 1124-1131.

[44] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science,* 185 (4157), pp. 1124-1131.

[45] Brabazon, T. (2000). Behavioral Finance: A new sunrise or a false dawn? *University of Limerick.*

Generally, such heuristics are pretty helpful, exceptionally when time is short, but sometimes they lead to bias. This is particularly important in modern trading when the amount and density of new information has increased substantially. The use of heuristics makes it possible to speed up the evaluation process as compared to rational processing of the available information. The prominent advantage is saving in time taken, while the main disadvantage is over dependence on past experience. Conventional financial models do not assume the use heuristics and considered that all investment choices are made on the basis of results of statistical tools.[46] [47]

Kahneman and Tversky (1974) also mentioned some behavioral factors belonging to heuristics: Representativeness, Availability bias, and anchoring. Other authors list even additional factors into the heuristic theory. Therefore, the following chapters will focus on the different behavioral factors belonging to heuristics and how those factors can impact the decision-making process of investors.[48]

Overconfidence

"In this most basic form, Overconfidence can be summarized as unwarranted faith in one's intuitive reasoning, judgments, and cognitive abilities". Psychological researchers have discovered that people in Overconfidence, overestimate their knowledge, underestimate risks and magnify their capacity to influence certain events. The theory of overconfidence deduces from a range of experiments which estimates their accuracy of the information given and how easily that information was predicted. Investors are very poor in predicting the events and their possibilities. Events that they believe are certain to occur are often very less. In a few words, participants believe they are more intelligent and have better knowledge than they actually have.[49]

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[46] Ritter, J. R. (2003). Behavioral Finance. *Pacific-Basin Finance Journal*, 11(4), pp. 429-437.

[47] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1(1), pp. 24 -41.

[48] Kahneman, D., and Tversky, A. (1973). On the Psychology of Prediction. *Psychological Review*, 80 (4), pp. 237-251.

[49] Pompian, M. (2006). *Behavioral finance and wealth management. How to build optimal portfolios that account for investor biases*, New Jersey.

Overconfidence *"pertains to how well people understand their own abilities and the limits of their knowledge"*. Overconfident investors always consider themselves better than they actually are, they tend to be too sure of their abilities and knowledge. It does not mean that an overconfident investor in making uninformed decisions or is incompetent, it just means that they are overestimating their skill and consider themselves to better than they actually are. Overconfidence in an investor is reflected when they are making selections regarding stocks. One interesting finding about overconfident investor is that they achieve significantly lower returns as compared to market returns, although they made most trades on average.[50]
Barber and Odean (2001) studied investors based on their gender to test their hypothesis that men are more overconfident than females. Moreover, it was shown that overconfident investors trade in an excessive manner. They found out that male investors have traded nearly 45% more than female investors, and find that men's net returns were significantly lower than women's net return between 1991 to 1997.[51] This was shown as well by Shefrin (2000).[52]

Glaser and Weber (2007) showed that almost 50% of the investors assume that their skills are better than average which helps them in excessive trading.[53] In a study conducted by Odean (1998a), author has identified overconfidence as a trait of human being, not markets, and identified how various traits of human influence the market.[54] Correlation between market returns and overconfidence has been in the preview of research for many years. Daniel et al. (2004) observed that overconfidence results from an overreaction to private information and an underreaction to publicly accessible knowledge results in mispricing of securities.

In 2002, James Montier, a researcher in investment banking at Dresdner Bank, tested the behavior of nearly 300 Portfolio Managers. He asked the respondents whether they think they are above average at their job. More than 74% of the respondents affirmed that. Remaining

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[50] Odean, T. (1998a). Are investors reluctant to realize their losses? *Journal of Finance*, 53 (5), pp. 1775-1798.

[51] Barber, B., and Odean, T. (2001). Boys will be boys: gender, Overconfidence, and common stock investment. *Quarterly Journal of Economics*, 116 (1), pp. 261-292.

[52] Shefrin, H. (2000). *Beyond Greed and fear: Understanding Behavior Finance and psychology of investing*. Boston, USA: Harvard Business School Press.

[53] Glaser, M., and Weber, M. (2007). Overconfidence and trading volume. *Geneva Risk and Insurance Review*, 32 (1), pp. 1-36.

[54] Odean, T. (1998). Are investors reluctant to realize their losses? *Journal of Finance*, 53 (5), pp.1775−1798.

respondents consider themselves to be average. Almost 100% of the respondents consider their job performance to be average or better. This clearly shows the high level of overconfidence of managers.[55]

Fagerström (2008) conducted a research to examine Overconfidence and overoptimism in the market and factors that influence people's decision- making in investment and analysis. The research method of the study is a quantitative back testing exercise using historical data from 1986 to 2008. The data collected summarizes the consensus earnings growth expectations for the companies in the S&P 500 for the next year and compares them to the actual outcome for that time period. The results showed that analysts of the S&P 500 were influenced by Overconfidence problems and showed significant overoptimistic biases.[56]

Bashir et al. (2013) concluded with a correlation and linear regression model that Overconfidence and excessive optimism biases directly impact investors' decision in Pakistan. The data were collected through 150 questionnaires and from teachers, finance students and bank managers.[57]

Kartasova (2013) found behavioral variables which impact decision making of individual investors in the stock market of Lithuania and identified the relationship between demographics of the investors and their level of overconfidence. His findings support that overconfidence has a significant impact on financial decisions.[58]

More recently, Alsabban and Alarfaj (2020) analyzed the investor's irrational behavior, specifically, Overconfidence behavior in the Saudi stock market between by collecting Saudi stock market data from 2007 to 2018 using Bloomberg database. Subsequently, a VAR model was estimated to identify the level of Overconfidence behavior in the Saudi stock market. The result shows that market returns in the past and market turnover are related positively and this reveal that market participants tend to trade excessively, if they get positive returns in the past

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[55] Montier, J. (2002). *Behavioral Finance: Insights into irrational Minds and Markets*. UK: Wiley.

[56] Fagerström, S. (2008). Behavioral Finance: The psychological impact and overconfidence in financial markets. *University of Skövde, School of Technology and Society*, pp. 1-57.

[57] Bashir T., Rasheed U., Fatima S., and Maqsood M. (2013). Impact of Behavioral Biases on Investors Decision Making: Male Vs Female. *Journal of Business and Management*, 10 (3), pp. 60-68

[58] Kartašova, J. (2013). Factors forming irrational Lithuanian individual investors' behavior. *Business Systems & Economics*, 3 (1), pp- 69-78.

month, which clearly depicts their Overconfidence bias.[59] Similar to Alsabban and Alarfaj (2020), Zia et al. (2017) explored the presence of Overconfidence behavior in the Pakistani stock market. They used as VAR model to examine the causal relationship between market turnovers and the stock market returns. The findings of the study depict the Overconfidence of Pakistani investors as market turnover was found to be correlated to returns.[60]

Cherono (2020) analyzed the influence of Overconfidence of the investor in stock market reactions of listed companies in Kenya. The study concluded that in Kenyan stock market, investor Overconfidence bias has a significant effect on stock market reaction.[61] A similar results was shown by Arshad and Sharif (2018) for the Lahore stock exchange (Pakistan).[62] Jannah and Ady (2017) analyzed young Indonesian investors and found that Overconfidence had a significant influence on the investment decisions of young investors.[63]

Self-Control

The behavioral bias and the tendency that makes humans consume today rather than save for tomorrow is attributed to Self-Control. It is the conflict between the superior desires and the inability of the human being, resulting from a lack of self-discipline, to take concrete action in the pursuit of these ambitions. Money is a typical field where people notoriously show a lack of Self-Control.[64] Self-Control means controlling one's emotions. An investor with a good Self-

[59] Alsabban, S. and Alarfaj, O. (2020). An Empirical Analysis of Behavioral Finance in the Saudi Stock Market: Evidence of Overconfidence Behavior. *EconJournals*, 10 (4), pp. 73-86.

[60] Zia, L.; Sindhu, M., and Shujahat Haider Hashmi, S. (2017). Testing Overconfidence bias in Pakistani stock market. *Cogent Economics, and Finance*, 5 (1), pp. 1-8.

[61] Cherono, I. (2020). Investor Behaviour and Stock Market Reaction in Kenya. *European Journal of Economic and Financial Research*, 4 (2), pp. 89-127.

[62] Arshad, M., and Sharif, M. (2018). Impact of Risk on Behavioral Biases across the Stock Market Investors: Evidence from Pakistan. *Research Journal of Finance and Accounting*, 9 (3), pp. 64-79.

[63] Jannah, W., and Ady, S. (2017). Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya. *Ekspektra: Jurnal Bisnis Dan Manajemen*, 1 (2), pp. 138-155.

[64] Hiraguchi, R. (2018). Temptation and self-control in a monetary economy. *Macroeconomic Dynamics*, 22 (4), pp. 1076-1095.

Control will prevent making losses but as well as avoid realizing any gains. However, this investor will also realize the loss to prevent further losses.[65]

Similar to this phenomenon of avoiding both losses and gains, Kleinfield (1983) proposes a strict rule that orders the realization of a loss in order to prevent extreme losses. Consequently, an investor should sell a stock of a company as soon as the decline arrives at a predetermined percentage of the original purchase price of that company, for instance, a drop of ten per cent.[66]

Financial attitude comprises of individual thinking and income and judgement about financial scenarios. Rational and confident investors are said to be in Self-Control. In a study conducted by Hayhoe et al. (1999) a positive relationship has been found between economic attitudes and financial levels. Financial attitude of a person also affects how he controls himself.[67]

Robbins and Judge (2007) analyzed the influence of Self-Control on investment decisions. They found out that Self-Control is all about persons confidence about events and destiny that occur to him.[68]

Byrne (2007) observed that Self-Control affects investment decisions. It was found that less knowledge on financial aspects leads to typical financial behavior and lead investors to make wrong financial plans. Therefore, financial behavior has a significant impact on person's investment decisions. Putri and Rahyuda (2017) also analyzed the correlation between Self-Control and investment decision. They found out the impact of behavior on investment decisions of individuals.[69] [70]

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[65] Thaler, R., and Shefrin, H. (1981). An Economic Theory of Self-Control. *Journal of Political Economy*, 89, (2), pp. 392-406.

[66] Kleinfield, S. (1983). *The Traders*. New York: Holt, Rinehart and Winstion, pp. 1-10

[67] Hayhoe, C., Leach, L., and Turner, P. (1999). Discriminating the number of credit cards held by college students using credit and money attitudes. *Journal of Economic Psychology*, 20 (6), pp. 643-656.

[68] Robbins, S., and Judge, T. (2007). *Organization Behaviour*. Upper Saddle River, NJ: Pearson Prentice Hall.

[69] Byrne, A. (2007). Employee Saving and Investment Decisions in Defined Contribution Pension Plans: Survey Evidence from the UK. *Financial Service Review*, 16 (1), pp. 1-29.

[70] Putri, N., and Rahyuda, H. (2017). The Effect of Financial Literacy Level and Sociodemographic Factors on Individual Investment Decision Behavior. *Economic and Business E-Journal Udayana University*, 6 (9), pp. 3407-3434.

Self-Control has been modelled by economic theory to explain observations that are hard to reconcile with the model of expected utility maximization.[71] A lack of Self-Control can cause humans to make decisions that can thwart their long-run interests, a good example would be an addictive behavior.[72] Overspending also considers to be lack of Self-Control.[73]

Representativeness

Gilovich et al. (2002) explain Representativeness as *"an assessment of the degree of correspondence between a sample and a population, an instance and a category, an act and an actor or, more generally, between an outcome and a model."*[74]

Representativeness is to be associated with determining conditional probabilities. Applying the heuristic and the probability calculus, what would be the likelihood that an event A belongs to the event B was selected. Representativeness is typically used in taking decisions under uncertain situations while humans are asked to judge the probability that A belongs to B.[75] In case A and B are described in the same terms, Representativeness can be reduced to 'similarity'.[76]

Any judgement based on over dependence on stereotypes can be considered as Representativeness. The success of an investor tends to stay in the future. Therefore, the investors' tendency to take decisions on the basis of experience is considered as stereotype.[77]

The Representativeness heuristic can be seen as the tendency to order events in different segments based on only visible characteristics. An investor becomes overconfident, and they

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[71] Samuelson, P. (1937). A note on measurement of utility. *Review of Economic Studies*, 4(2), pp.155-161.

[72] Bucciol, A., Houser, D., and Piovesan, M. (2010). Willpower in children and adults: a survey of results and economic implications. *International Review of Economics*, 57 (3), pp. 259-267.

[73] Heidhues, P., and Koszegi, B. (2010). Exploiting naivete about Self-Control in the credit market. *American Economic Review*, 100 (5), pp. 2279-2303.

[74] Gilovich, T., Griffin, D., and Kahneman, D. (2002). H*euristics and Biases: The Psychology of Intuitive Judgment.* Cambridge University Press, Cambridge.

[75] Tversky, A., and Kahneman, D. (1983). Extension versus Initiative Reasoning: The Conjunction Fallacy in Probability *Judgment. Psychological Review*, 90 (4), pp. 293-315

[76] Tversky, A., and Kahneman, D. (1986). Rational Choice and the Framing of Decisions. *Journal of Business*, 59 (4), pp. 251-278.

[77] Kim. K, and Byun. J, (2011). Studies on Korean capital market from the perspective of behavioral finance. *Asian review of financial research*, 24 (3), pp. 953-1020.

overlook sample size and mean reversion based on representative bias. An investor becomes overconfident, and they overlook sample size and mean reversion based on representative bias. Kim and Byun (2011) analyzed the Korean stock market and found out that investors see a small sample as representative for a whole population, ignoring the sample size and the law of probability. Investors frequently invest in stocks with recently high abnormal returns and the decision-making of investing in those stocks is only because of the Representativeness bias.[78] There exists several literature supporting the argument that Representativeness influence the investment decision-making. The most well-known researchers are Hirshleifer and Teoh (2003)[79], Chandra and Kumar (2011) [80], Sohani (2012).[81]

Representativeness heuristics can affect investor's decisions in two various ways. On the one hand, similar information can be understood as a form of pattern. Therefore, an investor gives more weight to the recent news about a company and overreacts while estimating that specific company's future performance. On the other hand, individuals can expect a reversion to mean if they face a series of similar data of a company even if the sequence of data is too short of applying this law.[82]
Representativeness bias affects investors' decision-making as well as affects stock prices. An investor overweighs a single factor about a firm, ignoring other factors and then overreacting and deciding irrationally. The weightage on noticeable information misleads the investor.[83]

Price Anchoring

[78] Dhar, R., and Kumar,A. (2001). A non-random walk down the main street: impact of the price trends on trading decision of individual investor. *International Center for Finance*, 45, pp. 1-40.

[79] Hirshleifer, D. and Teoh, S. (2003). Herd Behaviour and Cascading in Capital Markets: a Review and Synthesis. *European Financial Management*, 9 (1), pp. 25-66.

[80] Chandra, A., and Kumar, R. (2011). Determinants of individual investor behavior: An orthogonal linear transformation approach. *MRPA Working Paper*, No. 29722, pp. 1-30.

[81] Sohani, I. (2012). Behavioral finance of an inefficient market. *Global Journal of Management and Business Research*, 12 (14), pp. 113-114.

[82] Kaestner, M (2006). Investors' Misreaction to Unexpected Earnings: Evidence of Simultaneous Overreaction and Underreaction. *The ICFAI Journal of Behavioral Finance, ICFAI University Press*, pp. 1-17.

[83] Kirs, P., Pflughoef,. K., and Kroeck, G. (2001). A process model cognitive biasing effects in information system development and usage. *Information, and Management Journal*, 38 (3), pp. 153-165.

Anchoring explains the strong tendency human beings have to stick to a belief - which is not yet shown that it is true or not - and use this as a sort of reference point for later forthcoming decisions.[84]

An individual uses anchoring in the decision-making process to answer complicated situations by determining an initial reference point and gradually changing to reach a final decision. For instance, one of the most popular anchors is a previous event or a past incident. This can lead to systematic and predictable mistakes made. Consequently, this would allow them to improve these decision-making operations in situations of uncertainty. Anchoring occurs when people are faced with an estimation problem. Often the problem occurs with a specific initial value. The value is used to construct the answer and can be seen as an anchor.[85]

The most popular study regarding price anchoring was done by Kahneman and Tversky (1974). They executed a study where a wheel was spun, and the wheel contains the numbers 1 to 100. After spinning the first run, the participants had to answer if the membership for UN by African countries was lower or higher in percentage than the number displayed on the wheel. Afterwards, participants were queried to estimate the rate of UN membership by African countries. It was found that the value (anchoring value of the wheel) significantly influenced the answers of the participants. For instance, when the wheel came on 10, the estimated value given by participants was 25% were as when wheel came at 60, they give estimated value of 45%. Thus, it was concluded that the random numbers on wheel had anchoring effect which brought the estimates closer to the number on the wheel - even though the number did not correlate at all with the question about UN membership of African countries.[86]

More recently, Pena and Gomez-Mejia (2019) analyzed the anchoring and the adjustment biases in South-America (Chile, Colombia, Peru).[87] They found that specifying a starting value, such as the closing price, influences the predicts of the expected future value of the index, as this

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[84] Ricciardi, V., and Simon, H. (2001). Behavioral finance: A new perspective for investors and financial professionals. *Working paper*.

[85] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science*, 185 (4157), pp. 1124-1131.

[86] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science*, 185 (4157), pp. 1124-1131.

[87] Pena, V., and Gomez-Mejia, G. (2019). Effect of the anchoring and adjustment heuristic and optimism bias in stock market forecasts. *Revista Finanzas y Política Económica*, 11 (2), pp. 389-409.

given value serves as an anchor. This can lead to inefficient estimates and ascertain that this type of heuristic strongly influences financial activity.
Different studies have reached comparable results, analyzing how the anchoring heuristic affects several aspects in finance, like the current value of the Price-Earning Ratio (PER) and the expected projection of the dividend yield.[88] [89]

Availability

When a decision maker depends on knowledge which is easily available instead of searching for other alternatives, Availability bias creep in. It is the tendency to determine the chances of happening of certain incident on the basis of how easily we can recall similar situations and, therefore, to overweight present data instead of preparing all essential data.[90]

Kim and Nofsinger (2004) found out that Availability bias could be an efficient stimulus in portfolio decision.[91] Its estimation is based on frequency, probability and causality relationships based on the ease of retrieving information from memory.[92]
The researchers find evidence that recently observed or experienced events strongly influence future decisions.[93]

Humans mind can recover the inspirational and current events quickly. Gholipour (2009) analyzed that the data from the end of a year or month - the more recent data - have more power

[88] Pena, V., and Gomez-Mejia, G. (2019). Effect of the anchoring and adjustment heuristic and optimism bias in stock market forecasts. *Revista Finanzas y Política Económica*, 11 (2), pp. 389-409.

[89] Fisher, K., and Statman, M. (2000). Cognitive Biases in Market Forecasts. *Journal of Portfolio Management*, 27 (1), pp. 72-81.

[90] Kliger, D., and Kudryavtsev, A. (2010). The Availability heuristic and investors' reaction to company-specific events. *Journal of Behavioral Finance*, 11 (1), pp. 50-65.

[91] Kim, K., and Nofsinger, J. (2007). The behavior of Japanese individual investors during bull and bear markets. *Journal of Behavioral Finance*, 8 (3), pp. 138-153.

[92] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science*, 185 (4157), pp. 1124-1131.

[93] Shefrin, H. (2000). *Beyond Greed and fear: Understanding Behavior Finance and psychology of investing*. Boston, USA: Harvard Business School Press

and influence than those from the beginning.[94] The information that is literally at hand and that which is published daily is cognitively unavailable. So, if there is not enough data practically available, the investor's decisions are flawed.[95]

From a psychological perspective, the Availability heuristic can be seen as a cognitive rule of thumb that is limited to popular instant that popping up in one's mind. When people try to make decisions, a group of related incidents or events may instantly come to mind. One may evaluate those instances of events as more frequent and more likely than others. Consequently, one gives more credence to this information and tends to overestimate the likelihood that similar things will happen in the future.

Barber and Odean (2008) observed that investors prefer to consider stocks that have recently come to their attention when making an investment decision. This confirms the Availability bias in the US equity markets.[96] More recently, Babu (2020) explained that the Availability heuristic is considered as a heuristic factor that influence investors' investment decisions in the capital market and stock market in Indian.[97]

More recently, Atmaningrum et al. (2021) analyzed the different factors which affect the investment decision in Indonesia. The authors found out that there is no direct influence of Self-Control on investment decisions, but Self-Control affects financial behavior and financial attitude.[98]

Prospect theory

[94] Gholipour, A. (2009). Effects of Conceptual Errors in Character Investors and its Investment in the Tehran Stock Exchange. *Journal of Financial Research*, 29 (2), pp. 41-58.

[95] Montier, J. (2002). *Behavioral Finance: Insights into irrational Minds and Markets*. UK: Wiley.

[96] Barber, B., and Odean, T. (2008). All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors. *Review of Financial Studies*, 21 (2), pp. 785-818.

[97] Babu, D. (2020). Behavioral Finance Heuristic Driven Factors on Indian Stock Market Investors Investment Decisions: A Review. *Asia Pacific Journal of Research*, 1 (114), pp. 16-19.

[98] Atmaningrum, S., Kanto, D. and Kisman, Z. (2021), Investment Decisions: The Results of Knowledge, Income, and Self-Control. *Journal of Economics and Business*, 4 (1), pp.100-112.

A new theory of risk-taking behavior and uncertainty was proposed by Kahneman and Tversky (1979).[99] The theory came out to be known as prospects theory, which emphasizes on value systems which influence decision making of investors.[100] This is because people tend to underweight supposable outcomes related with certain ones. In the context of losses or gain, even in the same situation people react differently.[101] The theory develops why people are differently risk-averse, they tend to avoid risk in gains and take the risk in losses. This can also explain why individual investors emphasize on avoiding a loss rather than achieving a significant gain.

Kahneman and Tversky (1979) studied anomalies and inconsistencies in human behavior. When a choice is presented in a certain way, subjects might be risk averse, but when the same choice is presented differently, they might exhibit risk taking behavior. They used the example that a person may drive across town to save $5 on a calculator that costs $15, but on the other hand, the same person does not drive across town to save $5 on a $125 coat. A key finding of their study is that people's attitudes towards risks linked to gains can be totally different from their attitudes towards risks that are linked to losses.[102]

Another well-known example of the prospect theory by Kahneman and Tversky (1979) is the following: If people are given the choice of receiving $1000 with 100% certainty or having a 50% chance of receiving $2.500, they will prefer the certain $1.000 to the uncertain chance of receiving $2.500, even if the mathematical outcome of the uncertain choice is $1.250 (50% of $2.500). This is a perfectly consistent attitude described as Risk Aversion. However, when faced with a certain loss of $1.000 versus a 50% chance of no loss or a loss of $2.500, these same individuals often choose the riskier alternative. That kind of behavior is described as risk-seeking behavior.[103]

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[99] Kahneman, D., and Tversky, A. (1973). On the Psychology of Prediction. *Psychological Review*, 80 (4), pp. 237-251.

[100] Filbeck, G., Hatfield, P., and Horvath, P. (2005) Risk Aversion and Personality Type. *Journal of Behavioral Finance*, 6 (4), pp. 170-180.

[101] Lehenkari, M., and Perttunen, J. (2004). Holding on to losers: Finish evidence. *Journal of Behavioral Finance*, 5 (2), pp. 116-126.

[102] Tversky, A., and Kahneman, D. (1974). Judgment under Uncertainity: Heuristics and Biases science. *American Association for the Advancement of Science*, 185 (4157), pp. 1124-1131.

[103] Kahneman, D., and Tversky, A. (1973). On the Psychology of Prediction. *Psychological Review*, 80 (4), pp. 237-251.

A similar sampling and finding were made by Shiller (2013). If a person can choose between a guaranteed $300 versus a 50 per cent chance of winning $1.000 and a 50 per cent chance of losing $400, expected utility theory would argue that the lotteries are the same since both have an expected outcome of $300 ($300 versus ((0,5x$1.000+0,5x(-$400))=$300)). According to prospect theory, the likely loss of $400 might outweigh the potential gain of $1.000 because an investor might strongly prefer the safe $300.[104]

Kahneman and Tversky (1979) have reconstructed the subjective utility theory with a value function that indicates a potential payoff value. Unlike the expected utility theory predictions, the magnitude of negative and positive payoffs is not identical, as seen in **Figure 1.3.** The slope's negative section is steeper than the positive one. Therefore, the absolute value of a loss is greater than the total value of a similar gain. People are risk averse due to losses, which is explained by the utility function being concave for gains, which means that people feel good when they win, but a double gain does not mean they feel twice as good. The utility function is convex for losses, which means that people feel pain when they lose, but a double loss does not mean double the pain. This is where prospect theory gets its name: An investor sees every gamble as a prospect to change his current position, as seen in **Figure 1.3**.[105]

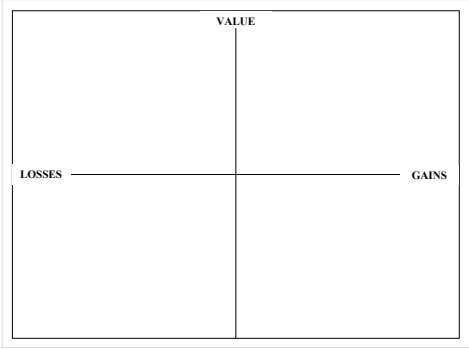

Figure 1.3. **Value Function by Kahneman and Tversky (1979)**

Source: Author's creation

[104] Shiller, R. (1999). Human Behavior and the Efficiency of the Financial System. *NBER Working Paper* No. w6375.

[105] Kahneman, D. and Tversky, A. (1973). On the Psychology of Prediction. *Psychological Review*, 80 (4), pp. 237-251.

Prospect theory estimates three emotional biases that impact investors' decision-making processes; namely: Loss Aversion, Regret Aversion, and Mental Accounting.[106] These three biases are explained in the following sections.

Loss Aversion

Loss Aversion implies that people are willing to take more risks to avoid losses than to realize gains. Consequently, losses have a stronger influence on decisions than gains. Investors are observed to be risk seekers when faced with the prospect of losses. Nonetheless, when they are faced with the prospect of getting gains, they become risk-averse. According to psychologists, Loss Aversion is fundamental to any human being. Kahneman and Tversky (1979) opined that individuals are loss averse than risk-averse, as the pain associated with loss is bigger than the satisfaction received from an equivalent gain. Loss Aversion also makes people opposed to making decisions that may result in changes. This is because humans focus mostly on the chances of loss than gains.[107]

Loss Aversion influences all sorts of decision-making, including monetary ones. It can also lead to a psychological factor called investor paralysis. Thaler and Johson (1990) found out that people are also more opposed to the prospect of losses in the future when they have encountered failures in the past. That reaction appears in investor paralysis.[108] [109]

Loss Aversion causes investors to do away with investment strategies that have a projected long-term profit because their short-term projects are never successful. They fail to adjust their investments' estimated value due to new information, affecting them to sell winners too early and losers too late. Finally, this forces them to change their portfolios' risk-reward profile for

[106] Kengatharan, L., and Kengatharan, N. (2013). The influence of behavioral factors in making investment decisions and performance: Study on investors of Colombo stock exchange, Sri Lanka. *Asian Journal of Finance & Accounting*, 6 (1), pp. 1-23.

[107] Tversky, A., and Kahneman, D. (1983). Extension versus Initiative Reasoning: The Conjunction Fallacy in Probability Judgment. *Psychological Review*, 90 (4), pp. 293-315.

[108] Thaler, R., and Johnson, E. (1990). Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice. *Management Science*, 36 (6), pp. 643-660.

[109] Barberis, N., and Huang, M. (2001). Mental Accounting, Loss Aversion and Individual stock Return. *Journal of Finance*, 56 (4), pp. 1247-1292.

the worse.[110] Even though Risk Aversion is known to be one of the common investor behaviors, it can also result in a bad decision distressing investor's wealth.[111]

In the following, some researches about loss-aversion are reviewed. Malik et al. (2017) examined the presence and influence of behavioral biases such as Overconfidence and Loss Aversion among investors in the Pakistan stock exchange. Their results indicated that the Pakistan stock exchange individual investors were heavily affected by Overconfidence and Loss Aversion.[112] A similar result was found by Kumar et al. (2018) for the Indian stock exchange.[113] Hwang and Satchel (2010) investigated the occurrence of behavioral bias of Loss Aversion in the financial markets of the United States of America and the United Kingdom using asset allocation problems. Their findings confirmed that investors are heavily impacted by Loss Aversion. Furthermore, investors become more sensible to Loss Aversion in times of a bull market than a bear market.[114] Rau (2014) studied the effect of gender on behavioral biases. His study confirmed the influence of Loss Aversion and disposition effect on the gender of investors. The result showed that female investors were more loss averse than males.[115]

Cherono (2020) found out that investor Loss Aversion in the Kenyan stock market significantly affects the stock market reaction. Her study concludes that Loss Aversion has a statistically impact on market reaction.[116]

Rieger (2020) investigates that stock market participation varies a lot thru countries by using data from a large-scale international survey. His research shows that uncertainty avoidance

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[110] Thaler, R. (1981). An Economic Theory of Self-Control. Journal of Political Economy, 89 (2), pp. 392-406.

[111] Ritter, J. (2003). Behavioral Finance. *Pacific-Basin Finance Journal*, 11(4), pp. 429-437.

[112] Mallik, K., Munir, M., and Sarwar, S. (2017). Impact of Overconfidence and Loss Aversion biases on Investor Decision Making Behavior, Mediating Role of Risk Perception. *International Journal of Public Finance, Law & Taxation*, 1(1), pp.14-21.

[113] Hawaldar, I., Naveen, K., and Mallikarjunappa, T. (2018). Pricing and Performance of IPOs: Evidence from Indian Stock Market. *Cogent Economics & Finance*, 6 (1), pp. 1-20.

[114] Hwang, S., and Satchell, S. (2010). How loss averse are investors in financial markets? *Journal of Banking & Finance*, 34 (10), pp-2425-2438.

[115] Rau, H. (2014). The disposition effect and Loss Aversion: Do gender differences matter? *Economics Letters*, 123 (1), pp. 33-36.

[116] Cherono, I. (2020). Investor Behaviour and Stock Market Reaction in Kenya. *European Journal of Economic and Financial Research*, 4 (2), pp. 89-127.

through its influence on Loss Aversion on the country level exhibits a significant impact on the investment decision-making process.[117] His result is similar to former studies in the field of cultural finance that indicate that several of the cultural differences in financial markets act through their influence on behavioral preferences, especially Loss Aversion.[118] [119]

Regret Aversion

Regret Aversion is a psychological error that results from an excessive focus on feelings of regret because a decision was made that turned out to be bad. The root of this type of error is the tendency of individuals to be reluctant to accept their mistakes. Suffering from this bias, investors may avoid certain actions because they fear that the decisions made will be suboptimal in retrospect.

It explains more than just the misery of monetary loss and involves the regret of feeling responsible for a wrong choice.[120] Regret avoidance can lead investors to continue keeping bad performing stocks. Therefore, one goal of regret avoidance is also likely to influence new investment decisions. Investors may tend to avoid companies and specific industries that have recently performed poorly in anticipation of the shame they would feel if they had made the investment and finally lost capital.

Another disadvantage is that it can discourage investors from investing in the market when there has been a downtrend - a bear market for a while - that shows signs of ending, suggesting that it is a potentially good buying opportunity.

The fear of regret often occurs when people hesitate while making decisions. Several empirical studies have shown that regret impacts decision-making in uncertain times. Regret-shy people tend to avoid burdens that result from two types of mistakes. First, commission errors occur as a result of bad decisions, where the investor reflects on his decision and regrets the fact that he

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[117] Rieger, M. (2020). Uncertainty avoidance, Loss Aversion and stock market participation. *Global Finance Journal*, 53 (c), pp.1-19.

[118] Breuer, W., Rieger, M., and Soypak, K. (2016), Corporate Cash Holdings and Ambiguity Aversion. *Review of Finance*, 21 (5), pp. 1933-1974.

[119] Hens, T., and Schindler, N. (2020). Value and patience: The value premium in a dividend-growth model with hyperbolic discounting, *Journal of Economic Behavior and Organization*, 172 (c), pp. 161-179.

[120] Shefrin, H. (2000). *Beyond Greed and fear: Understanding Behavior Finance and psychology of investing.* Boston, USA: Harvard Business School Press.

made it, causing him to question his beliefs. Secondly, errors of omission occur as a result of missing out on an opportunity that was there.[121]

Investors tend to be more regretful about holding falling shares too long than selling winning ones too soon. Psychologists have found out that regret is one of the strongest motivations to make a change in something. To avoid the pain of regret, one may change one's behavior in ways that are sometimes irrational.[122]

In a study of verbal expressions of emotions, Shimanoff (1984) discovered that regret was the most often mentioned negative emotion.[123] Lakonishok and Smidt (1986) found evidence for a significant volume discrepancy, moreover, there was more volume for winners over several periods.[124] Ferris et al. (1988) evaluated thirty stock of US companies and indicated evidence for the disposition effect current volume was negatively correlated with the volume on earlier days when stock prices were on an higher level than current.[125] Odean (1998a) observed a significantly higher tendency to realize paper gains than paper losses in investors accounts.[126] Confirmation for Regret Aversion has also been recognized in areas as varied as sexual behavior[127], negotiation behavior[128] or even health-related decisions.[129]

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[121] Pompian, M. (2006). *Behavioral finance and wealth management. How to build optimal portfolios that account for investor biases*, New Jersey.

[122] Fogel, O., and Berry, T. (2006). The disposition effect and individual investor decisions: the roles of regret and counterfactual alternatives. *Journal of Behavioral Finance*, 7 (2), pp.107-116.

[123] Shimanoff, S. B. (1984). Commonly named emotions in everyday conversations. *Perceptual and Motor Skills*, 58 (2), p. 514.

[124] Lakonishok, J., and Smidt, S. (1986). Volume for Winners and Losers: Taxation and Other Motives for Stock Trading. *Journal of Finance*, 41 (4), pp. 951-974.

[125] Ferris, S., Haugen, R., and Makhija, A. (1988). Predicting Contemporary Volume with Historie Volume at Differential Price Levels: Evidence Supporting the Disposition Effect. *Journal of Finance*, 43 (3), pp. 77-97.

[126] Odean, T. (1998a). Are investors reluctant to realize their losses? Journal of Finance, pp. 1775-1798.

[127] Richard, R., van der Pligt, J., and de Vries, N. (1998). Anticipated regret and precautionary sexual behavior. *Journal of Applied Social Psychology*, 28 (15), pp. 1411-1428.

[128] Larrick, R. , and Boles, T. (1995). Avoiding regret in decisions with feedback: A negotiation example. *Organizational Behavior and Human Decision Processes*, 63 (1), pp. 87-97.

[129] Connolly, T., and Reb, J. (2003). Omission bias in vaccination decisions: Where's the omission? Where's the bias? *Organizational Behavior and Human Decision Processes*, 91 (2), pp. 186-202.

More recently, Kengatharan and Kengatharan (2013) and Luu (2014) discovered that Regret Aversion bias positively impacts investors' decision-making.[130] Charles and Kasilingam (2014) found out that the personality of an individual's investment has played a meaningful role in determining the success of an investment.[131] Personality was identified by the style of attitude, cognition and decision-making. The authors also discovered that personality influenced investment preferences. Khan (2017) recognized the cognitive, decision-making styles and cultural impact of the different investor.[132]

Shah and Malik (2021) analysed the trading frequency in the context of the Pakistan Stock Exchange. The results show that Regret Aversion and Loss Aversion have statistically significant and negative impacts on the trading frequency of individual investors. [133]

Mental Accounting

Mental Accounting was invented by Richard Thaler (1999) as the *"set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities."*[134] Moreover, Mental Accounting refers to how people reflect and evaluate their financial investments and transactions.[135] It starts with the mental coding of prospects (gains and losses), moves on to the framing of options, then mental accounting and ends with decision-making. People divide their money into different accounts for a variety of subjective reasons. Individuals tend to assign different functions to each asset group, which often has an irrational

[130] Kengatharan, L., and Kengatharan, N. (2013). The influence of behavioral factors in making investment decisions and performance: Study on investors of Colombo stock exchange, Sri Lanka. *Asian Journal of Finance & Accounting*, 6 (1), pp. 1-23.

[131] Charles, A., and Kasilingam R. (2014), Does individual's investment personality explore their investment success. *Asian Journal of Management Research*, 5 (1), pp 11-24.

[132] Khan, S. (2017). Financial Risk Tolerance: An Analysis of Investor's Cognitive, Decision-Making Styles and Cultural Effects. *Journal of Finance, Accounting and Management*, 8 (1), pp. 20-38.

[133] Shah, I., and Malik, I. (2021). Regret Aversion and Loss Aversion Emotional Biases in Determining Individual Investors' Trading Frequency: Moderating Effects of Risk Perception. *Humanities & Social Sciences Reviews*, 9 (3), pp 1373-1386.

[134] Thaler, R. (1999). Mental Accounting Matters. *Journal of Behavioral Decision Making*, 12 (3), pp. 183-206.

[135] Barberis, N., and Huang, M. (2001). Mental Accounting, Loss Aversion and Individual stock Return. *Journal of Finance*, 56 (4), pp. 1247-1292.

and negative impact on their consumption decisions and other behaviors. Mental accounting refers to the principles people apply when assessing an investment decision.[136]

Ritter (2003) found out that people separate decisions which in principle should be shared. Many people have a household budget for food and another one for entertainment. For example, at home, with the household budget, one does not eat lobster because it would be more costly than fish. Nevertheless, in a restaurant, one orders a lobster even if it turns out to be more costly than a simple fish dish. If one does not assess the problem separately, one could recognize that it would be cheaper to eat the lobster at home than in a restaurant.[137]

Numerous experimental studies have shown that, in mental accounting people involve in narrow framing, which clarifies the reasons for investors focus on gains and losses which are narrowly defined. Investors who have impacted by the behavior of Mental Accounting, often tend to consider each element of portfolio separately rather than considering them as whole. For instance, if one of the securities in an investor's portfolio performs badly, an investor may regret the specific decision to buy that stock as they consider the gains and losses of the individual stocks in their decisions.[138]

Grinblatt and Han (2005) investigated that Mental Accounting provides a basis for the style in which investors set reference points for the accounts that identifies profit and loss. The central idea is that decision-makers tend to split different types of gambles into separate accounts and then apply Prospect Theory to each account, overlooking any possible correlations.[139]

Lee et al. (2013) has conducted a study and found that mental accounting is a factor which has high influence on the decisions of male investors as compared to female investors.[140]

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[136] Thaler, R. (1981). An Economic Theory of Self-Control. Journal of Political Economy, 89 (2), pp. 392-406.

[137] Ritter, J. (2003). Behavioral Finance. *Pacific-Basin Finance Journal*, 11 (4), pp. 429-437.

[138] Saberi, M., Darabi, R., Hamidian, M. (2020). The Different Role of Mental Accounting on Optimal Portfolio Based on Speculative Bubble. International Journal of Finance & Managerial Accounting, 5 (19), pp. 43-55.

[139] Grinblatt, M., and Han, B. (2005). Prospect theory, Mental Accounting, and momentum. *Journal of Financial Economics*, 78 (2), 311-339.

[140] Lee, Y., Low,W., Ng,C. (2013). Exploring Patient Values in Medical Decision Making: A Qualitative Study. *PLoS ONE*, 8 (11), pp. 1-9.

Investment decisions are largely influenced because people continue to hold the losing stocks and sell the winning stocks.[141]

Herding

Significant social changes influence individuals and it affects the economy, political environment and the financial markets alike. The phenomenon is popular within our species and often starts with a small social nudge. For instance, seeing the actors in a movie smile boosts the likelihood for the individual to smile as well. Herding is a trait that has moved us forward through evolution. Nevertheless, it also creates misconceptions that need to be discussed.[142] Herd behavior arises from following others' logic, where the individual has difficulty determining the right course of action due to lack of knowledge. It is a human characteristic that has prevailed through evolution as a survival mechanism that should increase the probability of survival.[143]

Herding in financial markets as a behavioral factor can be described copying the actions of large group which ultimately leads to similar actions. That can be a typical error where market participants copy the market choices opted by majority of the investors.[144] The Reliance Power IPO (Initial Public Offering), 2008 is an good example where numerous investors participate in the IPO without having full data about the company and the environment. Investors' excitement over the IPO continued despite concerns overvaluation. This IPO was more than 72 times oversubscribed and India's biggest initial public offering. The company had almost no significant assets or even positive cash flow. It benefited solely from the Reliance brand name and the euphoria on the Indian stock markets.

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[141] Jain, J., Walia, N. and Gupta, S. (2019). Evaluation of behavioral biases affecting investment decision making of individual equity investors by fuzzy analytic hierarchy process. *Review of Behavioral Finance*, 12 (3), pp. 297-314.

Grinblatt, M., and Han, B. (2005). Prospect theory, Mental Accounting, and momentum. *Journal of Financial Economics*, 78 (2), pp. 311-339.

[142] Thaler, R., and Sunstein, C. (2009). *Nudge* (2nd ed., p. 33). New York: The Penguin Group.

[143] Prechter, R. (2001). Unconscious Herding Behavior as the Psychological Basis of Financial Market Trends and Patterns. *Journal of Psychology and Financial Markets*, 2 (3), pp.120-125.

[144] Hirshleifer, D. and Teoh, S. H. (2003). Herd Behaviour and Cascading in Capital Markets:a Review and Synthesis. *European Financial Management*, 9 (1), pp. 25-66.

Investors apply to herd behavior because they are concerned about what others think of their investment decisions.[145] Private investors tend to be influenced by recommendations of popular analysts or other professionals. In his study, Welch (2000) discovered that professional analysts could also be exhibiting Herding behavior. Whenever an analyst revised his recommendations, this correlated positively with the following two revisions by other analysts. The revision was strongly impacted by the current market consensus and recent news updates.[146] Sias (2004) analyzed the Herding behavior of 894 American institutional investors. He identified Herding among investment fund managers as a result of reputational Herding, information cascade, investigative Herding and Herding tendencies.[147]

Herd behavior is the tendency of individuals to imitate the actions of a large group, regardless of whether they would make the decision independently. One reason for this is that people are gregarious and generally tend to seek the group's acceptance rather than be an outsider and swim against the stream. Another purpose is that the investor tends to think it improbably that a big group could be incorrect. This might tempt him to follow the herd, under the illusion that the herd might know something he does not.

Tan et al. (2008) conducted a study in which individual firm level returns and sector returns were analyzed on the basis of daily stock return data. Dual listed Chinese shares were analyzed from period of 1996 to 2003. He found the presence of herding behavior in domestic individual investors and foreign institutional investors.[148]

Economou et al. (2010) investigated herd behavior under extreme market conditions using daily data from the Greek, Italian, Portuguese and Spanish stock markets between 1998 and 2008. In addition, they also studied the presence of herd behavior during the 2008 global financial crisis. The results of the study showed that herd behavior is more pronounced in times of rising markets than in times of falling markets.[149]

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[145] Scharfstein, D.; and Stein, J. (2000). Herd Behavior and Investment. *American Economic Review*, 80 (1), pp. 465-479.

[146] Welch, I. (2000). Herding among security analysts. *Journal of Financial Economics*, 58 (3), pp. 369-396.

[147] Sias, R. (2004). Institutional Herding. *Review of Financial Studies*, 17 (1), pp. 165-206.

[148] Tan, L., Chiang, T., Mason, J., and Nelling, E. (2008). Herding behavior in Chinese stock markets: An examination of A and B shares. *Pacific-Basin Finance Journal*, 16 (1-2), pp. 61-77.

[149]Economou, F., Kostakis, A., and Philippas, N. (2010). An Examination of Herd Behavior in Four Mediterranean Stock Markets. *European Economics and Finance Society Conference Paper*.

By analyzing the Taiwanese Stock market, Lin (2011) argued that Herding is a behavior that follows main investors' decision rather than relying on stock price moments that finally impact the risk and return of Taiwanese investors.[150]

More recently, Arshad and Sharif (2018) have also observed with their 188 questionnaires Herding behavior in the Pakistan stock exchange.[151]

Market Factors

DeBondt and Thaler (1995) observed that investor behavior is an important factor influencing financial markets. They discovered that investors tend to over- or underreact to price changes. Investors tend to extrapolate past trends of stock prices into the future. Moreover, investors do not pay enough attention to the fundamentals of a stock. Finally, they showed that investors are biased towards popular stocks and seasonal price cycles.[152]
Besides previously mentioned factors from the Heuristic or the Prospect theory, other factors that impact investment decision-making in the stock market are market information, past stock trends, price changes, consumer preferences, excessive reactions, or changes in stock prices and fundamentals of the underlying company.[153] Those market factors can impact the investors decisions.

Changes in stock fundamentals, market prices and market information impact investors' decision-making behavior. Investors are heavily affected by market information because investors try to concentrate on popular stocks and focus on events that attract a lot of attention

[150] Lin, H.-W. (2011). Elucidating rational investment decisions and behavioral biases: Evidence from the Taiwanese stock market. *African Journal of Business Management*, 5 (5), pp. 1630-1641.

[151] Arshad, M., and Sharif, M. (2018). Impact of Risk on Behavioral Biases across the Stock Market Investors: Evidence from Pakistan. *Research Journal of Finance and Accounting*, 9 (3), pp. 64-79.

[152] DeBondt, W., and Thaler, R. (1995). Does the stock market overreact? *Journal of Finance*, 40 (3), pp.793-808.

[153] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. Int*ernational Journal of Business and Emerging Markets*, 1 (1), pp. 24-41.

in the stock market.[154] Hair et al. (2006) found out, that investors trade stocks with higher past price fluctuations, so price changes are recognized as an exciting incident in the market.[155]

DeBondt and Thaler (1995) found that investor behavior is an important factor influencing financial markets. They discovered that investors tend to over- or underreact to price changes. Investors tend to extrapolate past trends of stock prices into the future. Moreover, investors do not pay enough attention to the fundamentals of a stock. Finally, they showed that investors are biased towards popular stocks and seasonal price cycles.[156]
Barber and Odean (2000) indicate that specific events influenced investors decision-making. These events grab investors' attention, and the investor follows these stocks, even they do not know if this company news can be good for the share price and, therefore, for the future investment performance. This can be linked as well to the Overconfidence biases, which is discussed in the previous chapter. Odean (1998b) found out that overconfident investors trade quite often.[157]

Different price levels and price changes influence investment behavior as well. Waweru et al. (2008) figured out that price changes of public traded companies impact investment behavior.[158] Odean (1999) analyzed investor behavior in the context of volatile stock prices. He found out that investors prefer to buy - instead of sell - a stock that had higher prices changed in recent years.[159] This can be linked to the Herding bias, which is discussed in the previous chapter. Investors tend to swim with the tide when price changes happen.[160]

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[154] Lin, H.-W. (2011). Elucidating rational investment decisions and behavioral biases:Evidence from the Taiwanese stock market. *African Journal of Business Management,* 5 (5), pp. 1630-1641.

[155] Hair, J., Black, W., Babin, B., and Anderson, R. (2010). *Multivariate Data Analysis.* Pearson Higher Education.

[156] DeBondt, W., and Thaler, R. (1995). Does the stock market overreact? *Journal of Finance*, 40 (3), pp.793-808.

[157] Odean, T. (1998b). Volume, volatility, price and profit when all trades are above average. *Journal of Finance*, 53 (6), pp. 1887-1934.

[158] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1 (1), pp. 24-41.

[159] Odean, T. (1999). Do investors trade too much? *American Economic Review*, 89 (5), pp. 1279-1298.

[160] Caparrelli, F., D'Arcangelis, A., and Cassuto, A. (2004) Herding in the Italian Stock Market: A Case of Behavioral Finance, *Journal of Behavioral Finance*, 5 (4), pp. 222-230.

Another market factor is the phenomenon that investors tend to focus on the stock which are popular in the market. But the selection of the stock depends on the preference of the stock. For instance, stocks with good recent performance are preferred by momentum investors, whereas rational investors don't keep those stocks which have not performed well in past.[161]

Past trends in stocks also influence investors' decision-making behavior at some level. In a study conducted by Waweru et al. (2008), they found that before investing, investors frequently interpret the past trends of stocks using technical analysis methods.[162]

Hamidon and Kehelwaletenna (2020) analyzed the impact of behavioral factors on investors' investment behavior at the Colombo Stock Exchange (CSE) in Sri Lanka. Information about the market and the past trends of stocks were two most influential behavioral variable. These two factors are strongly positively related to the investment performance of individual investors.[163] These findings are similar to those of Luong and Ha (2011) on the Vietnamese stock market.[164]

In summary, market factors are often not counted as behavioral factors because they can influence investor behavior. Nevertheless, market factors influence behavioral investors and rational investors in various ways. Consequently, it would not be appropriate to omit market factors when considering behavioral factors. Therefore, market factors are treated as behavioral factors that influence investors' decisions in the stock market.

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[161] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. I*nternational Journal of Business and Emerging Markets*, 1 (1), pp. 24-41.
Odean, T. (1999). Do investors trade too much? *American Economic Review*, 89 (5), pp. 1279-1298.

[162] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1 (1), pp. 24-41.

[163] Hamidon, T., and Kehelwalatenna, S. (2020). The Influence of Behavioral Finance Factors and the Moderating Effects of Contextual and Demographic Factors on Individual Investor's Investment Performance. *Accounting and Finance Researc*h, 9 (3), pp. 1-16.

[164] Luong, L, and Ha, D. (2011) Behavioral factors influencing individual investors' decision making and performance: A survey a t the Ho Chi Minh Stock Exchange. *Umea School of Business, Umea University: China*.

1.5 Summarize on the literature of behavioral factors and the need to further research

In summary, the behavioral factors that influence investor decision-making can be classified into following factors and their short definitions, see **Table 1.2.**[165]

Table 1.2. **Behavioral factors influencing the investment decision-making process**

Behavioral Factors	Definition
Overconfidence	Overconfidence is the behavior of an investor who is confidence in the own ability to outperform, stock trades, knowledge to outperform and pint point market reversals.
Loss Aversion	Loss Aversion is the behavior of an investor who is willing to take more risks to avoid losses than to realize gain.
Herding	Herding is the behavior of an investor who follows the trading actions of other investors, as buying and selling, choice of stock and volume of stock.
Representativeness	Representativeness is the behavior of an investor whose investment decision depends on past earnings and last stock performance.
Price Anchoring	Price Anchoring is the behavior of an investor whose investment decision is based on comparing current stock prices with their past prices and fundamentals, and buying price as a reference point.
Availability	Availability is the behavior of an investor who relies on friend or co-workers' opinions, information from the internet or from the company and believes in financial experts' opinion.
Mental Accounting	Mental Accounting is the behavior of an investor who treatment of portfolio elements and their past performance
Regret Aversion	Regret Aversion is the behavior of an investor whose investment decision is based on low risks, fundamentals, price movements or another investor's opinion.

[165] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1(1), pp. 24 - 41.

Self-Control	Self-Control is the ability of an investor to manage his or her behavior in order to achieve goals, improve positive outcomes, and avoid negative consequences.

Source: Author's creation

Those factors represent an overall snapshot of nearly all behavioral factors that influence the decision-making process of investors. Therefore, they can be used to identify the behaviors of professional investors in Europe.

From reviewing the previous studies and the theoretical background of behavioral finance, the following conclusions can be made: This research agrees with earlier studies regarding the general topic of the influence of the individual investment decision-making process through behavioral factors. A lot of researchers have analyzed the behavioral factors in their local environments and at different stock markets. They all agreed upon the importance and effect of behavioral factors on the individual investment decision-making process. The practical studies applied a similar research tool, a questionnaire. Many studies were focused, for instance, only on one single behavioral factor and its consideration in analysis and security.
Furthermore, many studies focused only on individual investors and not on professionals like Portfolio Managers. There are two reasons behind that: First, it is much easier to access private investors instead of professionals. Secondly, it is much anticipated that private investors are much more affected by behavioral factors than professionals.

Therefore, this thesis differs from the previous studies mentioned above because it studies the nine behavioral factors altogether and not only one. In addition, this study is practical, while many studies done in this field were only theoretical and integrated previous studies into one body. Moreover, and importantly, the research is focused on professional investors, and therefore, this thesis will close the gap in the literature about behavioral factors influencing professional investors.

2 MODELLING AND CONCEPTUAL FRAMEWORK OF THE RESEARCH OF BEHAVIORAL FACTORS AFFECTING THE INVESTMENT PERFORMANCE AND THE DECISION-MAKING PROCESS IN EUROPE

2.1 Introductions

This chapter looks at the current situation of Portfolio Managers in Europe and their decision-making process as well their investment performance. The investment performance is typically measured by its fluctuation in price. As every mutual fund can be seen as a stock price, an increase in the price is a good performance. Conversely, a decrease in price is a poor performance.

Moreover, this chapter explains the research design of the study and the methods used to collect and analyze data. It starts by discussing the choice of research design by comparing it with other types. It then continues with respondents' selection using stratified sampling technique to have a representative sample of Portfolio Managers. Finally, the main research questions and the hypotheses are elaborated.

Data collection methods, namely the self-completion questionnaire and semi-structured interviews, are also reviewed, followed by explaining the questionnaire design and the measurements.

This chapter also shows how the data analysis is carried out on software like Stata, SPSS, and MATLAB. Moreover, this chapter will highlight the statistical tests applied. For this work, descriptive statistics, factor analysis and SEM were used.

2.2 Investment Performance and the decision-making process

2.2.1 Decision-making of investment in stocks

An investor as a decision-maker uses investment decisions based on his appetite for risk and return. The outcome of a decision ends in either a profit or a loss based on a mix of strategy and the prevailing state of nature at that time. The investor as decision maker has no influence on the states of nature prevailing in the future (i.e. the investor has no direct influence on the invested company). However, the future states of nature influence the strategy that an investor can adopt. Therefore, the decision-making process depends on the knowledge and assessment of how a specific future state of nature will affect the outcome of the specific strategy. Therefore, the valuation of a company is important. Classical decision-making theory and

valuation theory are based on the assumption that investors are rational, always trying to maximize their wealth and that share prices represent the fundamental value of the underlying company. The difference between a fundamental and a speculative value of a share is essential. The fundamental value of a share can be seen as the value of a stock investment held over the long-term. The speculative value, on the other hand, is the value that can be achieved through short-term trading.[166]

The share valuation process follows four major steps:

1. Forecast of the cash flows expected in the future
2. Prediction of the share price
3. Calculation of the present value of these cash flows, which represents the intrinsic value of the share
4. Comparison between the intrinsic value of the share and the current market price and finally the decision: to buy or sell this share.

There are a number of different valuation methods; therefore, the three most common methods are explained below. First, the discounted cash flow model or the capitalized earnings method. The capitalized earnings method, or commonly referred to as the discounted cash flow (DCF) model, is a common method for valuing an entire business. This method is based on the use of the concept of present and future value, which is well known in the financial world. The value of any investment can be estimated as the present value of the future cash flows generated by that investment. Cash flow (CF) represents the net cash payments that an investor will receive in a given period for holding a particular security.

$$PV = \frac{CF_1}{1+k} + \frac{CF_2}{(1+k)^2} + \cdots + \frac{\frac{TCF}{k-g}}{(1+k)^{n-1}}, \quad (1)$$

where CF_n: is the expected cash flow in year n;

TCF: is the terminal cash flow or expected cash flow overall;

k: is the discount rate;

g: is the expected growth rate of the dividends;

n: is the number of years included in the model.

[166] Tversky, A. (1990). The Psychology of Risk. *Association of Investment Management and Research*, pp. 62-73.

The Dividend Discount Model (DDM) is another common model. This model is based on the DCF model and assumes that the valuation of a share price is based on the assumption that the sum of all future dividends discounted back to present value is equivalent to current fair share prices.

In general, the DDM provides a simple method for estimating a fair share price from a mathematical point of view with only some input variables. However, the model relies on several assumptions: an accurate prediction of future dividend payments, the growth of dividend payments and the cost of equity. The correct prediction of all variables is quite tricky and therefore the theoretical fair share price is far from reality.

$$PV = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_n}{(1+k)^n}, \quad (2)$$

where D_n: is stock dividend for the period n;

The forecasted dividends during the long-term valuation period of dividends are the key factor determining the present stock value. The formula calculates the expected growth rate in dividends as following:

$$g = \frac{D_t - D_{t-1}}{D_{t-1}} \quad (3)$$

There are various types of DDM, depending upon the assumptions about the expected growth rate of the company dividend. The simplest version is the model with zero dividend growth:

$$PV = \frac{D_1}{k} = \frac{D_0(1+g)}{k} = \frac{D_0}{k_0} \ with\ g = 0 \quad (4)$$

The Gordon Growth Model (GGM) is one of the most commonly used variants of the dividend discount model. The model is named after the American economist Gordon (1959) and is based on the assumption that the stream of future dividends will grow at a constant rate for an infinite time in the future:[167]

$$PV = \sum_{t01}^{\infty} D_n \frac{1+g}{(1+k)^t} \ or\ PV_{Gordon} = \frac{D_1}{k-g} \quad (5)$$

For all previously discussed models like the DCF, DDM and GGM, the rational decisions-making for an investor in a stock, with the $V = current\ share\ price$, should be as following:

- If $PV < V$, the decision should be to buy the stock, because it is undervaluated.
- If $PV > V$, the decision should be to sell the stock, because it is overvaluated.

[167] Gordon, M. (1959). Dividends, Earnings, and Stock Prices, *Review of Economics and Statistics*, 41 (2), pp. 99-105.

- If $PV = V$, the stock is valuated at the same range as in the market and its current market price shows the intrinsic value. Therefore, the decisions would be indifferent.

Another quite common and practical way to judge a stock is the valuation using multiple, where the ratio analysis is essential. Ratio analysis converts raw information from the financial statement of a company into a more comparable form. The main idea is that with the help of the ratio analysis, the valuations of different companies can be compared. There are various financial ratios. The most common ratios are listed in the **Appendix**.

The financial ratios can be divided into five categories. Firstly, the profitability ratios quantify the earning power of the company. Secondly, liquidity ratios measure the company's ability to repay its liabilities. Thirdly, debt ratios scale the ability to repay debt obligations over time. Fourthly, asset-utilization ratios quantify the efficient use of assets. And finally, market value ratios reflect the market value of a company.[168]

The most common used multiply is the Price Earning Ratio (PER):

$$PER = \frac{P}{EPS} \quad or \quad P = EPS \times PER, \tag{6}$$

where P: is the market price of the stock;

EPS: is the earning per share.

The current stock price and the earnings measures are public available and, therefore, easy to get. The observed PER for a company or an industry derives directly from those public data. So the interesting part would be how the PER differs from the observed PER. Therefore, it is essential to differentiate between the observed PER with normative PER or what the PER should be according to the analyst:

$$PER_{nor} = \frac{V}{EPS_0}, \tag{7}$$

where PER_{nor}: is the normative PER for that stock;

V: is intrinsic value of that stock;

EPS_0: is the earning per share for the last period.

An investor should keep in mind that the PER_{nor} should be the same as peer companies or the industry average. Therefore, the rational decisions-making for an investor in a stock using the multiples valuations should be as following:

[168] Vause, B. (2009). *Guide to Analysing Companies*. 5th ed. The Economist Books/ Profile Books.

- If $PER_{nor} > PER_x$, the decision should be to buy the stock, because it is undervaluated.
- If $PER_{nor} < PER_x$, the decision should be to sell the stock, because it is overvaluated.
- If $PER_{nor} = PER_x$, the share is valued in the same range as in the market. In that case, the decision depends on the further information (i.e. another different multiple) of investor.

The PERs across different industries differs quite a lot because the PER is a synthetic measurement of different equity value drivers. The PER increases when the profitability (margin) and the growth rate of a company increase. On the other hand, the PER decrease when the risk of the company increases. Interest rates and the risk-free rate affects the PER as well.

2.2.2 Investment Performance of the European stock market and Portfolio Managers

The antagonists of behavior finance argue that the bad performance (absolute as well as relative wise) of investors who tend to behave irrationally will be forced to leave stock market. Meaning, no investor will survive if he is underperforming the market for years. This holds the same theory by the neo-classical researchers Friedman (1954), who argues that trading losses will force the imperfectly rational traders to leave the market.[169]

Other researchers found out that overconfident investors who have an extremely high trading behavior benefit from abnormal returns. An overconfident investor trades much more than a rational investor but expects a higher return in the long run. Interestingly, in the study conducted by Wang in 2001 it was found out that both underconfidence and Overconfidence does not exist in long run.[170]

In the study conducted by Kim and Nofsinger in 2007, ownership in Japanese stocks in bull and bear markets were analyzed. The major finding of their work was that if any stock which is facing high degree of change in ownership were actually winners in past. Whereas stocks which faced decrease in individual ownership were loser in past. All this can be attributed to

[169] Friedman, M (1954). Essays in Positive Economics. *Economic Journal*, 64 (256), pp. 796–799.

[170] Wang, F. (2001). Overconfidence, Investor Sentiment, and Evolution. *Journal of Financial Intermediation*, 10 (2), pp. 138-170.

disposition effect, which condition investors to sell winning securities whereas keeping losing securities.[171]

Oberlechner and Osler (2004) found out that overconfident currency dealers are not pushed out of the market, which is in contrast to previous studies and contrary to the neo-classical view. Moreover, they identify the different stages of Overconfidence in the investment performance on the basis of rate of return on the investment and their trading experience. They found out that the return on investment is not affected by Overconfidence. Whereas, the experience of trading is influenced by Overconfidence of the investor.[172]

The investment performance of the European stock market can be seen by the different mutual funds in Europe. Every public mutual fund in Europe and its Portfolio Manager is listed on Bloomberg. Bloomberg provides financial software tools and business applications such as analytics and stock trading platforms, data services and news for financial companies and organizations. Every listed mutual fund and their performance can be tracked by Bloomberg. The investment performance is typically measured by its fluctuation in price. As every mutual fund can be seen as a stock price, an increase in the price is a good performance. Conversely, a decrease in price is a poor performance. Moreover, as every mutual fund must have a benchmark, the mutual fund which has a better return as its benchmark, outperformed the benchmark. When the mutual fund had a worst performance than its benchmark, the Portfolio Manager of that fund underperformed the benchmark.

At the time of March 2021, there are 2.865 different mutual funds in Europe, which are investing only into the European equity market. The total amount of AUM is at the time of March 2021 over Bn. 360 EUR in those European mutual funds.[173]
Each mutual fund has a particular – own set – benchmark. The goal of each Portfolio Manager is to beat this specific benchmark. Thereby that new mutual funds are founded in the last years,

[171] Kim, K., and Nofsinger, J. (2007). The behavior of Japanese individual investors during bull and bear markets. *Journal of Behavioral Finance*, 8 (3), pp. 138-153.

[172] Oberlechner, T. and Osler, C. (2004). Overconfidence in currency markets. *Working Papers from Brandeis University, Department of Economics and International Businesss School*, 2, pp. 1-40.

[173] Bloomberg at 28.3.2021 and author's own calculations, See more Appendix.

and only 1.533 mutual funds are analyzed. Those mutual funds persist at least five years in Europe.[174]

The average performance of those 1.533 European funds is 33,2% in the timeframe between 2016 to 2020. Interestingly, their own set benchmark has an average return of 38,5%.
The returns have to be compared to the two main indices in Europe: The EURO STOXX 50 and the MSCI Europe Indices. The EURO STOXX 50 Index includes the biggest companies in the region. The index covers 50 stocks from 8 Eurozone countries: Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands and Spain. Whereas, the MSCI Europe Index captures large and mid-cap companies across 15 Developed Markets countries in Europe.
With 434 components, the index covers approximately 85% of the free float-adjusted market capitalization in Europe. The return of the MSCI Europe was 5,8% worse than the average European fund, whereas the EURO STOXX 50 was only 3,2% worse. This can be seen in **Table 2.2.**

Table 2.1. **Performance of European Equity Funds between 2016 to 2020**

Year	average Funds in %	Average Benchmarks in %	MSCI Europe Index in %	EURO STOXX 50 Index in %
2016	5,1%	6,8%	3,2%	4,8%
2017	13,2%	14,8%	10,3%	9,3%
2018	-12,3%	-11,0%	-10,1%	-11,0%
2019	24,7%	26,7%	26,8%	29,4%
2020	2,5%	1,2%	-2,8%	-2,6%
2016 - 2020 accumulated	33,2%	38,5%	27,4%	30,0%

Source: Author's creation[175]

As highlighted above, the goal of an active managed mutual fund is to outperform the market, especially the individual benchmark. **Figure 2.1.** shows the outperformance and underperformance of the European mutual funds regarding their benchmark. For instance, more

[174] Bloomberg at 28.3.2021 and author's own calculations, See more Appendix.

[175] Bloomberg at 28.3.2021 and author's own calculations, See more Appendix.

than 67% of all 1.533 European mutual funds have underperformed their own benchmark in the timeframe between 2016 to 2020. This can be seen in the in the **Appendix.**

Figure 2.1. **Under- and Outperformance of European Equity Funds between 2016 to 2020**

Source: Author's creation[176]

The findings are essential in contrast to the different methods to measure an investment performance. Previous authors - i.e., Kim and Nofsinger (2003) measured the investment performance on the basis of investment results of individual investors in security markets using secondary data. Professional investors were asked to judge their own investment performance, which follows Oberlechner and Osler's research (2004). The rate of return of a stock was evaluated by comparing their current performance to expected returns and average market return. Thus, the comparison is said to be subjective as well as objective.[177]

[176] Bloomberg at 28.3.2021 and author's own calculations, See more Appendix.

[177] Oberlechner, T., and Osler, C. (2004). Overconfidence in currency markets. *Working Papers from Brandeis University, Department of Economics and International Businesss School*, 2, pp. 1-40.

Additionally, the satisfaction level of investment decisions is as well suggested as a criterion as an investment performance measurement. In reality, investors feel happy with their own investment performance even if their investment profits are not high or better than the market return. On the other hand, other investors do not feel satisfied with their investments even when their profits are extremely high. Therefore, the satisfaction level of investment decisions and the investment performance are suggested as the investment performance measurements in this thesis.

2.3 Research model and research design of behavioral factors affecting the investment decision-making and the investment performance

This subchapter explains the research design of the study and the methods used to collect and analyze, as seen in the **Figure 2.2**.

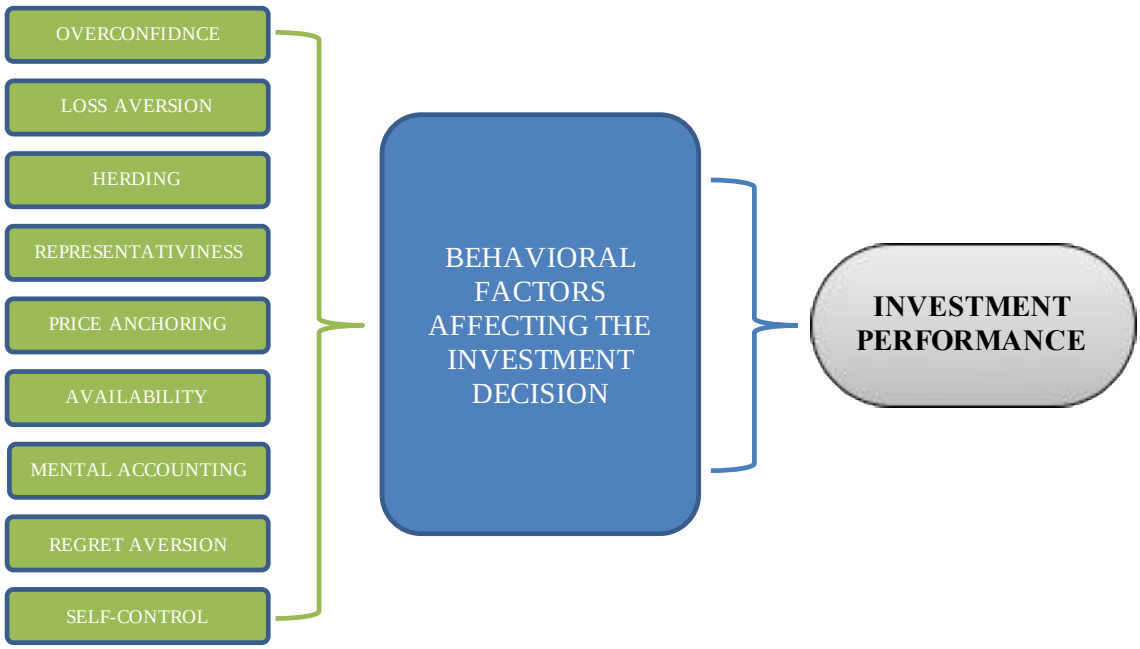

Figure 2.2. **Research Model**

Source: Author's creation

Research design gives the framework for data collection and analysis.[178] It can also be transferred to a scheme, plan, or outline used to create solutions to research problems.[179] To understand individual investors' common behaviors, cross-sectional design fits well. Case study, experimental design or longitudinal design will not work For understanding, the relationship between variables, experimental design is used. Two groups are established in experimental design; one is called experimental group, and the other one is a control group, differences between the two groups are compared. The case study examines the variables in one particular case. The longitudinal design is employed to study the changes in variables and its cause and effect over the period of time. The present study examines a large sample at a single time to study the impact of behavioral factors on the investment performance. Hair et al. (1998) suggests statistical methods in data analysis works well if the surveyed sample is more than 100 respondents.[180]

Hence, the cross-sectional design is used in the present study. The association between the variables is then examined by using the collected quantitative data.[181] This study is beneficial because it allows collection of quantitative and qualitative data appropriate for this descriptive method. The quantitative data is collected through survey research and structured observation on a single sample.[182]

Quantitative data about the opinion, attitude, behavior, or values of professional investors of Europe was collected through survey research. The most widely used data gathering tool is field survey as it can report the attitudes and opinions of investors which represents the relationship between the variables that serve as a basis for further research.

To get a profound understanding of investor's behavioral factors that influence investment decision-making style and performance, qualitative research strategy was used. Smith (1987)

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[178] Williams, C. (2007). Research Methods. *Journal of Business & Economics Research*, 5 (3), pp. 65-72.

[179] Kamau, C. (2013), What does being initiated severely into a group do? The role of rewards. International *Journal of Psychology*, 48 (3), pp. 399-406.

[180] Hair, J., Black, B., Babin, B., Andersion, R., and Tatham, R.. (1998). *Multivariate data analysis*. Prentice-Hall, International, Inc.

[181] Rinaldo, R., & Guhin, J. (2022). How and Why Interviews Work: Ethnographic Interviews and Meso-level Public Culture. *Sociological Methods & Research*, 51 (1), pp. 34-67.

[182] Queirós, A., Faria, D., and Almeida, F. (2017). Strengths and Limitations of Qualitative and Quantitative Research Methods. *European Journal of Education Studies*, 3 (9), pp. 369-387.

describes using a qualitative-research strategy to collect data representing a picture of events, situations and interactions with people and things. Therefore, besides the questionnaires, this study used ethnography and semi-structured interview method to collect data from Portfolio Managers in Europe.[183]

The ethnographic method allows understanding Portfolio Managers' perceptions through direct observations to get some deeper involvement to study their behavior. Harris and Johnson (2000) define ethnography as the description of a particular culture's attitudes, beliefs, and behavior. With ethnographic observations, we also employ an interview technique to get detailed insight into the behavior of Portfolio Managers in Europe.[184]

Therefore, interviews are conducted with professional investors who have above 26 years' experience at European stock exchange. The maximum time for an interview was around 41 minutes and the minimum time is 25 minutes.

Thus, ethnography provides the opportunity to observe the behavior of Portfolio Managers in Europe. At the other time, the semi-structured interview guides us to conclude whether behavioral factors influence investment decisions or not. The data are analyzed through the software Nvivo. To understand the patterns of behavior which influence the investment decisions, thematic analysis as well content analysis are applied. The word tag cloud, word tree-map and word tree are given in the analysis of the study.

2.4 Data collection method and sample selections

Structured Interview, semi structured interview, unstructured interview, questionnaire, observation and group discussions are various methods of data collection available to a researcher. For the purpose of present study, structured questionnaire was used to collect quantitative data and qualitative data were gathered using semi-structured interview.

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[183] Smith, M. (1987). Publishing Qualitative Research. *American Educational Research Journal*, 24 (2), pp. 173-183.

[184] Harris, M., and Johnson, O. (2000) Cultural Anthropology. 5th Edition, Allyn and Bacon, Needham Heights.

The questionnaire is most popular methods of collecting quantitative data. This approach is preferred for some reasons. For instance, the question which researcher wants to ask, are clearly defined. Therefore, questionnaires are the best alternative to collect data, which is easy to process, analyze and interpret. Another important fact is that the result and answers are not influenced by the interviewers or a group. Furthermore, this method is more economical than other methods. As the research is about European investors, it would be a costly affair if face-to-face interviews are conducted.[185]

Another significant advantage of using the questionnaire method is that it saves a lot of time by sending it out at once. Since the respondents of the present study are the professional investors, they may be too busy to answer through personal interview. Moreover, questionnaires are more time flexible because they can fulfil the questionnaires whenever they have free time. Respondents give honest answers while answering questionnaires than in a personal interview. This is even quite relevant because the respondents are supposed to provide very sensitive information.

Saunders et al. (2009) divided questionnaires in two different ways:[186]

1) Postal questionnaire: In this channel, questionnaires were mailed directly to respondents, and they were asked to answer by mail or submit the questionnaire to some specific person.
2) Delivery-collection questionnaire.: In this method researcher personally hand over the questionnaire to the respondents and takes back right after the questionnaire is completed.

In this research, postal questionnaire method is selected due to the distance constraint between European countries and the Covid-19 pandemic. Questionnaires were sent to the investors in Europe via brokers of investment companies. Since the relationship between investors and brokers is strong, it was expected that the response rate would be high.

Every Portfolio Manager in Europe with a public mutual fund is listed on Bloomberg. In Europe, there are 2.865 different mutual funds, which are investing only in the European equity market. From 1.963 of the total 2.865 mutual funds, names and surnames of the Portfolio Manager are available. Portfolio Managers do sometimes have even more than one fund.

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[185] Queirós, A., Faria, D., and Almeida, F. (2017). Strengths and Limitations of Qualitative and Quantitative Research Methods. *European Journal of Education Studies*, 3 (9), pp. 369-387.

[186] Saunders, M., Lewis, P., and Thornhill, A. (2009) Research methods for business students, Fifth edition. Italy: Pearson Education Limited.

Therefore, the list with different Portfolio Managers is reduced further to 1.187. The author sent to these Portfolio Managers as well a Mail with the questionnaire.

Besides the structured questionnaire, semi structured interviews were also used. Expert interviews provide a deeper understanding of the results and help in better understanding the behavior of respondents. Due to Covid-19, interviews were conducted online through video calls using Zoom and Microsoft Teams. Semi structured interviews are less standardized method of collecting data.[187] A list of questions on the basis of topics to be covered, is being prepared and sent before the discussion to the interviewees. Consequently, deep information and knowledge about the financial behaviors and the decision-making process are obtained through the expert's discussion.

There are two types of data used in this thesis. Primary data was collected from the questionnaires as well as from the expert interviews. The questionnaire and the interview were framed in such a way to get acknowledgements from the respondents, who are Portfolio Managers.
Published data or also known as secondary data was collected from various journals and books on finance and financial markets. Secondary data were also obtained from Bloomberg regarding the different performance and benchmarks of Portfolio Managers in Europe.

Summing up, this study used both quantitative and qualitative data. Quantitative data was collected through questionnaires whereas qualitative data was collected from interviews with eleven Portfolio Managers. The collected data provide basic understanding of the factors affecting the decision-making of professional investors.

As this research investigates the behavioral factors of professional investors in European stock exchange, a relatively bigger sample size is required. The bigger the size of sample is, the result is more reliable because it is more representative. For example, Hair et al. (1998) have

[187] Saunders, M., Lewis, P., and Thornhill, A. (2009). *Research methods for business students*, Fifth edition. Italy: Pearson Education Limited.

suggested that responses from at least 100 respondents should be examined for effective statistical methods of analyzing data.[188]

In Europe, there are nearly 1.200 different Portfolio Managers of mutual funds. Therefore, the goal is to get as many as possible responses. Consequently, questionnaires are sent to them directly in the hope to receive at least 100 responses. Moreover, the questionnaires are sent to brokers of leading European Investment Banks and were requested to send to individual investors.

As mentioned in the previous part, after having the results from data analysis of the questionnaires, expert interviews with Portfolio Managers are conducted to have a more profound understanding of the financial behaviors of professional investors in Europe. Therefore, Portfolio Managers in Europe were kindly asked to help with an interview.

Invitations for an expert interview are sent to respondents using convenience sampling. Eleven Portfolio Managers are interviewed. Since these managers are responsible for different European mutual funds for years, they must have deep knowledge and experience of the stock markets and investors behaviors.

2.5 Design of measurements and questionnaire

In the following session, the different design of the questionnaire is reviewed. The questionnaire is segmented into three sections: personal details about the respondents, behavioral factors influencing investment decisions, and investment performance.

In the first part of the questionnaire, personal information about the respondents is collected. The nominal and ordinal measurements are used. The nominal data categorizes the items on the basis of their names, categories or other qualitative classifications. The ordinal data allows for

[188] Hair, J., Black, W., Babin, B., and Anderson, R. (2010). *Multivariate Data Analysis*. Pearson Higher Education.

a specific ranking.[189] For analyzing the personal information of the respondents, various measurement scales used are presented below in **Table 2.2.**:

Table 2.2. **Types of measurements for personal information of the respondents**

Personal Information	**Questions No.**	**Types of Measurement**
Classifying: gender and investment type	Questions 1, 7	Nominal Type
Classifying and rank order: Age, educational level, working years, asset under management, monthly income	Questions 2, 3, 4, 5, 6	Ordinal Type

Source: Author's creation

The questionnaire is based on different theories of behavioral finance, which are discussed in the first part of this thesis: Overconfidence, Loss Aversion, Herding, Representativeness, Price Anchoring, Availability, Mental Accounting, Regret Aversion, Self-Control.

The standardized 5-point Likert scales are used. According to Menike et al. (2015) and Bakar and Yi (2016), in a Likert type scale, information about the degree of their agreement is collected. The Likert scale aids in getting answers from respondents about their agreement and disagreement degrees about the items of the study. A 5-point Likert scale includes ranking from 1 to 5 respectively: strongly disagree, disagree, neutral, agree and strongly agree.[190] The scale is popular, easy, and time-efficient. Likert scales are certainly more reliable and provide a greater quantity of data as compared to than other scales.[191] [192]

[189] Williams, C. (2007). Research Methods. *Journal of Business & Economics Research*, 5 (3), pp. 65-72.

[190] Menike, L., Dunusinghe, P., and Ranasinghe, A. (2015). Behavioral factors influence on investment performance: A survey of individual investors at Colombo Stock Exchange. *Proceedings of 10th Annual London Business Research Conference 10 - 11 August 2015,* Imperial College, London, UK, 978 (1), pp. 8-81.

[191] Smith, M. (1987). Publishing Qualitative Research. *American Educational Research Journal*, 24 (2), pp. 173-183.

[192] Chyung, S., Swanson, I., Roberts, K., and Hankinson, A. (2018), Evidence-Based Survey Design: The Use of Continuous Rating Scales in Surveys. Performance Improvement, 57 (5), pp. 38-48.

The 5-Likert scale offers this neutral classification, which can be an advantage in the case of complex statements on which the respondents have not formed an opinion or could not form one. A Likert scale with even answer options would force the respondent to take a position (acceptance or rejection) in such situations. Fewer choices make differentiated analysis difficult, and the level of information is low. With more than five options, studies have shown that respondents increasingly choose options randomly. For this reason, the 5-Likert scale has prevailed in practice.[193]

A Likert scale provides more information than binary questions, which only allow two choices, thus the analyses have a stronger significance. The high flexibility of the Likert scale allows the questioners to adapt the scale level to the item, while still allowing a time-efficient analysis of the results, unlike, for example, a question where the respondents can write a text. The simple quantification of the response options and the resulting calculation of the standard deviation also allows the range of responses to be reflected. [194] This is summarized in **Table 2.3**.:

Table 2.3. **Types of measurements of behavioral factors influencing investment decisions**

Behavioral Factors	**Questions No.**	**Types of Measurement**
Overconfidence: Experienced investor, confidence in own ability to outperform, stock trades, knowledge to outperform and pint point market reversals	Questions: I a; I b, I c, I d, I e, I f, I g	5-point Likert
Loss Aversion: Losing vs. gaining, nervous by losing and investment decision in poor market environment,	Questions II a; II b, II c, II d, II e, II f, II g	5-point Likert
Herding:	Questions III a; III b, III c, III d	5-point Likert

[193] Dawes, J. (2008). Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. *Journal of the Market Research Society*, 50 (1), pp. 61-77.

[194] Eutsler, J., and Lang, B. (2015). Rating scales in accounting research: The impact of scale points and labels. *Behavioral Research in Accounting*, 27 (2), pp. 35-51.

Following the trading actions of other investors, as buying and selling, choice of stock, volume of stock, and speed of Herding		
Representativeness: Investments defending on past earnings and last stock performance, hot stocks vs. poor stocks	Questions IV a; IV b, IV c, IV d, IV e, IV f	5-point Likert
Price Anchoring: Comparing current stock prices with their past prices and fundamentals, and buying price as a reference point	Questions V a; V b, V c, V d, V e, V f	5-point Likert
Availability: rely on friend or co-workers' opinions, information from the internet or from the company and believe in financial experts' opinion	Questions VI a; VI b, VI c, VI d, VI e, VI f, VI g	5-point Likert
Mental Accounting: treatment of portfolio elements and their past performance	Questions VII a; VII b, VII c	5-point Likert
Regret Aversion: investment decision based on low risks, fundamentals, price movements or another investor's opinion	Questions VIII a; VIII b, VIII c; VIII d, VIII e	5-point Likert
Self-Control: gender and investment type	Questions IX a; IX b, IX c, IX d, IX e,	5-point Likert

Source: Author's creation

The drafted questionnaire was tested and checked by the Supervisor and three other professional investors before finalizing the questionnaire.

2.6 Data process and analysis

Data was processed and analyzed by using statistical software like SPSS, AMOS as well as NVivo-11. Regarding the different data processes and methodologies, the methodology of the semi-structured interviews is explained first. After that, the main method with the data of the questionnaires is defined.

To get a detailed understanding of behavioral factors that influence the investment decision-making style of Portfolio Managers in Europe, qualitative research strategy was used. As Smith (1987) already highlight, the reason for adopting qualitative research strategy is to collect data that portray an accurate picture of events, situations and interactions with people and things. So in this study, an ethnography and semi-structured interview method is used to collect data from Portfolio Managers. Using an ethnographic approach, a deeper understanding of the perception of Portfolio Managers is provided through direct observations. For instance, Siggelkow (2007) describes ethnography as a robust tool to build a theory. As professional investors involved in daily share price movements, they can better explain what behavioral aspects influence the decision-making into the European stock market. The most commonly used method for gathering information is doing an interview.[195] The structure of interviews can vary from highly structured to unstructured interviews. To achieve the purpose of this thesis, a semi-structured interview is used to discover the impact of behavioral factors on the decision-making of Portfolio Managers. Using a semi-structured interview, which is more flexible and comparable, can help the interviewer to concentrate on the main objective of the interview. The findings and the results of the expert interviews are the fundament for the questionnaire.

After collecting the questionnaire data, the first step is the cleaning of those data by excluding the questionnaire with poor quality, meaning incomplete questionnaires. Various statistical techniques were applied in order to attain the objective of the research. Statistical tools like descriptive statistics (mean, standard deviation), factor Analysis to identify the behavioral factors which influence investment performance, to test the reliability of the construct, Cronbach's alpha was used, and to analyze the impact of independent variables on dependent variables SEM was used.

[195] Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, 50 (1), pp. 20-24.

In order to describe the personal information of the respondent, descriptive statistics were used. Descriptive Statistics summarizes the data at hand through these specific numbers to understand the data more accessible. Descriptive statistics represent the data which is available and not based on any probability theory.

In order to reduce the larger number of variables into fewer manageable factors, factor analysis is used.[196] Maximum common variance form all variables are extracted and then put them into a standard score.[197] It is part of the general linear model (GLM) with several linear relationships, no multicollinearity, and an accurate correlation between variables and factors.[198] In factor analysis, the questionnaire variables are included in same group representing similar characteristics. Factor analysis can be classified into two main types:

- Exploratory factor analysis (EFA)
- Confirmatory factor analysis (CFA)

EFA is the basic factor analysis technique used by researchers when there is no previous literature available. Which factor/ indicator will belong to which factor, researcher has no prior knowledge. Moreover, it attempts to explore the basic framework of a relatively large number of variables. Whereas, factors and their factor loadings are determined using CFA. It confirms what is expected from the primary or re-established theory. It is expected that there is some connect between factors and subsets of variables measured.[199]

Factor analysis has been used in this work, to identify the factors that influence behavioral factors and performance of investors. To be precise, EFA is used to eliminate the items which are less important for the study and to retain the important factors
Certain criteria should be met in factor analysis regarding sample adequacy, sphericity, variance Eigen value etc. In this work, the criteria of EFA followed is shown below:

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[196] Krishnakumar, J., and Nagar, A. (2008). On Exact Statistical Properties of Multidimensional Indices Based on Principal Components, Factor Analysis, MIMIC and Structural Equation Models. *Social Indicators Research*, 86 (3), pp. 481-496.

[197] Williams, C. (2007). Research Methods. *Journal of Business & Economics Research*, 5 (3), pp. 65-72.

[198] Lawley, D., and Maxwell, A. (1962). Factor analysis as a statistical method. *Statistician*, 12 (3), pp. 209-229.

[199] Fabrigar, L., Wegener, D., MacCallum, R., and Strahan, E. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4 (3), pp. 272-299.

1. All the factors selected for CFA must have factor loading greater than 0,5. Factor loadings are the results of factor analysis which acts as a threshold for selection of factor and consequently eliminate less important factors which leads to data reduction.[200] [201]
2. Another criterion which should be met is measure of sample adequacy. KMO test is applied to measure the sample adequacy. Kaiser- Meyer- Olkin is the test which represent the level of suitability of using EFA for selected sample. Ideally a sample should have KMO value between 0,5 to 1,0, this indicates that sample is good enough.[202] [203]
3. Total Variance Explained can be understood as variance in dependent variable explained by all the factors in total. TVE is used to identify the number of retained factors. Ideally all the factors should explain at least 50% of the variance in dependent variable.[204]
4. In factor analysis, Eigenvalues are applied to condense the variance in a correlation matrix. Eigenvalue is the variance in all variables explained by one particular factor. Ideally Eigen value should be greater than 1, eigen value less than1 means that factor is not able to describe the information equal to the information described by a single item of the variable.[205]

SPSS was used to undertake EFA with these different criteria

Internal consistency of the construct is a mandatory requirement. Internal consistency measures how closely the items in a group are set.[206]

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[200] Adachi, K. (2015). A New Algorithm for Generalized Least Squares Factor Analysis with a Majorization Technique. *Open Journal of Statistics*, 5 (3), pp.165-172.

[201] Bartholomew, D. (1995). Spearman and the origin and development of factor analysis. *British Journal of Mathematical and Statistical Psychology*, 48 (2), pp. 211-220.

[202] Kaiser, H., and Rice; J. (1974). Little jiffy, mark iv. *Educational and Psychological Measurement*, 34 (1), pp. 111-117.

[203] Kaiser, H. (1970). A second generation little jiffy. *Psychometrika*, 35 (4), pp. 401-415

[204] Kim, J. -O., and Mueller, C. (1978). Factor Analysis: Statistical methods and practical issues. Newbury Park, CA: Sage Publications.

[205] Nering, E. (1970). *Linear Algebra and Matrix Theory* (2nd ed.), New York: Wiley.

[206] Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16 (3), pp. 297-334.

It is considered as a measure of scale reliability and includes a statistical summary that describes the consistency of a specific sample of respondents across a set of variables. Cronbach's basis equation for Alpha, $\propto$, is following:

$$\propto = \frac{n}{n-1}\left(1 - \frac{\sum V_i}{V_{Test}}\right), \quad (8)$$

where

n: is the number of questions,

V_i: is the variance of scores of each question,

V_{Test}: is the total variance of overall scores on the entire test.

In social science and behavioral research, reliability of the construct is identified by Cronbach's Alpha [207] After applying factor analysis, major behavioral factors which influence investment performance of investors were identified. Then Cronbach's alpha test statistics were calculated for selected factors. Research highlighted that a value of Cronbach's alpha equal to or greater than 0,7 is considered good enough to ensure the reliability of the construct. Cronbach's alpha was calculated using SPSS.[208]

SEM (Structural Equation Modelling) is a combination of Confirmatory factor analysis and regression.[209] Structural equation modelling examines the causal relationship between the variables. Other than experimental and observational research, SEM is used in Behavioral science also.[210] In this work, SEM was used to identify which behavioral factor influence the decision making of the investors in European Stock Exchange on the basis of their regression weights. SEM was applied on AMOS software.

[207] Guttman, L. (1945). A basis for analysing test-retest reliability. *Psychometrika*. 10 (4), pp. 255-282.

[208] Revelle, W. (1979). Hierarchical cluster analysis and the internal structure of tests. *Multivariate Behavioral Research*, 14 (1), pp. 57-74.

[209] Tarka, P. (2017). An overview of structural equation modeling: Its beginnings, historical development, usefulness and controversies in the social sciences. *Quality & Quantity*, 52 (1), pp. 313-354.

[210] Mueller, R. (1997). Structural equation modeling: Back to basics. *Structural Equation Modeling: A Multidisciplinary Journal*, 4 (4), pp. 353-369.

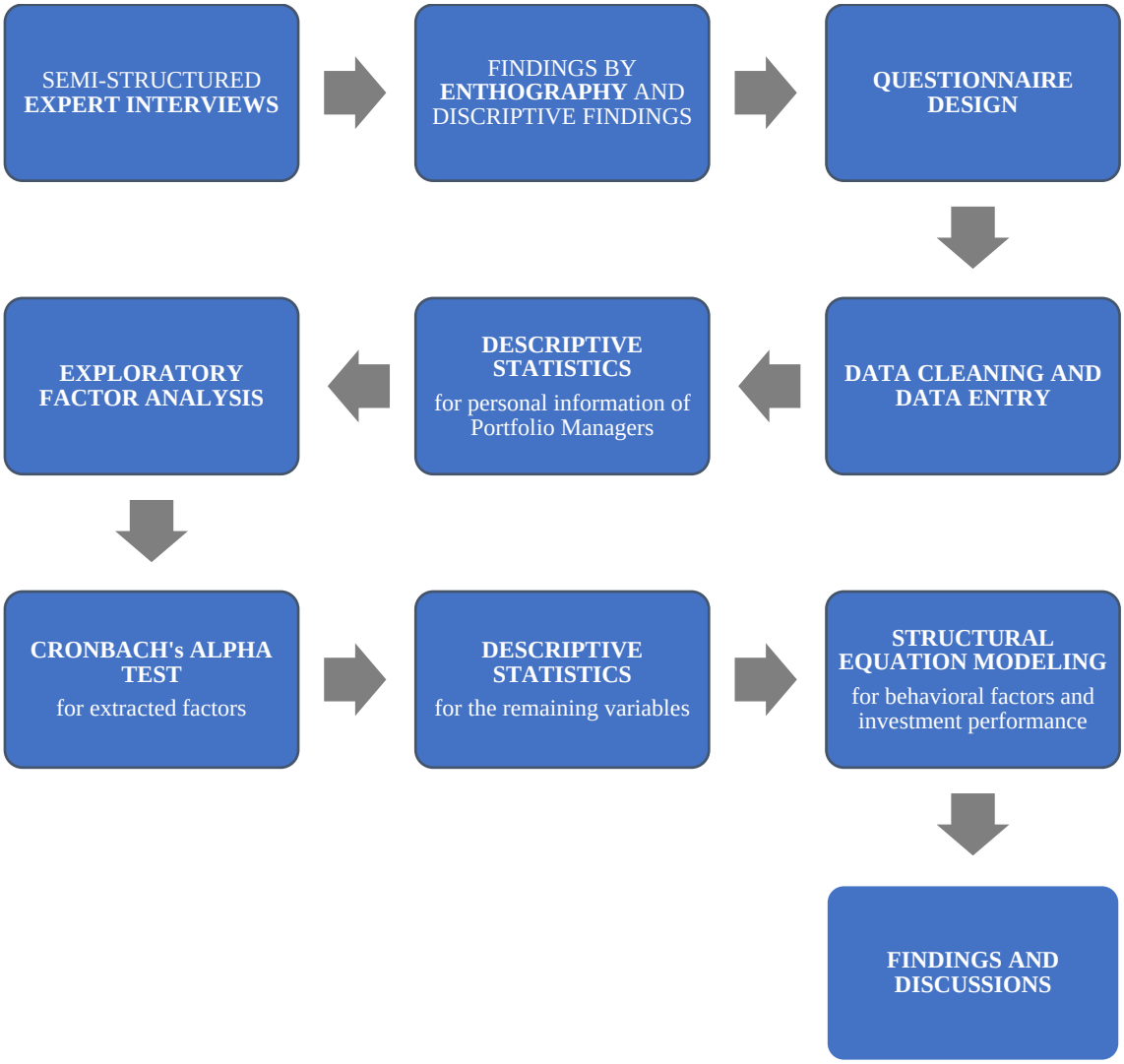

Figure 2.3. **The summary of the data process and data analysis**

Source: Author's creation

The summary of the data process and data analysis are displayed in the **Figure 2.3**. Starting with the semi-structured expert interviews and their findings to underpin the design of the questionnaires. After the data cleaning and the descriptive statistics, the EFA should be done. Ending with the Cronbach's Alpha and finally end with the SEM to identify which behavioral factors have a significant influence on the decision-making process and consequently on the investment performance.

2.7 Limitations of the research model and the definition of hypotheses and main research questions

One of the basic shortcomings of this study is that the behavioral patterns of investors are studied using questionnaires. When an investor is making financial decisions, they must have made irrational decisions at some point of time in their life, as financial decisions are demanding. Several attempts have been made to overcome this problem to a certain extent, many questions were directed to dig out the past mistakes of investors which they have made in their career as a portfolio manager. While giving answers to the questions, investors may get different emotions as various questions were based on hypothetical circumstances.

Although the size of sample selected was relatively large (N = 139) and all the statistical requirements were met, but a larger sample would have given more precise results.

Another major limitation of this work is relatively obvious, and that is the limitation to the geographic region of Europe. This thesis will focus on the European continent without Russia, Ukraine, and Belarus.

The semi-structured expert interview respondents are directly chosen from the author, mainly through business connections from the author. Another shortcoming is the results cannot be the generalized for the entire population.

From the analyses in the topic relevance section, the following research questions arise:

1. Do Portfolio Managers suffer from behavioral factors such as unprofessional investors and what are the major behavioral factors influencing the decision-making process of Portfolio Managers in Europe?
2. Can personal determinants, like the gender, net income, work experience, influence the decision-making and the investment performance of Portfolio Managers in Europe?

Based on these two research questions, the basic hypothesis is proposed as follows:

H_B: The main b*ehavioral finance factors have a significant influence on the decision - making and consequently, on the investment performance of Portfolio Managers at the European stock market.*

One the basis of the major hypotheses, following sub-hypotheses were formulated:

H_1: *Overconfidence has no impact the investment performance of Portfolio Managers in Europe.*

H_2: *Loss Aversion has no impact the investment performance of Portfolio Managers in Europe.*

H_3: *Herding has no impact the investment performance of Portfolio Managers in Europe.*

H_4: *Representativeness has no impact the investment performance of Portfolio Managers in Europe.*

H_5: *Price Anchoring has no impact the investment performance of Portfolio Managers in Europe.*

H_6: *Availability has no impact the investment performance of Portfolio Managers in Europe.*

H_7: *Mental Accounting has no impact the investment performance of Portfolio Managers in Europe.*

H_8: *Regret Aversion has no impact the investment performance of Portfolio Managers in Europe.*

H_9: *Self-Control has no impact the investment performance of Portfolio Managers in Europe.*

As behavioral factor may differ between the individual investors, following hypothesis is to be tested:

H_{10}: *The behavioral factors and their influence on the investment decisions are not different within the Portfolio Managers and their various characteristics - namely gender, age, education, work experience, AUM or net income.*

Consequently, more detailed sub-hypotheses need to be formulated in the course of this investigation:

H_{Gender}: *The differences between the gender of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

H_{Age}: *The differences in age of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

$H_{Experience}$: *The differences in the work experience of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

H_{AUM}: *The differences in amount of the AUM of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

$H_{Education}$: *The differences in the education level of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

$H_{Net\ Income}$: *The differences in the Net Income of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

3 RESEARCH RESULTS OF BEHAVIORAL FACTORS AFFECTING THE INVESTMENT DECICISON-MAKING

3.1 Introduction of the findings about the behavioral factors of Portfolio Managers

This chapter sets out the data analyses and results from the various different methods and draws together to give an overall outcome and finally, answering the research questions and hypotheses.

Firstly, the data collected by expert interviews and the questionnaire were described to get idea about the sample of the study. As a result, the different types of behavioral biases based on expert interviews in Europe are analyzed and the first approaches to avoid behavioral biases are made.

Secondly, the data and the empirical findings from the questionnaire of Portfolio Managers in Europe are analyzed to see the impact levels of behavioral factors on the investment decisions. The results of statistical test like factor analysis is shown. Reliability of construct is measured using Cronbach's alpha which is presented in this segment. And at the end, the results of SEM are provided which depicts the magnitude of the impact of behavioral factors and as well as correlation among them.

Finally, the research questions are answered and the hypotheses are tested. Finishing by testing the results against the hypotheses and providing a framework for a better understanding of behavioral factors and their influences.

3.2 Findings from the semi-structured interviews of Portfolio Managers

3.2.1 Descriptive results of the semi-Structured interviews and their knowledge about behavioral finance

The semi-structured interviews were conducted in 9th of March 2021 and in 2nd of February 2022 virtually via Video-Call software like Microsoft Teams or Zoom. In total, eleven experts were interviewed by the author of this thesis. Portfolio Managers were directly contacted by the author with the help of three directories of membership: fondsweb.com from FWW Media GmbH as well Bloomberg, where every mutual fund is listed.

The average age of the experts – which were interviewed by the author – is 55 years and the average work experience is 26 years, so these experts have spent most of their time at stock

exchange. The average asset under management is € 4.508 Million. That said, it is important to mentioned two outsiders, one above € 38 Billion and the other € 15 Million. Therefore, the median is a better measurement, and the median is € 375 Million of that sample.

Table 3.1. contains the list of interviewees and shows the education, age, working-experience as well the asset under management.

Table 3.1. **List of semi-structured interviewees**

No.	Name (Initials)	Education	Age	Work Experience	AUM in Mio. €
1	A.H.	PhD. in Economics	59	28	5.000
2	B.G.	Diploma in Business Administration	67	39	375
3	D.R.	Diploma in Economics	42	16	190
4	D.H.	PhD. in Finance	53	24	38.000
5	M.E.	PhD. in Economics	65	31	15
6	K.T.	Diploma in Economics	57	28	1.400
7	M.S.	Law Degree (LLB)	62	35	355
8	T.C.	Diploma in Business Administration	42	15	145
9	U.W.	Diploma in Engineering	47	22	745
10	R.K.	Doctor in Medicine	61	29	117
11	W.A.	Diploma in Economics	48	24	3.247

Source: Author's creation

The experts were randomly selected by the author**.** The criteria for selection of expert were also clearly defined by the author. Any person who qualifies to be an expert must have clear understanding and in-depth knowledge of the financial markets as well as a long work experience as a Portfolio Manager. This is shown by the high work experience in years, over 26 years as an average. Review of available literature suggests that expert panel should consist of blend of different group of experts, so as to maintain heterogeneity and diverse point of

view.[211] Interestingly, 3 of the 11 interviewees had not a financial education background. One had a Diploma in Engineering, the other had a Law Degree. Another interesting thing to mentioned is, that 3 of those 11 respondents have a Ph.D. Those 4 experts with a Ph.D. have an average asset under management of € 10 bn., which is significantly above the average of the total 11 respondents.

In the beginning, all interviewees talked about their general knowledge of behavioral finance. They all relied on the efficient market theory, which can be seen as the cornerstone of traditional finance theory. According to it**,** all the relevant information is reflected by securities prices. and for this reason, it also should be impossible to achieve excess returns. Therefore, for more than 50 years, academics argued that it was pointless to look for undervalued stocks. However, B.G. then points out that in this case, it would be questionable why active fund managers exist and why some of them even outperform the market.[212] This is, among other things, the reason why nowadays this theory is considered quite controversial. He mentions the psychologist Daniel Kahneman, who combined behavioral and cognitive psychology with traditional financial theories. His goal was to explain the irrational behavior of investors. In fact, many investment decisions are guided by emotions. B.G. also refers here to the case that speculative price bubbles are created in this way.[213] D.R. exactly relates to the same fact and confirms that there could be no explanation for existing speculative bubbles if all the relevant information is reflected by prices, and it is not possible to outperform the market as the efficient market theory suggests.[214] Dr. A.H. also believes that this theory cannot fully exist in the real world because otherwise, investors would not be able to outperform the benchmark or the stock market. However, it has been clearly proven that this is possible. Moreover, investors display human and sometimes even irrational behavior. After all, people sometimes have problems controlling themselves or get influenced by their own biases. The interviewees agree that behavioral finance explains this inconsistency in the efficient market theory and deals with the irrational behavior in investment decisions.[215]

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[211] Mayer, R. (2002). Cognitive Theory and the Design of Multimedia Instruction: An Example of the Two-Way Street Between Cognition and Instruction. *New Directions for Teaching and Learning*, 89, pp. 55-71

[212] Expert-Interview B.G. (2021)

[213] Expert-Interview B.G. (2021)

[214] Expert-Interview D.R. (2021)

[215] Expert-Interview Dr. A.H. (2021)

3.2.2 Types of behavioral biases based on expert interviews in Europe

In the course of the interviews, the debriefed experts explained the relevance of behavioral finance in their professional lives and whether there are any specific examples they can share. Dr. A. H. started by talking about Overconfidence. He refers to a survey by James Montier in which he asked Portfolio Managers if they thought their work was above average. It showed that more than two of a third of the respondents believed they were better than others. The rest thought they were average, but none said they were below average. From his point of view, it also turns out that Portfolio Managers with more experience usually have more Overconfidence. Younger colleagues, therefore, seem to suffer less from this phenomenon.[216] Dr. D. H. confirms and specifies: *"In my 24 years career, I rarely met a Portfolio Manager, who said: This was my fault, or This was my bad decision"*.[217] It clearly shows, that Overconfidence is a quite common behavior along with Portfolio Managers.[218] It is striking that almost all interviewees mentioned Overconfidence as one example they knew from their professional life. M.S. also cites self-confidence, which is comparable to Overconfidence, as an example and confirms that it can lead to wrong decisions as it often interferes with objective observation. This bias more likely occurs with professional investors and leads to a poor risk-reward ratio in stock valuation.[219] In addition, pride also plays a major role here. After investors have made mistakes in their decisions, they usually find it difficult to admit them. Moreover, they refuse to sell the asset because they hope that it will recover. In M.S.'s estimation, however, there also seem to be Portfolio Managers who miss good opportunities because they are too hesitant or unwilling to take risks. Accordingly, both can have unpleasant consequences.[220]

Besides Overconfidence, overoptimism was also mentioned. Dr. M.E. even believes that these two are the most common behavioral biases from his professional life. Many investors take too many risks because they rely very much on their own abilities. In addition to that, opinions are adapted very quickly without any research of their own behind them. It would simply help to question the opinions of others more clearly than to simply adapt their behavior. As a result, many things take on a life of their own and can very quickly no longer correspond to the truth.

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[216] Expert-Interview Dr. A.H. (2021)

[217] Expert-Interview Dr. D.H. (2021)

[218] Expert-Interview Dr. D.H. (2021)

[219] Expert-Interview M.S. (2021)

[220] Expert-Interview M.S. (2021)

He adds that that phenomenon will probably become even more relevant in the near future due to many fast news sources spreading on the internet.[221]

Herding is another example that has been mentioned quite frequently. Many are sure that speculative bubbles can arise precisely because of this bias. B.G. explains this using the example of the bursting of the technology bubble - or dot.com.
Those days, I came to the office and nearly every day, a new company went public, and everyone believed in everything. Newspapers and even private – unexperienced – investors were talking about listed companies and how interesting everything is. Valuation – nobody cares! It was all about – do you dare to miss this massive opportunity?"[222]

The interviewees also broadly agreed that Herding was also the reason for the recent events surrounding the share game stop. Among private investors, this company was discussed in a stock exchange forum because many hedge funds shorted it. As a result, many private investors bought this stock. The share price then consequently increased significantly. The chain reaction started because the hedge funds had to close their short positions and bought back these shares. D.R. believes that the private investors made this decision because they lacked certain information and simply did what others told them to do instead of doing more research themselves, which is typical for Herding. [223] In summary, Herding describes the procedure of copying what others do without an own analysis and independent conclusions.[224] In addition to that, U.W. and B.G. talk about confirmation biases. B.G. explains that meeting a company's CFO or CEO can significantly benefit the investment process to make the right decision. However, Portfolio Managers often seem to be looking for the information that confirms the investment case rather than information that questions it. This can sometimes lead to bad investments.[225]

Another irrational behavior pattern that was frequently mentioned is anchoring. It describes clinging to the original price, despite poor performance. A Portfolio Manager refuses to sell his

[221] Expert-Interview Dr. M. E. (2021)

[222] Expert-Interview B.G. (2021)

[223] Expert-Interview D.R. (2021)

[224] Expert-Interview Dr. A.H. (2021)

[225] Expert-Interview B.G. (2021)

stock in the hope of at least breaking even rather than suffering a loss.[226] Dr. A. H. believes that younger colleagues are again more likely to be affected by anchoring. He believes that if you ask investors, for example, where the Microsoft stock will be in 6 months, the older Portfolio Manager will argue with DCF methods or other fundamental theories. The younger Portfolio Manager will make his investment decision according to the current level of the stock.[227] Another example of irrational behavior was mentioned a few times: Loss Aversion. D.R.´s example for Loss Aversion is particularly interesting. In this behavioral bias, investors tend to focus on avoiding losses rather than generating equivalent gains. In order to make the connection clear, he cites a research result by psychologist Daniel Kahneman. *"If someone loses $100, he will feel more satisfaction than the same person would if he gained $100. As you know, active Portfolio Managers are all about outperforming the benchmark, so reducing risk is a very important part."*[228] K.T. notices that these days clients are not only looking to maximize profits. For example, some Europeans prefer European stocks or bonds in their portfolios because they know the companies, giving them a sense of familiarity and security. Investors also buy stocks they already know from their private life like Coca Cola, Daimler, BMW or Nestle.[229]

U.W. says that in his professional life he was, among others, most confronted with familiarity bias and home bias. These two cases are even a little similar in parts: Home biases are pretty common in Europe. He describes that especially people from *"Italy, Spain or Portugal"*, tend to invest in companies from their home countries.[230] In his experience, foreign companies are even more likely to be sold during a sell-off than domestic ones. U.W. confirms and believes that certain behaviors are more pronounced depending on the situation in the market, as it may lead people to act irrationally. In his opinion, for example, Loss Aversion or Overconfidence is very common in particularly volatile times.[231]

[226] Expert-Interview Dr. D.H. (2021)

[227] Expert-Interview Dr. A.H. (2021)

[228] Expert-Interview D.R. (2021)

[229] Expert-Interview K.T. (2021)

[230] Expert-Interview U.W. (2021)

[231] Expert-Interview U.W. (2021)

T.C. creates an interesting comparison by highlighting and comparing the biases of the different generations. In his opinion, *Generation Y* is usually more at risk of falling prey to Herding, as was the case around Game Stop's stock, for example. With *Baby Boomers*, he sees more of a problem of anchoring and a tendency to make bad decisions based on Overconfidence. He also explained that the generation tends to be influenced by recency bias, which means that they tend to choose their investments based on recent events and believe that this trend will also continue in the future. The consequence could be, for example, selling a stock during a market downturn. The last generation he speaks about was born between 1928 and 1945. This so-called *Silent Generation* prefers to invest in domestic stocks or whatever feels comfortable. This is comparable to the familiarity bias, that K.T. already talked about. This behavior shows, that especially older generations feel safer when investing in stocks they are already familiar with. Besides, investing in foreign stocks used to be very rather fraught with risk back in the days, which has of course changed over the years.[232]

K.T. explains that social and environmental factors play an increasingly important role for customers regarding the companies in which they intend to invest. ESG ratings are also getting more attention from investors during the last couple of years. However, if only the risk-return ratio is used for evaluation, such factors would never play a role for a rational investor. There is also another common problem called framing. Affected investors focus primarily on having an advantage over other market participants because they belief, that the market must simply be defeated.[233]

M.S. describes two generations of behavioral finance. In his view, the first generation began in the early 1980s. It focused on rational behavior to achieve high returns with low risk. In the current time and thus the 2nd generation of Behavioral Finance, other aspects such as hope for prosperity, freedom from worries, old-age provision and social reputation are as critical, emotional decision criteria as the risk-reward ratio in decision making.[234] The social factors just mentioned also play a role here. M.S. mentions that humans often have difficulties in considering all these factors relevant in decision making. Instead, they shortcut the process and thus, misjudgments occur. He cites Availability as an example: if an asset is frequently reported

[232] Expert-Interview T.C. (2021)

[233] Expert-Interview K.T. (2021)

[234] Expert-Interview M.S. (2021)

in the media, the trading volume also increases. Since normal investors do not usually react rationally, they buy that asset without evaluating all factors, which can lead to bad investment decisions.[235]

U.W. was the only one who said that, unfortunately, behavioral finance has no relevance in his job at the moment. On the other hand, he describes that he deals a lot with volatility, for example. Maybe this point of view simply comes from a lack of perspective, that volatility could also be the result of behavioral factors? He mentions the case of Game Stop for instance, linked to a market exaggeration, which some of the other interviewees clearly classified as the result of behavioral biases.[236]

3.2.3 Empirical Results of the semi-structured interviews and approaches to avoid behavioral biases

The eleven semi-structured interviews were analyzed with the software NVivio.

Figure 3.1. represents the word tag cloud, which shows different words helpful in thematic analysis. Word tag cloud is a technique to analyze the qualitative data, which visually represents social tags, alphabetically in a paragraph- style where the repetition frequency determines the size of each word.

In the eleven interviews, the investors (respondents) frequently said some behavioral aspects which influence their decisions at the stock exchange. These aspects became the themes for this study e.g., Anchoring, Risk Aversion, Overconfidence, news, work experience are the major factors that affect the decisions of Portfolio Managers.

As Covern and Adams (2020) highlighted, the number of expert interviews is not decisive, but when saturation is reached. As Covern and Adams (2020) pointed out, it is not the number of expert interviews that matters, but when saturation is reached. After nine interviews, it already looked like saturation. Opinions about behavioral factors were largely identical or very similar.

[235] Expert-Interview M.S. (2021)

[236] Expert-Interview U.W. (2021)

Nevertheless, two additional interviews were held so that even greater saturation and thus high reliability could be achieved.[237]

Figure 3.1. **Word Tag Cloud**

Source: Author's creation

Figure 3.2. shows a word tree map. This shows how Portfolio Managers talked about different aspects of behavioral finance and linkages of those aspects with their investment decisions.

[237] Cobern, W., and Adams, B. (2020). When interviewing: how many is enough*? International Journal of Assessment Tools in Education*, 7 (1), pp. 73-79.

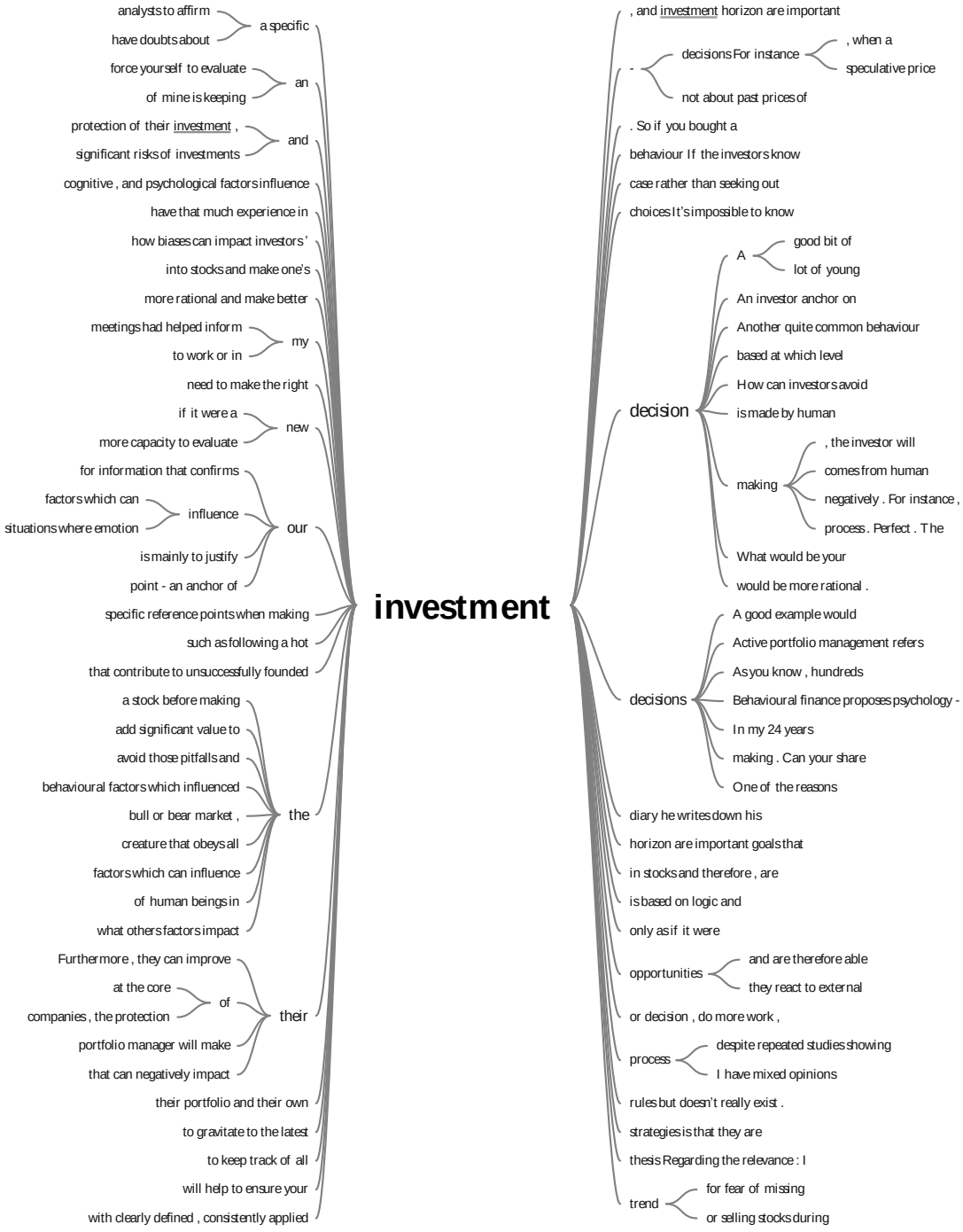

Figure 3.2. **Word Tree Map**

Source: Author's creation

Lastly, **Figure A in the Appendix** shows the word frequency in the eleven expert interviews.

But how can investors avoid pitfalls that lead to such behavior and thus to bad investments? First of all, almost all interviewees advise following strict rules when investing. Like most other interviewees, Dr. A.H. recommends knowing the various behavioral factors and refreshing the

knowledge. This could be done, for example, in the form of seminars at the workplace. In addition, some behavioral errors could be avoided through standardized decision-making processes and better research. The interviewees recommend a certain guideline when investing in a company. Using a DCF analysis or other valuation model could also help from Dr. A.H.´s perspective.[238] In D.R.´s company, such seminars already take place sometimes. They even have a so-called risk manager whose task is to monitor the behavior of the Portfolio Managers. If a stock position of a fund is more than 15% down, Portfolio Managers must first justify themselves, what they do with this position.[239] In K.T.'s company, young Portfolio Managers also get an experienced supervisor. In order to better understand and perhaps avoid their behaviors, at the end of the year, the two have a conversation about their good and bad decisions. He additionally explains that there are behavioral finance seminars every six months for Portfolio Managers in his company.[240] U.W. adds that a portfolio should be balanced, with few individual stocks, which are, however, more highly concentrated. In this case, it can be assumed that the investor knows his portfolio very well and acts rationally and thoughtfully.[241]

To summarize the findings of the expert interviews, most of the portfolio managers interviewed highlighted several behavioral factors that influence their stock market decisions. For example, anchoring, risk aversion, and overconfidence. Interestingly, more or less all portfolio managers also cited news and professional experience as the most important factors influencing their decision-making process. Respondents indicated that investors, both individual and professional, sometimes have trouble controlling themselves or are influenced by their own biases. Respondents agree that behavioral finance explains this inconsistency in efficient market theory and addresses irrational behavior in investment decisions. It is interesting to note that the behavior of professional investors - in the form of Portfolio Managers - are not different from private investors in the stock market.

[238] Expert-Interview Dr. A.H. (2021)

[239] Expert-Interview D.R. (2021)

[240] Expert-Interview K.T. (2021)

[241] Expert-Interview U.W. (2021)

3.3 Empirical findings from the questionnaire of Portfolio Managers in Europe

3.3.1 Data background of the questionnaire respondents

In total, 152 questionnaires are answered by professional investors at the European Stock Market. The characteristics of gender, age and education are described as the following:

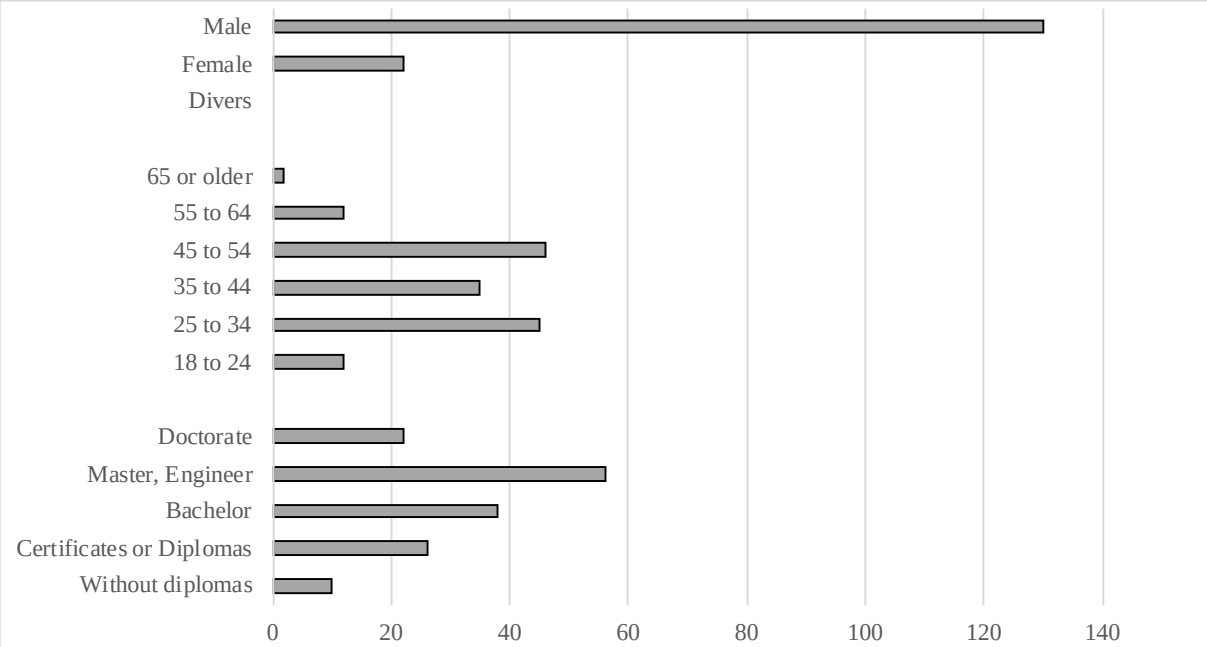

Figure 3.3. **Gender, Age and Education of Respondents**

Source: Author's creation

Figure 3.3. shows descriptive statistics about the demographics of the sample. There is unequal distribution of respondents on the basis of gender. Male counts for nearly 85% and female about 15%. The potential gender bias can be a limitation of this study related to the potential gender bias and will be further discussed. Although, the research about gender biases is quite controversial. For instance, In the study conducted by Barbalos et al. (2015) the performance of 358 diversified European equity mutual funds was analyzed, controlling for gender diversity. They concluded that there is no significant differences in the performance of fund managers on the basis of their gender.[242] whereas, in a study conducted by Beckmann and Menkhoff (2008) performance of 649 fund managers from United States, Italy, Germany and Thailand was analyzed and findings reported significant difference the behavior of fund managers on the

[242] Babalos, V., Caporale, G., and Philippas, N. (2015). Gender, style diversity, and their effect on fund performance. *Research in International Business and Finance*, 35, pp. 57-74.

basis of their gender. Female fund managers were more risk-averse and less confident as compared to male fund managers.[243]

The ages of the respondents are mainly from 25 to 54 years; 82,9% of the total sample are in that age interval. At the same time, 7,9% of the investors are between 18 to 24 years. On the other hand, 9,2% of the respondents are older than 54 years.

Figure 3.3. also presents the education level of the respondents. Nearly 3 of 4 Portfolio Managers have at least a bachelor degree. More than half of the respondents have at least a Master or Engineer degree. 22 of 152 also have a doctor degree, which is quite mentionable.
Gonzalez-Igual et al. (2021) analyzed the impact of gender, age and education of professional investors at the Spanish stock market. The findings of their work support that female fund managers are more experienced investors and tend to have higher level of confidence. Whereas educational level of investor does not influence the performance. [244]

In a study conducted by Metawa et al. (2019) apart from effect of common demographic variables such as age, gender and education, effect of investor sentiments on investment decisions at Egyptian Stock market was also studied. They found out the significant impact of gender, age and education level on the investment performance of non-professional investors.[245]
Contrary, in the work of Hibbert et al. (2012) was shown that the financial education is important when investing as finance professors are less prone to behavioral biases.[246]

Figure 3.4. shows the different experience levels of the Portfolio Managers. Nearly 50% of the questionnaire respondents have more than nine years of experience when it comes to investing

[243] Beckmann, D., and Menkhoff, L. (2008). Will Women Be Women? Analysing the Gender difference among Financial Experts. *Kyklos* (3), 61, pp. 364-384.

[244] Gonzalez-Igual, M., Santamaria, T., and Vieites, A. (2021). Impact of education, age and gender on investor's sentiment: A survey of practitioners, *Heliyon*, 7 (3).

[245] Metawa, N., Hassan, M., Metawa, S., Safa, M. (2019). Impact of behavioral factors on investors' financial decisions: case of the Egyptian stock market. *International Journal of Islamic and Middle Eastern Finance and Management*, 12 (1), pp. 30-55.

[246] Hibbert, A., Lawrence, E., Prakash, A. (2012). Do finance professors invest like everyone else? *Financial Analyst Journal*, 68 (5), pp. 95-105.

in the European stock market. Only 27 of the 152 respondents have only a work experience of 1 to 3 years.

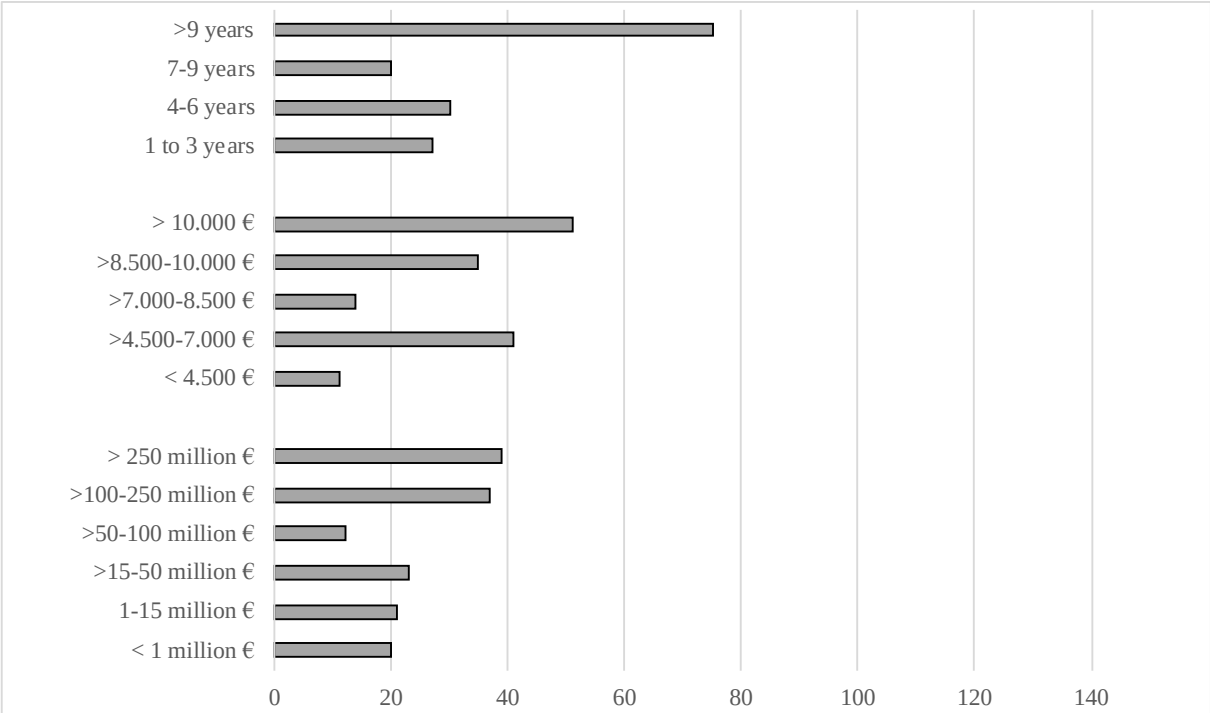

Figure 3.4. **Experience in years, AUM and average monthly income**

Source: Author's creation

In a study conducted by Gervais and Odean (2001), it was concluded that with the increase in experience of the investor, his level of Overconfidence decreases. Therefore, a high experience of the respondents of the questionnaire is essential. As Gervais and Odean (2001) pointed out, investors gain experience by participating in the stock market. It was also pointed out in the study that the level of experience depends on time spent in stock market and the level of participation.[247]

The work of Locke and Mann (2001) suggests that more experienced investors are less prone to take risk after a period of abnormally good profits than their less experienced investors.[248]

[247] Gervais, S., and Odean, T. (2001). Learning to be overconfident. *Review of Financial Studies*, 14 (1), pp. 1-27.

[248] Locke, P., and Mann, S. (2001). House money and Overconfidence on the trading floor. *Working Paper, George Washington University.*

Similar results were shown by Gloede and Menkhoff (2011), where a high experience of a professional investor follows low level of Overconfidence.[249]

Researchers found out that the level of income of an investor impacts the decision-making process as well. **Figure 3.4.** shows that more than 56,5% of the respondents have an average monthly income of more than 8.500 €. For instance, Zhu (2003) showed that high-income investors are less local biased. Those high-income investors are less in favor of local companies than low-income investors.[250]

The sample consists of a diversity of investors with different asset under management. **Figure 3.4.** shows that half of the proportion of respondents have more than 100 Mio. € AUM. However, the respondents cover all the ranges of investments from 1 Mio. € to more than 250 Mio. € AUM, more than a quarter of the respondents are in charge of more than 250 Mio. € each.

Figure 3.5. shows that mainly professional investors are investing for a long-term horizon and not short. More than 86% of the respondents are long-term investors, 11% are short term, and only 1% are daily traders.

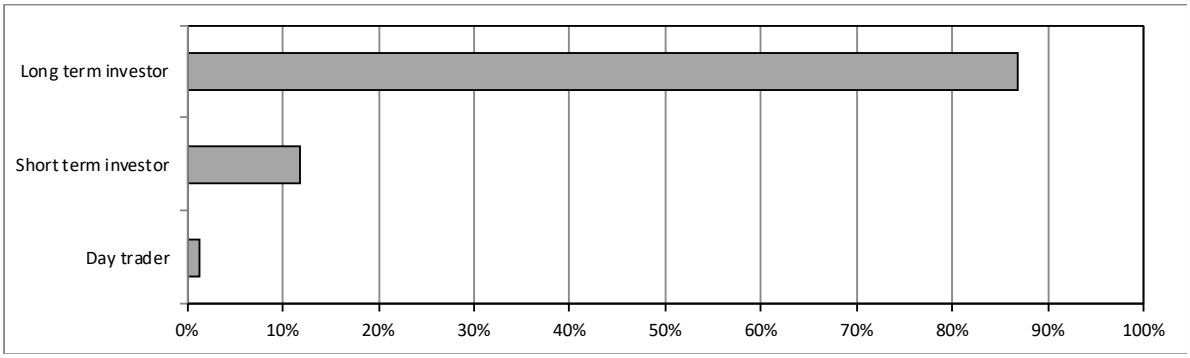

Figure 3.5. **Investment Horizon**

Source: Author's creation

[249] Gloede, O., and Menkhoff, L. (2011). Financial professionals' Overconfidence: is it experience, function, or attitude? *European Financial Management*, 20 (2), pp. 236-269.

[250] Zhu, N. (2003). *Investor behavior, differential information, and asset pricing*. New Haven, Conn., Yale Univ.

3.3.2 Impact levels of behavioral factors on the investment decisions

This chapter analyze the influence of the different behavioral variables such as overconfidence, loss aversion, herding, representativeness, price anchoring, availability of information, mental accounting, regret aversion, self-control on the Portfolio Managers. The magnitude of influence of behavioral factors on investment decisions have been estimated by calculating mean for each variable. Investment performance of the respondents is calculated in similar way, on the basis of mean score.

Since 5-Point Likert type scale has been used to measure the variable, mean scores have been used to check the magnitude of influence of each variable. Following parameters have been used to measure influence:

- Mean score < 2 Means Low Impact
- Mean Score ranging from 2 to 3,5 Means Moderate impact
- Mean Score ranging from 3,5 to 5 means High Impact.

Overconfidence and the impact on investment decisions of Portfolio Managers

Table 3.2. **Means and Ranks for Overconfidence**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
I.a.	I am an experienced investor.	4,35	86,9%	0,67	1
I.b.	I feel more confident in my own investment opinions over the opinions of my colleagues or competitors.	4,14	82,9%	0,72	5
I.c.	I have the ability to choose the stocks which performance will be better than the market performance.	4,22	84,5%	0,47	4
I.d.	I trade stocks excessively.	3,47	69,5%	0,12	7
I.e.	My investing profits can be attributed to my successful investment strategy.	4,24	84,9%	0,48	3
I.f.	I believe that my skills and knowledge of the stock market can help me to outperform the market.	4,27	85,5%	0,49	2
I.g.	I can pinpoint the major reversals in the stock market.	3,65	73,1%	0,89	6
	Average	**4,05**	**81,0%**	**0,43**	

Source: Author's creation

Almost 81% of Portfolio Managers in Europe consider themselves as better decision-makers than they actually are, see **Table 3.2**. Kent et al. (2001) confirmed this result by their findings that investors are overconfident is present among investors when they are making investment decisions.[251]

The highest mean is for the item number 1 - *I am an experienced investor* (4,3453). It can be concluded from the result that the respondents might agree to this item. Consequently, Portfolio Managers are overconfident and optimistic. This specific Overconfidence suggests that they do not learn from their past failures because they do not see Overconfidence as a bias or error that influences their decision making.[252]

The lowest mean in this segment is number 4 - *I trade stocks excessively* with a mean of 3,4748, which still influences the decision-making process. This is very similar to the findings of Barber and Odean (1999). They have shown that high levels of trading in financial markets are due to Overconfidence.[253]

The means of numbers 3 and 6 are even relatively high (4,2230 and 4,2734). Previous studies confirm these findings. For instance, Kahneman et al. (1998) pointed out that while estimating the values of securities, overconfident investors often tend to neglect available information and give undue importance to their private information.[254]

The overall mean of the Field - *Overconfidence* is equal to 4,0514. The mean of this field is significantly high, and this means that Overconfidence have a significant impact on the decision making of Portfolio Managers in the European Stock Exchange.

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[251] Kent, D., Hirshleifer, D., and Subrahmanyam, A. (2001). Overconfidence, Arbitrage, and Equilibrium Asset Pricing. *Journal of Finance*, 56 (3), pp. 921-965.

[252] Galant, D. (1995). How Safe Are Stocks? *Institutional lnvestor*, 24 (4), p. 133.

[253] Barber, B., and Odean, T. (2000). Trading is hazardous to your wealth: the common stock investment performance of individual investors. *Journal of Finance*, 55 (2), pp. 773-806.

[254] Kahneman, D., Schkade, D., and Sunstein, C. (1998). Outrage and Erratic Awards: The Psychology of Punitive Damages. *Journal of Risk and Uncertainty*, 16 (1), pp. 49-86.

Table 3.3. **Means and Ranks for Loss Aversion**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
II.a.	I am more concerned about a large loss in my stock than missing a substantial gain.	4,12	82,4%	0,82	1
II.b.	I feel nervous when I have large paper losses in my invested stocks.	3,95	79,0%	0,97	2
II.c.	I will not increase my investment when the market performance is poor.	3,72	74,4%	1,31	4
II.d.	When it comes to investment, avoiding a capital loss is more important than returns.	3,91	78,1%	0,99	3
II.e.	I sell stocks that increased in value very rapidly.	3,47	69,4%	1,11	6
II.f.	I keep stocks that decreased in value for long time.	3,78	75,5%	0,88	5
II.g.	I avoid selling shares that have decreased in value and quickly sell shares that have increased in value.	2,29	45,8%	0,96	7
	Average	**3,6**	**0,72086286**	**0,58**	

Source: Author's creation

The statistical analysis shows that the Portfolio Managers suffer from Loss Aversion and this have a moderate influence on investment decisions, see **Table 3.3**.

The highest mean is for the item number 1 - *I am more concerned about a large loss in my stock than missing a substantial gain*. (4,1223). It might be concluded that the respondents might agree to this item. This behavior is similar to previous findings. Odean (1998a) found that individual investors show a significant propensity to sell winning stocks and losing stocks will be held back. In a study conducted by Benartzi and Thaler (1995) investors were asked to allocate their savings among equities and fixed income securities. Their preference was significantly different between two choices of securities as difference lies in the presentation of historical returns. When presented with 30 separated one-year returns, the median stock allocation was 40%, while 90% was the median equity allocation when 30-years returns were presented.[255]

[255] Benartzi, S., and Thaler, R. (1995). Myopic Loss Aversion and the Equity Premium Puzzle. Qua*rterly Journal of Economics*, 110 (1), pp. 73-92.

The overall mean of the Field - *Loss Aversion* is equals 3,6043, meaning that 72% of the Portfolio Managers are averse to loss. The overall mean of this field is moderately high, which means Loss Aversion is significantly influencing the investors decisions in the European Stock Market.

Herding and the impact on investment decisions of Portfolio Managers in Europe

Table 3.4. **Means and Ranks for Herding**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
III.a.	Other investors' decisions of choosing stock types have an impact on my investment decisions.	4,09	82%	0,83	1
III.b.	Other investors' decisions of the stock weights in their portfolio don't have impact on my investment decisions.	2,35	47%	0,91	4
III.c.	Other investors' decisions of buying and selling stocks have impact on my investment decisions.	3,94	79%	0,94	2
III.d.	I usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.	3,6	72%	1,16	3
	Average	**3,49**	**70%**	**0,69**	

Source: Author's creation

The highest mean (4,09) is for the item number 1 which says choice of investment decisions of a fund manager are influenced by other investors, as one can see from **Table 3.4**. Mean score greater than 4 concludes that respondents agree on this statement. Symbolic for herding is also swimming with the current and not swimming against the current, as number 3 statement says buying and selling decisions of fund managers are influenced by other investment other investors,78 % of Portfolio Managers agree to this behavior.

The overall mean of this field - *Herding* - with 3,4946 is moderate, which means there is moderate influence of this behavioral factor on investment decisions of Portfolio Managers at the European Stock Exchange

Table 3.5. **Means and Ranks for Representativeness**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
IV.a.	I try to avoid investment in companies with a history of low earnings.	3,66	73,2%	0,82	6
IV.b.	I rely on past performance to buy stocks because I believe their good performance will continue.	3,76	75,3%	1,00	4
IV.c.	Good stocks are companies with past consistent earnings growth.	4,17	83,3%	0,91	1
IV.d.	I buy hot stocks and avoid stocks that performed poorly in the near past.	3,83	76,7%	1,19	2
IV.e.	Analysis of a portfolio manager's track record for the past six month suggests, that on average this portfolio manager has performed better than the market. Thus, you are likely to conclude that his performance is the result of skilled allocation and stock selection.	3,74	74,8%	1,09	5
IV.f.	Suppose you analyzed the performance of a stock for the last ten quarters. You found out that its performance during the initial five to six quarter has been poor but for the last four quarters is has been excellent, so you expect the same outstanding performance from this stock in the future.	3,82	76,4%	1,02	3
	Average	**3,83**	**76,6%**	**0,76**	

Source: Author's creation

Item number 3 - *Good stocks are companies with past consistent earnings growth* (4.1655) - of this conduct is having the highest mean, as one can see from **Table 3.5.** It might be concluded that the respondents might agree to this item. The overall mean of the field - *Representativeness* is equal to 3,8309. Since the mean score of this field is more than 3,5, which means Representativeness have a high influence on decision making of investors at the European Stock Exchange. Consequently, Portfolio Managers are following data of the past trends of the companies.

This is consistent with the findings of Barber and Odean (2008). According to their study, those stock which have experienced higher trading volumes, or have gained excess one day returns, or in some way they happen to be attention- grabbing stocks and are in news, that stocks are

preferred by individual investors as they provide good expectation against past performance or publicity of that particular stock.[256] Another famous study by Shefrin and Statman (1995) showed that investors assume that the stocks of companies that perform well in Fortune magazine's annual corporate reputation survey prove to be good investments.[257]

Price Anchoring and the impact on investment decisions of Portfolio Managers

Table 3.6. **Means and Ranks for Price Anchoring**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
V.a.	I compare the current stock prices with their recent year high and low prices to justify my stock purchase.	3,81	76,3%	1,12	2
V.b.	I am likely to sell my stock after the price hits recent year high.	2,98	59,6%	1,20	6
V.c.	I am unlikely to buy a stock if it was more expensive than last year.	3,35	66,9%	1,12	5
V.d.	I see the stock price as high if the price has increased to the current year high.	3,47	69,5%	1,07	3
V.e.	I believe that the position of the year high and low price defined the current stock price movement range.	3,43	68,6%	1,07	4
V.f.	I use the stock buying price as a reference point for trade.	3,84	76,8%	0,80	1
	Average	**3,48**	**69,6%**	**0,83**	

Source: Author's creation

As one can see from **Table 3.6,** the highest mean is for the item number 6 - *I use the stock buying price as a reference point for trade* (3,8417). This means that 76,83% of the asked Portfolio Managers agree with that.

[256] Barber, B. and Odean, T. (2008). All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors. *Review of Financial Studies*, 21 (2), pp. 785-818.

[257] Shefrin, H., and Statman, M. (1995). Making sense of beata, size, and book-to-market. *Journal of Portfolio Management*, 21 (2), pp. 26-34.

Previous research such as that of Heath et al. (1999) found that the highest share prices of the past years are also considered as reference points and anchors.[258] In a study conducted by Fischer and Gerhardt (2007) it was found that winner shares were sold too early and loser shares were hold for too long.[259] The overall mean of the field – *Price Anchoring*- is equal to 3,4808. The mean of this field is less than 3,5, which means Representativeness have a moderate impact on the decision-making process and Portfolio Managers are anchored to the stock prices.

Availability and the impact on investment decisions of Portfolio Managers

Table 3.7. **Means and Ranks for Availability**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
VI.a.	If I heard from a friend about a stock that achieved high returns, I would buy it.	3,85	77,0%	1,27	6
VI.b.	If I want to invest in the stocks of a particular company, I will rely on my co-workers opinions.	3,84	76,8%	1,02	7
VI.c.	If I want to invest in the stocks of a certain company, I will rely on information from the internet.	3,87	77,4%	0,95	5
VI.d.	If I want to invest in the stocks of a certain company, I will rely on information from the same company.	4,01	80,1%	0,76	3
VI.e.	If I want to invest in the stocks of a certain company, I will rely on information from financial experts.	4,14	82,9%	0,83	1
VI.f.	If a friend advised me to purchase a stock of a certain company then news arrived me about the probability of that stock‘s price rising, I will invest in these stocks.	4,09	81,7%	0,65	2
VI.g	During a visit to a HighTech company, you meet many of your college fellows who studied mathematics at college and were very good at it. You can conclude from this experience that good mathematics students tend to join HighTech companies.	3,9	78,0%	0,99	4
	Average	**3,96**	**79,1%**	**0,67**	

Source: Author’s creation

[258] Heath, C., Huddart, S., Lang, M. (1999). Psychological Factors and Stock Option Exercise. *Quarterly Journal of Economics*, 114 (2), pp. 601-627.

[259] Fischer, R., and Gerhardt, R. (2007). Investment Mistakes of Individual Investors and the Impact of Financial Advice. *20th Australasian Finance and Banking Conference 2007 Paper*, pp. 1-33.

Item number 5 is having highest mean (4,14), as one can see from **Table 3.7.** This statement says investors rely on the information of financial experts before investing their money in any company. High mean score signifies that respondent agree to this statement.

Similar finding was provided in a study conducted by Kliger and Kudryavtsey (2010) which proved the presence of heuristics in decision making process of investors. Shiller (1998) notes that investors' attention to specific asset classes (for instance, investments abroad versus investments at home) can be influenced by changing flows of public attention or inattention.[260]

The overall mean of the field - A*vailability* - is equals 3,9568. The overall mean of this field is more than 3,5, which means availability of information have a high impact on individual investors decision at the European Stock Exchange.
Hence, individual investors in European Stock Exchange rely on the available information from different sources.

Mental Accounting and the impact on investment decisions of Portfolio Managers

Table 3.8. **Means and Ranks for Mental Accounting**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
VII.a.	I tend to treat each element of my investment portfolio separately.	3,70	74,0%	0,80	2
VII.b.	I hesitate to sell stocks that had high returns in the past even though their prices decrease nowadays.	3,88	77,7%	0,96	1
VII.c.	I don‘t care about the performance of my investment portfolio as a whole but I care about the return of each account separately.	3,30	65,9%	1,13	3
	Average	**3,63**	**72,5%**	**0,79**	

Source: Author’s creation

As seen from the above **Table 3.8**, the highest mean is for mental accounting is for item number 2 which says investors hesitate to sell their stocks which had high returns in past, although their

[260] Kliger, D., and Kudryavtsev,A. (2010). The Availability Heuristic and Investors' Reaction to Company-Specific Events. *Journal of Behavioral Finance*, 11 (1), pp. 50-65.

prices have decreased nowadays. Mean score stands out at 3,88 which shows that respondents agree to this statement.

The similar findings were provided in the study conducted by Barberis and Huang (2000) where it was evident that investors respond to the profits and losses separately for different stocks and apply mental accounting to their stock holdings.[261]

The overall mean of the Field — *Mental Accounting* is equal to 3,6259. The overall mean of this field is more than 3,5, which means mental accounting have a high influence on decision making of individual investors at European Stock Exchange.

Regret Aversion and the impact on investment decisions of Portfolio Managers

Table 3.9. **Means and Ranks for Regret Aversion**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
VIII.a.	I invest in companies with low risks.	3,71	74,1%	1,02	3
VIII.b.	I keep the stocks that decreased in value.	3,92	78,4%	0,91	1
VIII.c.	I sell the stocks that increased in value faster.	3,62	72,4%	0,90	4
VIII.d.	I don‘t buy the stocks that decreased in value.	3,4	68,1%	1,02	5
VIII.e	I buy the stocks that a group of investors owns.	3,85	77,0%	0,83	2
	Average	**3,70**	**74,0%**	**0,66**	

Source: Author’s creation

The highest mean is for the item number 2 which says investors keep the stocks that have decreased in value, as one can see from **Table 3.9.** Which means that over 78,4% of Portfolio Managers agree to this item. This finding illustrates the level of regret aversion in the behavior of investors, as they hold stocks which are giving losses and do not prefer to sell them as they avoid regret. From a pragmatic perspective, this behavior can lead to serious problems in the context of decisions related to investments. As investors behave irrational in their decisions related to investments and may miss many opportunities to sell those securities and buy other stocks. If they continue to lose and their prices continue to fall. Therefore, investors seem more willing to sell stocks that are rising in value than those whose value is falling.

[261] Barberis, N., and Huang, M. (2001). Mental Accounting, Loss Aversion and Individual stock Return. *Journal of Finance*, 56 (4), pp. 1247-1292.

Barberis and Huang (2000) assume that investors treat their stock holdings according to the principle of mental accounting and react to gains and losses separately for different stocks.[262] The overall mean score of the construct is 3,6993. The overall mean of this field is more than 3,5, which means regret aversion have a high influence on decision making of individual investors at the European Stock Exchange.

Self-Control and the impact on investment decisions of Portfolio Managers

Table 3.10. **Means and Ranks for Self-Control**

No.	Question	Mean	Proportional mean (%)	Standard deviation	Rank
IX.a.	I can achieve profits out of my stocks by consulting expert always.	3,81	76,1%	1,03	3
IX.b.	If I believe that some details about a certain stock are not available to me, I don‘t buy that stock.	3,73	74,7%	1,07	4
IX.c.	Whatever my investment goals are in the stock market, I can achieve them.	3,87	77,4%	0,900	1
IX.d	I care about spending on my daily obligations more than caring about saving for the future.	2,61	52,2%	1,09	5
IX.e.	I divide my money to capital for investment and money for daily spending.	3,86	77,1%	0,70	2
	Average	**3,58**	**71,5%**	**0,37**	

Source: Author’s creation

The overall mean of this behavioral factor - *Self-Control* – is equal to 3,5755 and almost near the upper end of the moderate impact, as one can see from **Table 3.10**. Therefore, Self-Control has a moderate influence on the investment decision-making of Portfolio Managers.

In a study conducted by Thaler and Shefrin in 1981, authors have already mentioned that market participants should always show some tolerance and self-control. [263]

[262] Barberis, N., and Huang, M. (2001). Mental Accounting, Loss Aversion and Individual stock Return. *Journal of Finance*, 56 (4), pp. 1247-1292.

[263] Thaler, R., and Shefrin H. (1981). An Economic Theory of Self-Control. *Journal of Political Economy*, 89 (2), pp. 392-406.

The highest mean is for the item number 3 which ask the level of agreement of respondents that they can achieve their investment goals in the stock market. Thus, it can also be concluded that respondents agree to this statement.

3.3.3 Differences between Portfolio Managers in gender, age, education, net income, work experience and AUM in Europe and the impact on the individual investment decision-making

In the study by Berggren and Gonzales (2010), it is explained that gender is one of the demographic characteristics that have a significant influence on behavioral biases such as Overconfidence.[264] Therefore, the following hypothesis needs to be tested:

H_{Gender}: *The differences between the gender of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*

Differences in the investment decisions of Portfolio Managers in relation to their gender

Table 3.11. **Differences in relations to the gender of the Portfolio Managers**

No.	Variable	Test statistic	Significance value	Means	
				Male	Female
1	**Overconfidence**	**2,25**	**0,03**	**4,08**	**3,84**
2	Loss Aversion	0,01	0,99	3,78	3,79
3	Herding	1,16	0,25	3,84	3,71
4	Representativeness	-0,96	0,34	3,82	3,93
5	Price Anchoring	-1,18	0,24	3,57	3,54
6	Availability	0,94	0,35	3,98	3,82
7	Mental Accounting	-0,44	0,66	3,67	3,46
8	Regret Aversion	-1,36	0,18	3,62	3,66
9	Self-Control	0,51	0,61	3,73	3,76

Source: Author's creation

There is an insignificant relationship between dependent variables with respect to gender differences of Portfolio Managers except for Overconfidence. There is a significant difference in the behavioral factor *Overconfidence* as the significance value is $\leq 0,05$ (0,026) and test statistics is 2,253, see **Table 3.11**.

[264] Berggren, J., and Gonzalez, R. (2010). Gender difference in financial decision making: A quantitative study of risk aversion and overconfidence between the genders. *Umea University*, pp. 1-55.

However, it can be deduced from the statistics that all other factors have no significant influence on the decision-making process, but only Overconfidence has a significant influence Therefore the **null hypothesis is accepted.** Consequently, the finding does not support the hypothesis that differences between the gender of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.

This result is in line with previous research. For example, Barber and Odean (2001) studied the self-confidence of men and women and how this affects their performance. They found that men were more affected by the Overconfidence bias and their returns were lower than those of women. Lin (2011) came to similar conclusions.[265] This assumption is also supported by this study, clearly visible in the different means for the behavioral factors *Overconfidence* between female (3,84) and male (4,08) respondents. Nevertheless, it is quite remarkable, that the other eight behavioral factors do not differ between the gender.

Differences in the investment decisions of Portfolio Managers in relation to their age

Table 3.12. **Differences in relations to the age of the Portfolio Managers**

No.	Variable	Test statistic	Significance value	Means					
				18 to 24	24 to 34	35 to 44	45 to 54	55 to 64	>65
1	Overconfidence	0,95	0,45	4,30	4,01	4,00	4,06	4,10	3,93
2	**Loss Aversion**	**3,69**	**0,00**	**4,09**	**3,84**	**3,74**	**3,70**	**3,71**	**3,64**
3	**Herding**	**7,24**	**0,00**	**4,50**	**4,08**	**3,52**	**3,66**	**3,75**	**4,00**
4	**Representativeness**	**4,24**	**0,00**	**4,56**	**3,99**	**3,56**	**3,67**	**4,04**	**3,75**
5	**Price Anchoring**	**2,94**	**0,02**	**3,83**	**3,61**	**3,40**	**3,52**	**3,83**	**3,83**
6	**Availability**	**4,84**	**0,00**	**4,66**	**4,12**	**3,74**	**3,80**	**4,03**	**3,50**
7	**Mental Accounting**	**3,58**	**0,01**	**3,06**	**3,77**	**3,74**	**3,58**	**3,70**	**3,83**
8	Regret Aversion	1,12	0,36	3,58	3,57	3,65	3,66	3,76	3,20
9	Self-Control	1,73	0,13	4,18	3,81	3,51	3,64	4,02	4,00

Source: Author's creation

Different studies show that the age of investors can have an influence on the decision-making process.[266] Therefore, the following hypothesis needs to be tested:

[265] Lin, H.-W. (2011). Elucidating rational investment decisions and behavioral biases: Evidence from the Taiwanese stock market. *African Journal of Business Management*, 5 (5), pp. 1630-1641.

[266] Bashir T., Rasheed U., Fatima S., and Maqsood M. (2013). Impact of Behavioral Biases on Investors Decision Making: Male Vs Female. *Journal of Business and Management*, 10 (3), pp. 60-68.

H_{Age}: *The differences in age of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*.

There is a significant difference in the fields of *Loss Aversion, Herding, Representativeness, Price Anchoring, Availability of information and Mental Accounting* with respect to the age of the respondents, as the sig. value are less than 0,05, as one can see from **Table 3.12.**

This find is quite interesting because it means, for instance, regarding *Representativeness*, that older people (3,75) are less affected by Representativeness bias than younger people (4,56). Meaning that younger people put too much weight on recent experience and ignore the average long-term rate, whereas older people could take advantage of their experience.[267]

While there is no significant difference in *Overconfidence, Regret Aversion and Self-Control* with respect to the age of the respondents. Thus, the hypothesis that that differences between respondents in age do not have an impact on investment decisions at European Stock Exchange can be rejected.

Differences in the investment decisions of Portfolio Managers in relation to their education level

Table 3.13. **Differences in relations to the education level of the Portfolio Managers**

No.	Variable	Test statistic	Significance value	Means				
				without Diplomas	Certificates or Diplomas	Bachelor	Master, Engineer	Doctorate
1	Overconfidence	2,29	0,06	4,33	4,10	4,08	3,93	4,10
2	Loss Aversion	1,82	0,13	3,84	3,87	3,88	3,68	3,73
3	Herding	1,38	0,24	3,92	4,00	4,07	3,58	3,74
4	**Representativeness**	**2,53**	**0,04**	**3,98**	**3,93**	**4,08**	**3,58**	**3,85**
5	Price Anchoring	0,93	0,45	3,61	3,49	3,70	3,53	3,51
6	**Availability**	**4,69**	**0,00**	**4,05**	**4,25**	**4,18**	**3,70**	**3,81**
7	**Mental Accounting**	**4,46**	**0,00**	**3,41**	**3,47**	**3,75**	**3,83**	**3,36**
8	Regret Aversion	0,77	0,55	3,69	3,57	3,65	3,62	3,64
9	Self-Control	1,86	0,12	3,73	3,75	3,92	3,53	3,86

Source: Author's creation

There is a significant difference in the fields of Representativeness, Availability of information and Mental Accounting with respect to the education of the respondents, as the sig. value are less than 0.05, as one can see from **Table 3.13**. Therefore, the following hypothesis needs to be tested:

$H_{Education}$: *The differences in the education level of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*

[267] Ritter, J. (2003). Behavioral Finance. *Pacific-Basin Finance Journal*, 11 (4), pp. 429-437.

While there is no significant difference in Overconfidence, Loss Aversion Herding, Price Anchoring, Regret Aversion and Self-Control with respect to the education of the respondents. Thus, hypothesis that that differences between respondents in education do not have an impact on investment decisions at European Stock Exchange can be rejected.

On the other hand, this evaluation shows very clearly that people with higher education (e.g. with a doctorate) suffer less from Availability bias than people without a degree. This means that people with higher education do not overuse readily available information, which corresponds to the definition of Availability.[268]

Differences in the investment decisions of Portfolio Managers in relation to their investment experience

Table 3.14. **Differences in relations to the investment experience of the Portfolio Managers**

No.	Variable	Test statistic	Significance value	Means			
				1 to 3 years	3 to 6 years	7 to 9 years	> 9 years
1	Overconfidence	0,30	0,83	3,99	4,07	4,11	4,05
2	**Loss Aversion**	**3,54**	**0,02**	**3,89**	**3,84**	**3,89**	**3,69**
3	**Herding**	**1,23**	**0,00**	**4,18**	**4,07**	**3,97**	**3,58**
4	Representativeness	4,41	0,01	4,09	4,10	3,98	3,62
5	Price Anchoring	1,98	0,12	3,58	3,70	3,69	3,48
6	**Availability**	**5,34**	**0,00**	**4,37**	**4,14**	**3,89**	**3,79**
7	**Mental Accounting**	**4,14**	**0,01**	**3,41**	**3,75**	**3,84**	**3,62**
8	Regret Aversion	2,14	0,10	3,70	3,36	4,00	3,60
9	Self-Control	1,87	0,14	3,82	3,85	3,94	3,61

Source: Author's creation

Greenwood and Nagel (2009) have demonstrated that past life experiences can strongly influence investors' decisions and that these past influences are often unconsciously incorporated into an investor's strategy.[269] Therefore, the following hypothesis needs to be tested:

[268] Waweru, N., Munyoki, E., and Uliana, E. (2008). The effects of behavioral factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1(1), pp. 24-41.

[269] Greenwood, R. and Nagel, S. (2009). Inexperienced investors and bubbles. *Journal of Financial Economics*, 93 (2), pp. 239-258.

$H_{Experience}$: *The differences in the work experience of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

There is a significant difference in the fields of *Loss Aversion, Herding, Representativeness, Availability of information and Mental Accounting* with respect to the investors experience of investing, as the sig. value are less than 0,05, see **Table 3.14.**

This can be easily seen by the data analysis, where people with work experience more than nine years are less affected Availability bias than people with a small amount of experience, like 1-3 years. This means that people with less experience are using available information excessively and therefore, can be easily biased by new arisen information without putting these in context.

While there is no significant difference in *Overconfidence, Price Anchoring, Regret Aversion and Self-Control* with respect to the experience of the investor. Thus, hypothesis that that differences between investors experience do not have an impact on investment decisions at European Stock Exchange can be rejected.

Differences in the investment decisions of Portfolio Managers in relation to their AUM

Table 3.15. **Differences in relations to the AUM of the Portfolio Managers**

No.	Variable	Test statistic	Significance value	Means				
				<4.500€	>4.500-7.000€	>7.000-8.500€	>8.500-10.000€	>10.000€
1	**Overconfidence**	**6,80**	**0,00**	**3,52**	**4,07**	**4,16**	**4,24**	**3,96**
2	**Loss Aversion**	**6,51**	**0,00**	**3,56**	**3,84**	**4,00**	**3,76**	**3,73**
3	**Herding**	**6,04**	**0,00**	**3,36**	**4,13**	**4,09**	**3,82**	**3,59**
4	**Representativeness**	**4,12**	**0,00**	**3,17**	**4,00**	**4,17**	**3,94**	**3,64**
5	**Price Anchoring**	**5,37**	**0,00**	**3,11**	**3,50**	**3,87**	**3,61**	**3,58**
6	**Availability**	**3,37**	**0,01**	**3,56**	**4,12**	**4,31**	**3,99**	**3,78**
7	**Mental Accounting**	**3,20**	**0,02**	**4,26**	**3,44**	**3,57**	**3,64**	**3,71**
8	**Regret Aversion**	**2,68**	**0,03**	**3,47**	**3,58**	**3,40**	**3,82**	**3,62**
9	Self-Control	0,92	0,45	3,40	3,78	3,84	3,82	3,66

Source: Author's creation

Menkhoff and Nikiforow (2009) analyzed German fund management companies in 2002 and found out, that the different among of asset under management have an impact on the investment performance.[270] Consequently, the following hypothesis needs to be tested:

H_{AUM}: *The differences in amount of the AUM of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*

[270] Menkhoff, L., and Nikiforow, M. (2009). Professionals' endorsement of behavioral finance: does it impact their perception of markets and themselves? *Journal of Economic Behavior & Organization*, 71 (2), pp. 318-329.

As one can see from **Table 3.15**, there is a significant difference in all the fields of study except *Self-Control*, as the sig. values for all behavioral factors are less than 0,05.

While there is no significant difference in Self-Control with respect to the amount of investment. Thus, hypothesis that that differences between investment amount do not have an impact on investment decisions at European Stock Exchange can be rejected.

Differences in the investment decisions of Portfolio Managers in relation to their Net Income

Table 3.16. **Differences in relations to the Net Income level of the Portfolio Managers**

No.	Variable	Test statistic	Significance value	Means				
				<4.500€	>4.500-7.000€	>7.000-8.500€	>8.500-10.000€	>10.000€
1	**Overconfidence**	**6,80**	**0,00**	**3,52**	**4,07**	**4,16**	**4,24**	**3,96**
2	**Loss Aversion**	**6,51**	**0,00**	**3,56**	**3,84**	**4,00**	**3,76**	**3,73**
3	**Herding**	**6,04**	**0,00**	**3,36**	**4,13**	**4,09**	**3,82**	**3,59**
4	**Representativeness**	**4,12**	**0,00**	**3,17**	**4,00**	**4,17**	**3,94**	**3,64**
5	**Price Anchoring**	**5,37**	**0,00**	**3,11**	**3,50**	**3,87**	**3,61**	**3,58**
6	**Availability**	**3,37**	**0,01**	**3,56**	**4,12**	**4,31**	**3,99**	**3,78**
7	**Mental Accounting**	**3,20**	**0,02**	**4,26**	**3,44**	**3,57**	**3,64**	**3,71**
8	**Regret Aversion**	**2,68**	**0,03**	**3,47**	**3,58**	**3,40**	**3,82**	**3,62**
9	Self-Control	0,92	0,45	3,40	3,78	3,84	3,82	3,66

Source: Author's creation

Gertler and Rogoff (2004) studied the irrational behavior of investors and found that different behavior can occur with different investor incomes.[271] Therefore, the following hypothesis needs to be tested:

> **$H_{\text{Net Income}}$:** *The differences in the Net Income of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*

There is a significant difference in all the fields of study except *Self-Control*, as the sig. values for all behavioral factors are less than 0,05, as one can see from **Table 3.16**.

While there is no significant difference in *Self-Control* with respect to the net income. Thus, hypothesis that that differences between net income do not have an impact on investment decisions at European Stock Exchange can be rejected.

[271] Gertler, M., and Rogoff, K. (2004). Perspectives on Behavioral Finance: Does Irrationality Disappear with Wealth? Evidence from Expectations and Actions. *NBER Macroeconomics Annual*, 18, pp. 139-208.

3.4 Results of the factor analysis of behavioral variables influencing the investment decisions

3.4.1 Factor analysis of behavioral variables influencing the investment decisions

Question number 8 to 57 of the questionnaires were framed to examine the impact of behavioral variables on investment decisions of portfolio managers in European Stock Market. Perceived investment performance is identified from question 58 to 60.

Factors were identified using exploratory factor analysis in SPSS. After eliminating several unsuitable items, whose factor loadings were less than 0,50, 6 factors were identified. Out of which 5 behavioral factors and 1 investment factor was identified. Eigen Value was 1,027 and the value of KMO was identified to be 0,815, (sig. = 0,000), 73% total variance was explained by these factors.

Factor loading for all the variables were greater than 0,5, which makes the results acceptable and suitable for further analysis.

The Following table shows the result of factor analysis and more details of the analysis done by SPSS is shown in the appendix, see **Table 3.17.**

Table 3.17. **Factor analysis of behavioral variables influencing the investment decisions**

Variables	Factor Loadings						
Statements	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**
PA6 - *I use the stock buying price as a reference point for trade.*	0,851						
PA1 - *I compare the current stock prices with their recent year high and low prices to justify my stock purchase.*	0,751						
PA5 - *I believe that the position of the year high and low price defined the current stock price movement range.*	0,727						
PA4 - *I see the stock price as high if the price has increased to the current year high.*	0,636						
LA1 - *I am more concerned about a large loss in my stock than missing a substantial gain.*		0,847					
LA4 - *When it comes to investment, avoiding a capital loss is more important than returns.*		0,791					
LA3 - *I will not increase my investment when the market performance is poor.*		0,620					
LA2 - *I feel nervous when I have large paper losses in my invested stocks.*		0,618					
AVA3 - *If I want to invest in the stocks of a certain company, I will rely on information from the internet.*			0,818				
AVA4 - *If I want to invest in the stocks of a certain company, I will rely on information from the same company.*			0,814				
AVA5 - *If I want to invest in the stocks of a certain company, I will rely on information from financial experts.*			0,689				
AVA6 - *If a friend advised me to purchase a stock of a certain company then news arrived me about the probability of that stock 's price rising, I will invest in*			0,638				
OC5 - *My investing profits can be attributed to my successful investment strategy.*				0,833			
OC6 - *I believe that my skills and knowledge of the stock market can help me to outperform the market*				0,801			
OC3 - *I have the ability to choose the stocks which performance will be better than the market performance.*				0,781			
MA1 - *I tend to treat each element of my investment portfolio separately.*					0,88		
MA3 - *I don 't care about the performance of my investment portfolio as a whole but I care about the return of each account separately.*					0,63		
MA2 - *I hesitate to sell stocks that had high returns in the past even though their prices decrease nowadays*					0,619		
OC1 - *I am an experienced investor.*						0,877	
OC2 - *I feel more confident in my own investment opinions over the opinions of my colleagues or competitors.*						0,768	
IP3 - *You feel satisfied with your investment decisions in the last year (including selling, buying, choosing stocks, and deciding the stock volumes)* **.**							0,889

Source: Author's creation

3.4.2 Measurement Reliability Test using Cronbach's Alpha

The reliability of the construct is very important aspect of data analysis, as if the reliability of instrument is compromised, no matter who robust the results are, we cannot be ascertain about their accuracy. This segment measures the reliability of the construct using Cronbach's Alpha. The results are shown in the following table, **Table 3.18**:

Table 3.18. **Summary of the Cronbach's Alpha**

Factor	Variables	Cronbach's Alpha
Price Anchoring	PA1	0,9
	PA4	
	PA5	
	PA6	
Availability	AVA3	0,8
	AVA4	
	AVA5	
	AVA6	
Mental Accounting	MA1	0,8
	MA2	
	MA3	
Overconfidence	OC3	0,7
	OC5	
	OC6	
	OC1	
	OC2	
Loss Aversion	LA1	0,8
	LA2	
	LA3	
	LA4	

Source: Author's creation

From the table, it is evident that all the factors are having alpha value greater than 0,6. These indexes show that items included in the factors Price Anchoring, Availability of Information, Ability of the Investor, Mental Accounting, Overconfidence and Loss Aversion are reliable enough for further analysis i.e., Structural Equation Modelling to identify the between those factors. Overconfidence has an alpha value of 0,7, which is very low, but still acceptable.
More detailed reliability tables of Cronbach's alpha for all these items done by SPSS are shown in the following Appendix.

3.4.3 Influences of Behavioral Factors by using the Structural Equation Modeling

SEM (Structured Equation Modelling) is a technique which combines factor analysis and regression analysis into one model. The relationship between various variables of the study is identified by SEM. Confirmatory Factor Analysis (CFA) aids in identifying the factors which have a bearing on investment performance. Exploratory Factor Analysis (EFA) provides the factors and CFA confirm the results and identifies which factors are suitable for further analysis. EFA was done SPSS, while AMOS is used to do CFA. Whereas Regression measures the magnitude of the impact of each variable, also known as regression weights**.**

Another prominent aspect of SEM is model fitness. Which means SEM measures whether the presented model in the study is fit or not, is determined on the basis of certain indices. The results of SEM are shown in the table given below:

The model fit is substantially good with GFI of 0,851 (Goodness- of- fit Index). CFI (Comparative- fit- index) is 0,859, RMSEA=0,085, CMIN/DF= 1,97, P Value= 0,000. The model fits good and has a high validity, as for instance, the value of CFI is closed to 1.[272] These values show the validity of the model. More detailed tables are presented in **Table 3.19**.

Table 3.19. **Model Fit Measures for Model**

Measure	Value
CMIN/DF	1,987
P Value	0,000
CFI	0,859
GFI	0,815
AGFI	0,753
SRMR	0,053
RMSEA	0,085
PCLOSE	0,000

Source: Author's creation

The tables, **Appendix Table L and Appendix Table M,** provides the estimates of factor loadings, regression weights between variables as well as the variances of each variable

[272] Smeulders, B., Crama, Y., and Spieksma, F. (2019). Revealed preference theory: An algorithmic outlook. *European Journal of Operational Research*, 272 (3), pp. 803-815.

explained by the other variables. Factor loadings are mentioned to the top of each square of measured variable. Regression weights are written on end of each arrow. Whereas variance explained by each variable is written on covariance arrows. According to the model, six factors were identified to have influence on investment performance of the investors which are shown in **Table 3.20**.

Table 3.20. **Factors impacting the Investment Performance**

Behavioural Factor	**Questions and variable in the SEM**
Price Anchoring	PA1, PA4, PA5, PA6
Availability	AVA3, AVA4, AVA5, AVA6
Mental Accounting	MA1, MA2, MA3
Over Confidence	OC1, OC2, OC3, OC5, OC6
Loss Aversion	LA1, LA2, LA3, LA4

Source: Author's creation

The results show that convergent validity of data is ensured as each factor and its variable are having factor loadings more that 0,5. Mental Accounting is the factor which has highest impact on investment performance, having regression weight of 0,224. Availability of information has regression weight of 0,034 which slightly influence investment performance. Overconfidence and Loss Aversion also have an impact on performance of investment. There regression weights are 0,150 and 0,048 respectively. One of the behavioral factors is having negative influence on investment performance, that is Price Anchoring, its regression weight is -0,240, as one can see from **Figure 3.6.**

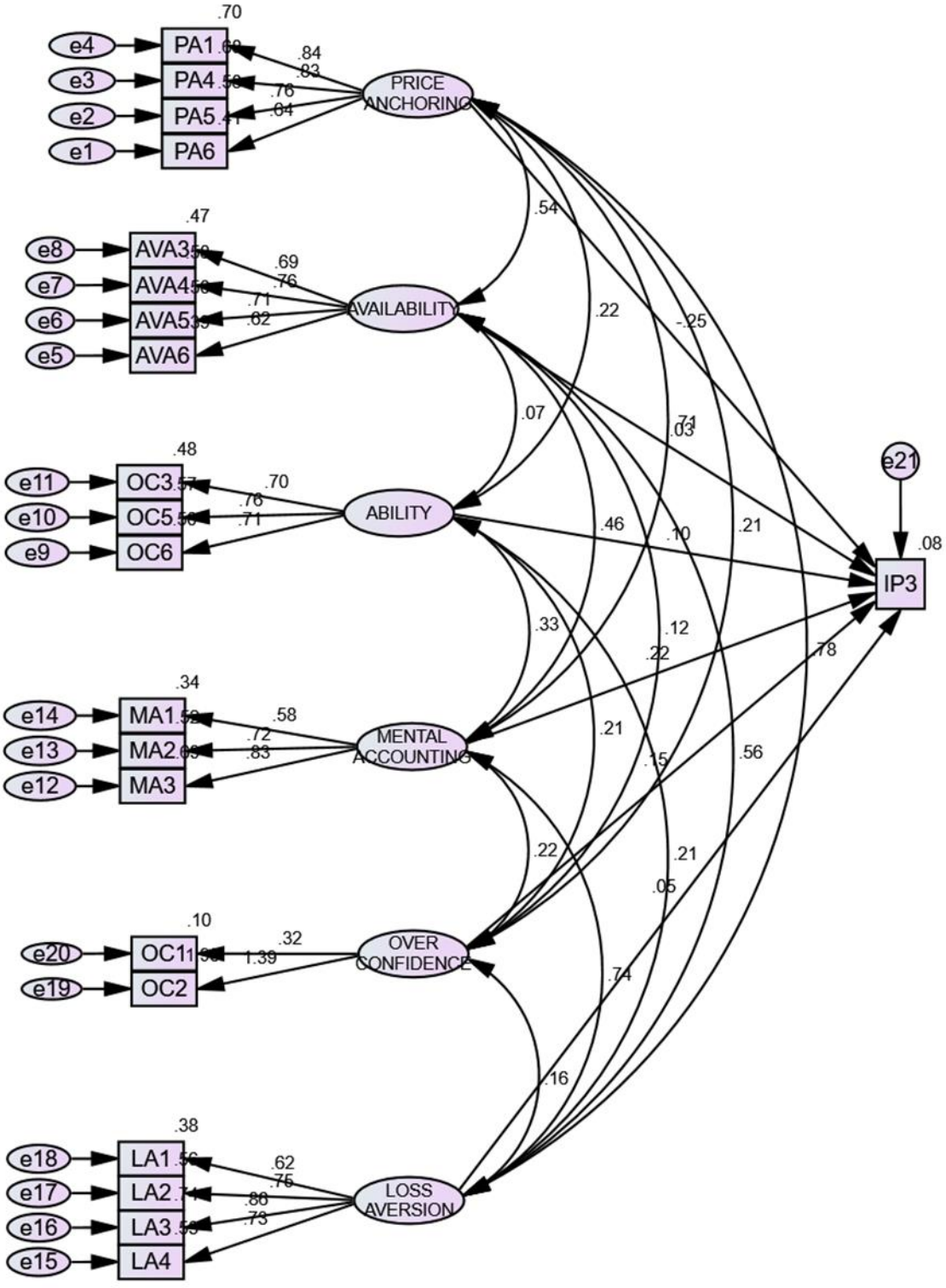

Figure 3.6. **Structural Equation Modelling for Behavioral Factors and Investment Performance of Portfolio Managers**

Source: Author's creation

The findings of the study propose that the behavioral factor of price anchoring is having negative impacts on the investment performance of the investors and hence should be handled with utmost care. The findings also suggests if we improve the herding and heuristic behavior of investors, their investment performance can also be improved. One of the astonishing findings of the study is that behavioral factors are reported to have high impact on investment decision making but they do not significantly influence the investment performance of the investors. Thus, the null hypothesis that all behavioral factors have a significant positive impact on investment performance of the investors is not supported by the results of Structured equation modelling (SEM). Our study was conducted in European stock exchange, out of total 9 factors only and only five factors are expected to have a significant influence on investment performance of the investors.

3.5 Discussion of hypotheses and interpretation of the results

In order to establish a general basis, it is necessary to analyze the significance of behavioral finance and the associated factors for decision-making and ultimately for investment performance. This has been done in the first chapter by reviewing a large amount of literature and past studies on this subject. The past literature mainly refers to the individual investor and studies on professional investors, such as portfolio managers of funds, are very rare. This thesis attempts to fill this gap by examining the decision-making process and performance of Portfolio Managers in Europe.

With the help of the eleven expert interviews, both the basis for the questionnaires is designed and a first impression is given as to which behavioral factors may affect professional investors. The evaluation of the 139 completed questionnaires and their data analysis, allows the verification of the main hypothesis:

H_B: The main b*ehavioral finance factors have a significant influence on the decision - making and consequently, on the investment performance of Portfolio Managers at the European stock market.*

The result of the data analysis shows that not every behavioral influence is significant. Nine different behavioral factors occur in the decision-making process. Only four factors (Overconfidence, Loss Aversion, Availability and Mental Accounting) are assumed to have a positive influence on investment performance, while Price Anchoring has a negative influence on investment performance. **Therefore, the main hypothesis H_B can be rejected.**

On the one hand, these findings are in line with past studies, namely Overconfidence, Loss Aversion, Availability, Price Anchoring and also Mental Accounting.[273] [274] [275]

On the other hand, they clearly contradict past studies, which showed that Herding, Loss Aversion, Representativeness, Self-Control and also Regret Aversion impair the decision-making processes of individual investors. [276] [277] [278]With the help of the SEM and its evaluation, the following sub-hypotheses can be tested as seen in **Table 3.21**:

Table 3.21. **Sub-Hypothesis - Behavioral Factors**

Sub-Hypothesis - Behavioral Factors	**Decision**
H_1: ***Overconfidence*** *has no impact the investment performance of Portfolio Managers in Europe.*	**rejected**
H_2: ***Loss Aversion*** *has no impact the investment performance of Portfolio Managers in Europe.*	**rejected**
H_3: ***Herding*** *has no impact the investment performance of Portfolio Managers in Europe.*	**accepted**
H_4: ***Representativeness*** *has no impact the investment performance of Portfolio Managers in Europe.*	**accepted**
H_5: ***Price Anchoring*** *has no impact the investment performance of Portfolio Managers in Europe.*	**rejected**
H_6: ***Availability*** *has no impact the investment performance of Portfolio Managers in Europe.*	**rejected**

[273] Kengatharan, L., and Kengatharan, N. (2013). The influence of behavioral factors in making investment decisions and performance: Study on investors of Colombo stock exchange, Sri Lanka. *Asian Journal of Finance, and* Accounting, 6 (1), pp. 1-23.

[274] Jannah, W., and Ady, S. U. (2017). Analisis Fundamental, Suku Bunga, Dan Overconfidence Terhadap Pengambilan Keputusan Investasi Pada Investor Di Surabaya. Ekspektra: *Jurnal Bisnis Dan Manajemen*, 1 (2), pp. 138-155.

[275] Hwang, S., and Satchell, S. E. (2010). How loss averse are investors in financial markets? *Journal of Banking & Finance*, 34 (10), pp. 2425-2438.

[276] Atmaningrum, S., Kanto, D., and Kisman, Z. (2021), Investment Decisions: The Results of Knowledge, Income, and Self-Control. *Journal of Economics and Business*, 4 (1), pp. 100-112.

[277] Welch, I. (2000). Herding among security analysts. *Journal of Financial Economics*, 58 (3), pp. 369-396,

[278] Hirshleifer, D. and Teoh, S. H. (2003). Herd Behaviour and Cascading in Capital Markets:a Review and Synthesis. *European Financial Management*, 9 (1), pp. 25-66.

H_7: ***Mental Accounting*** *has no impact the investment performance of Portfolio Managers in Europe.*	**rejected**
H_8: ***Regret Aversion*** *has no impact the investment performance of Portfolio Managers in Europe.*	**accepted**
H_9: ***Self-Control*** *has no impact the investment performance of Portfolio Managers in Europe.*	**accepted**

Source: Author's creation

A further component of this work was to test how far the different personal information from the Portfolio Managers has an influence on the behavioral factors. Consequently, the hypothesis to be tested is as follows:

H_{10}: *The behavioral factors and their influence on the investment decisions are not different within the Portfolio Managers and their various characteristics - namely gender, education, work experience, AUM or net income.*

The result of the model of this thesis rejects this sub-hypothesis H_{10}, analyzing if the behavioral factors and their influence on the investment decisions are not different within the Portfolio Managers and their various characteristics - namely gender, education, work experience, AUM or net income. The finding regarding the different sub-hypothesis for the differences in the respondent's characteristic can be seen in following table:

Table 3.22. **Sub-Hypothesis - Differences in Respondents' Characteristics**

Sub-Hypothesis - Differences in Respondents' Characteristics	Decision
$H_{Genders}$: *The differences between the genders of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*	**accepted**
H_{Age}: *The differences in age of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*	**rejected**
$H_{Experience}$: *The differences in the work experience of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*	**accepted**

H_{AUM}: *The differences in amount of the AUM of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange.*	**rejected**
$H_{Education}$: *The differences in the education level of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*	**accepted**
$H_{Net\ Income}$: *The differences in the Net Income of the Portfolio Managers have no influence on investment decisions on the European Stock Exchange*	**rejected**

Source: Author's creation

Looking more into the details of the data analysis and testing the sub-hypotheses, following results are worth mentioning. Testing the sub-hypothesis $\mathbf{H_{Gender}}$, the findings are similar to previous studies and suggest that gender differences significantly affect only the Overconfidence decision-making, whereas all other tested behavioral factors do not have a significant impact. This is similar to Kartasova (2013), he was able to show that Overconfidence has a strong influence on the financial decision-making process.[279] The result from this work is also congruent with the result from Barber and Odean (2001), showing that male investors are more overconfident than females.[280] The finding by Rau (2014), that female investors are more loss averse than males could not be proven by this thesis. [281]

AUM and Net Income have a substantial and significant effect on all behavioral factors (expect Self-Control) and therefore both $\mathbf{H_{AUM}}$ and $\mathbf{H_{NetIncome}}$ can be rejected. No other study has been able to prove this so far, one reason for this is probably the problem of getting the data.
Different studies have shown that the age of investors can have an influence on the decision-making process. [282] The data analysis of this study shows that Overconfidence, Regret Aversion

[279] Kartašova, J. (2013). Factors forming irrational Lithuanian individual investors' behavior. *Business Systems & Economics*, 3 (1), pp- 69-78.

[280] Barber, B., and Odean, T. (2000). Trading is hazardous to your wealth: the common stock investment performance of individual investors. *Journal of Finance*, 55 (2), pp. 773-806.

[281] Rau, H. (2014). The disposition effect and Loss Aversion: Do gender differences matter? *Economics Letters*, 123 (1), pp. 33-36.

[282] Rekik, Y., and Boujelbene, Y. (2013). Determinants of Individual Investors' Behaviors: Evidence from Tunisian Stock Market. *IOSR Journal of Business and Management*, 8 (2), pp. 109-119.

and Self-Control have no impact on the decision-making process. On the other hand, the other 6 behavioral factors do have a significant impact on the decision-making process of Portfolio Managers and therefore, the $\mathbf{H_{AGE}}$ can be rejected.

Work experience and the education level of a Portfolio Manager have only partly a significant impact on the behavioral factors, namely Loss Aversion, Herding, Availability and Mental Accounting. On the other behavioral factors, no influence was found and therefore, the sub-hypothesis $\mathbf{H_{Experiece}}$ and $\mathbf{H_{Education}}$ can be accepted.

3.6 Summarize of the findings and final framework for a better understanding of behavioral factors affecting Portfolio Managers

In order to establish a general framework for a better understanding of the behavioral factors, which can affect the investment decisions-making process of Portfolio Managers in Europe, it is necessary to summarize the findings.

As shown in the previous subchapter, there are only a three personal information about Portfolio Managers which has an influence on the behavioral factors:

1) The age of the Portfolio Managers have a significant impact on the decision-making process
2) The AUM or the amount, which the Portfolio Manager is managing, have a substantial and significant effect on all behavioral factors.
3) The average net income per month of the Portfolio Manager has a substantial and significant effect on all behavioral factors.

Therefore, following questions should be ask to find out and help out for a better understanding of the different behavioral factors:

Table 3.23. **Framework of Personal Information affecting the Behavioral Factors**

Personal Information						
What is your age?	18 to 24 ☐	25 to 34 ☐	35 to 44 ☐	45 to 54 ☐	55 to 64 ☐	65 or older ☐
Please estimate the amount, which you are in charge of and is invested into stocks?	< 1 mio. € ☐	1-15 mio. € ☐	>15-50 mio. € ☐	>50-100 mio. € ☐	> 250 million € ☐	
What is your average net income per month?	<4.500€ ☐	4.500-7.000€ ☐	>7.000-8.500€ ☐	>8.500-10.000€ ☐	>10.000€ ☐	

Source: Author's creation

The result of data analysis in the previous sub-chapter shows that not every behavioral influence is significant. Only four factors (Overconfidence, Loss Aversion, Availability and Mental Accounting) are assumed to have a positive influence on investment performance, while Price Anchoring has a negative influence on investment performance. Therefore, the framework for a better understanding the behavioral factors should include following questions as seen in the table below:

Table 3.24. **Framework of Behavioral Factors affecting the Investment-Decision Making**

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Price Anchoring					
I use the stock buying price as a reference point for trade.	☐	☐	☐	☐	☐
I compare the current stock prices with their recent year high and low prices to justify my stock purchase.	☐	☐	☐	☐	☐
I believe that the position of the year high and low price defined the current stock price movement range.	☐	☐	☐	☐	☐
I see the stock price as high if the price has increased to the current year high.	☐	☐	☐	☐	☐
Loss Aversion					
I am more concerned about a large loss in my stock than missing a substantial gain.	☐	☐	☐	☐	☐
When it comes to investment, avoiding a capital loss is more important than returns.	☐	☐	☐	☐	☐
I will not increase my investment when the market performance is poor.	☐	☐	☐	☐	☐
I feel nervous when I have large paper losses in my invested stocks.	☐	☐	☐	☐	☐
Availability					
If I want to invest in the stocks of a certain company, I will rely on information from the internet.	☐	☐	☐	☐	☐
If I want to invest in the stocks of a certain company, I will rely on information from the same company.	☐	☐	☐	☐	☐
If I want to invest in the stocks of a certain company, I will rely on information from financial experts.	☐	☐	☐	☐	☐
If a friend advised me to purchase a stock of a certain company then news arrived me about the probability of that stock's price rising, I will invest in these stocks.	☐	☐	☐	☐	☐
Mental Accounting					
I tend to treat each element of my investment portfolio separately.	☐	☐	☐	☐	☐
I don't care about the performance of my investment portfolio as a whole but I care about the return of each account separately.	☐	☐	☐	☐	☐
I hesitate to sell stocks that had high returns in the past even though their prices decrease nowadays	☐	☐	☐	☐	☐
Overconfidence					
I am an experienced investor.	☐	☐	☐	☐	☐
I feel more confident in my own investment opinions over the opinions of my colleagues or competitors.	☐	☐	☐	☐	☐
My investing profits can be attributed to my successful investment strategy.	☐	☐	☐	☐	☐
I believe that my skills and knowledge of the stock market can help me to outperform the market.	☐	☐	☐	☐	☐
I have the ability to choose the stocks which performance will be better than the market performance.	☐	☐	☐	☐	☐

Source: Author's creation

In the following sections, the first steps to protect against the five different relevant behavioral biases are discussed and elaborated. This framework applies to both private investors and a portfolio manager.

Overconfidence can be combated and prevented in a number of ways. One starting point is to encourage yourself to give space to the perspectives of others and thus change your own perspective. While investors often overestimate their own abilities, they tend to be more rational and objective when considering the decisions of others. Another strategy is that investors should

consider and discuss previous investment decisions. The investor should recognize that over-reliance has led to poor results over time. These poorer results should be compared to results using a more realistic approach. Another quite common method is to perform a *premortem* process according to Klein (2008).[283] This process is a sort of pre-investment meeting where a team imagines what could happen that could make an investment decision go wrong. The team then works backwards to create a plan that will help avoid potential roadblocks and increase the chances of success. This exercise can help investors spot potential risks and missteps that their overly optimistic mood may have overlooked.

Loss Aversion can be avoided if an investor takes an overall portfolio perspective and does not look at investments individually. For example, different asset classes or different sectors will perform differently (i.e., companies in cyclical industrials vs. companies in healthcare). So, if an investor has a well-diversified portfolio, there will be some underperformers within the portfolio and some outperformers on the other side. Therefore, an investor does not suffer from extreme losses or volatility at the overall portfolio level.

Mental Accounting is the tendency that investors sometimes need to treat the same stocks differently depending on their objective, e.g. B. Short-term or long-term investments. A good way to capitalize on this trend is to take a goal-based approach to investing. When the investor has a clear investment objective and horizon, mental accounting can be reduced.

Availability: Investors need to think long-term, think rationally and ideally only look beyond difficult market phases. For example, the Covid-19 pandemic was an unprecedented scenario that had a significant impact on global capital markets. However, investors must overlook this and ultimately speculate on the end of the pandemic, because every decline is usually followed by an upswing. Therefore, a drop would be more of an investment opportunity than a reason to exit.

Looking again into the details of the data analysis of the previous sub-chapter, gender significantly affect the Overconfidence decision-making. A potential solution for reducing the Overconfidence bias would be to introduce a minimum quota for portfolio managers.

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[283] Klein, G. (2008). Performing a Project Premortem. *IEEE Engineering Management Review*, 36 (2), pp. 103-104.

Therefore, a Portfolio Manager should follow following steps of a framework to reduce the affect of the different behavioral bias, as seen in the **Table 3.24** as well in the **Appendix**:

1) Knowledge of both traditional finance and the theories of behavior finance should serve as a minimum requirement for practicing the profession as a Portfolio Manager in Europe. In addition, Portfolio Managers should educate themselves about the potential biases and how to recognize if they affect investment decisions. So that the knowledge is not only anchored in the subconscious, courses and seminars should be attended at least once a year to constantly refresh the knowledge.
2) Looking into the different personal Information which affecting the behavioral biases, age, asset under management as well monthly income must be considered. Diversity can be fulfilled, for example, by a minimum quota for women. It is also important that there are different income groups as well as age groups within the portfolio managers.
3) Explanation of Behavioral Finance and the different factors (namely: Price Anchoring, Loss Aversion, Availability, Mental Accounting and Overconfidence) which can affect the investment decision-making process and consequently, having an impact on the investment performance. Those factors having an impact on the investment decision making process of Portfolio Managers in Europe.
4) Portfolio Managers should create a process that takes into account the investor's goals and preferences so that they focus on their long-term results. With a clear investment approach, Portfolio Managers can then objectively assess how each decision may affect a portfolio over the long term. A potential checklist can help ensure that the decision-making process is rational and not impulsive. Portfolio managers should record their decisions in an investment journal so that they or other Portfolio Manager can easily review what the impact has been. In this way, the behavioral committee, which meets at least once a year, could control past decisions and improve the behavior of portfolio managers in the long term.

Taking these steps and using the results of Structural Equation Modeling have the potential to protect Portfolio Managers from behavioral biases and consequently, from irrational investment decisions.

CONCLUSIONS

The results of the theoretical and analytical findings combined with the empirical research results lead to the following conclusions and answers to the research questions as well as hypotheses:

1. The analyses of literature have contributed to a better understanding of the stock market and its behavior. It shows how important it is to know the different behavioral factors because they can impact investment decision-making and, consequently, affect investment performance of individual investor no matter if professionally or amateurish.
2. Based on the extensive literature review, many studies focused only on individual investors and not on professionals like Portfolio Managers. There are two reasons behind that: First, it is much easier to access private investors instead of professionals. Secondly, it is much anticipated that private investors are much more affected by behavioral factors than professionals.
3. The behavioral factors most commonly encountered and discussed in the literature are: Overconfidence, Loss Aversion, Herding, Representativeness, Price Anchoring, Availability, Mental Accounting, Regret Aversion, and Self-Control.
4. Thus, the lack of specific models for behavioral finance and the highly increased occurrence– driven by new media and technologies – generates the hypothesis H_B of a correlation between the level impact of behavioral factors of Portfolio Managers and the improvement in the investment performance resulting in the newly proposed causal model.
5. The results of the expert interviews show that knowledge and awareness about behavioral finance exist, and many behavioral aspects were mentioned in the different interviews. However, it seems that the decision-making process of professional investors are also influenced by these behavioral factors. Furthermore, while there are some concrete approaches to avoid such behaviors, there is still a great need to complete and adapt specific concepts.
6. Based on the literature, the expert interviews as well as the questionnaires, the paper answered the main research questions about the influence of behavioral factors on the decision-making of Portfolio Managers. The result of the data analysis shows that not every behavioral influence is significant. Nine different behavioral factors occur in the decision-making process. Only four factors (Overconfidence, Loss

Aversion, Availability and Mental Accounting) are assumed to positively influence the investment performance, while Price Anchoring is the only behavioral factor which has a negative impact on investment performance. Therefore, the main hypothesis H_B can be rejected.

7. The goal of an active managed mutual fund is to outperform the market, especially the individual benchmark. This thesis found out that more than 67% of all 1.533 European mutual funds have underperformed their own benchmark in the timeframe between 2016 to 2020. That said, investors feel happy with their own investment performance even if their investment profits are not high or better than the market return. On the other hand, other investors do not feel satisfied with their investments even when their profits are extremely high.
8. The developed SEM tests the hypothesis H_1, that Overconfidence has no impact on the investment performance of Portfolio Managers in Europe. The result of the data analysis rejected this hypothesis and indicated that Overconfidence has a significant modest positive impact on investment performance.
9. The hypothesis H_2, that Loss Aversion has no impact on the investment performance of Portfolio Managers in Europe, could be rejected. The result of the data indicated that Loss Aversion has a significant modest positive impact on investment performance.
10. Previous work has found that Herding is often practiced by individual investors and can influence investment performance. Contrary to past research, this thesis could not reject the hypothesis H_3, which means Herding has no significant influence on the investment performance of Portfolio Managers in Europe.
11. Similar to the findings about the impact of Herding on the investment performance on the private investors, this research found out that Representativeness has no significant impacts on the investment performance of Portfolio Managers in Europe. Therefore, the hypothesis H_4 cannot be rejected.
12. The result of the data analysis with the SEM rejected the hypothesis H_5, that Price Anchoring has no impact on the investment performance of Portfolio Managers in Europe. The result of the data showed that Price Anchoring is the only factor which has a significant negative influence on the investment performance of Portfolio Managers in Europe.

13. The result of the data analysis rejected the hypothesis H_6 and indicated that Availability of information is a behavioral factor which has a modest positive influence on the investment performance of Portfolio Managers.
14. Previous research has found that Mental Accounting is common among individual investors and can affect investment performance. This is also true for professional investors in Europe. As a result, the H_7 hypothesis can be rejected. Mental Accounting has the largest positive impact on investment performance.
15. The sub-hypothesis H_8, that Regret Aversion has no impact on the investment performance of Portfolio Managers in Europe, can be accepted. These results are in conflict with other studies, which, however, have mainly investigated the behavioral patterns of private investors and not of professional investors.
16. It was also hypothesized that Self-Control is not having any significant impact on the investment performance of investors. The data analysis found out that Self-Control has no effect on performance and therefore, H_9 is not rejected.
17. The result of the model of this thesis rejects the sub-hypothesis H_{10}, analyzing if the behavioral factors and their influence on the investment decisions are not different within the Portfolio Managers and their various characteristics - namely gender, education, work experience, AUM or net income. The findings suggest that gender differences significantly affect only the Overconfidence decision-making, whereas all other tested behavioral factors do not have a significant impact. Age, AUM and net income have a substantial and significant effect on all behavioral factors (expect Self-Control). Work experience and the education level of a Portfolio Manager have a significant impact on the behavioral factors, namely Loss Aversion, Herding, Availability and Mental Accounting, and therefore on the decision-making process. These findings are answering the second research question, that specific determinants can influence the decision-making and the investment performance of Portfolio Managers.
18. Testing the sub-hypothesis $H_{Gender,}$ the findings suggest that gender differences significantly affect only the Overconfidence decision-making, whereas all other tested behavioral factors do not have a significant impact, this is contrary to previous research, which found out that female investors are more loss averse than males could not be proven by this thesis. Therefore, H_{Gender} can be accepted.

19. AUM and Net Income have a substantial and significant effect on all behavioral factors (expect Self-Control) of Portfolio Managers and therefore, both H_{AUM} and $H_{NetIncome}$ can be rejected.
20. The age of Portfolio Managers do have a significant impact on the decision-making process. Six of the nine different behavioral factors do have a significant impact on the decision-making process of Portfolio Managers and therefore, the H_{AGE} can be rejected.
21. The Work experience and the education level of Portfolio Managers have only partly a significant impact on some behavioral factors, namely Loss Aversion, Herding, Availability and Mental Accounting. On the other behavioral factors, no influence was found and therefore, the sub-hypothesis $H_{Experiece}$ and $H_{Education}$ can be accepted.
22. Many previous articles have emphasized that professional investors are rational and therefore do not suffer from behavioral factors. The results of this work refute this impressively. Professional investors, namely portfolio managers, can also be influenced by behavioral factors.

SUGGESTIONS

Out of the research study findings there is a broad variety of suggestions which can be posed to professional and individual investors, investment companies, economics and academics.

Suggestions to Portfolio Managers, investors and investment companies:

1. The main recommendation for investors is to enhance their awareness towards behavioral finance by educating them on the field. Analyzing the different behavioral biases and understanding their influence on decisions certainly help in making financial decisions in uncertain situations.
2. Especially professional investors in the European equity market should educate themselves or should be trained in courses, workshops or seminars on behavioral biases that influence investment decisions in order to be qualified to manage their portfolios. This should be mandatory in a similar way as, e.g., annual compliance trainings. Therefore, annual behavioral finance workshops should be held, in which every portfolio manager must participate and then complete a short test.
3. Investors would be in better position to take rational decisions if they are provided awareness about behavioral biases and how it influences investment decision making process.
4. Collective views on a specific investment should be applied by fund managers as this has tendencies of reducing personal biases on an investment. The formation of a committee could be a good approach to solve those biases. Those committees should meet at least every month to analyze and discuss the past mistakes, understand those and take steps to avoid making them again. This will increase the investment performance of the Portfolio Managers and consequently, the investment companies will be benefited as well.
5. Portfolio Managers should have an acceptable level of Overconfidence to be able to use their skills and knowledge to improve investment performance in certain circumstances. In times of uncertainty, Overconfidence can be helpful for investors to cope with complex tasks and predict future trends. Nevertheless, overconfident investors tend to underestimate the risks associated with active equity investing, which can have a negative impact on their investment results. A good piece of advice

for investors, therefore, is that confidence is suitable for their investments if they can use it wisely and appropriately.

6. Male and female portfolio managers are affected differently by overconfidence. Therefore, investment companies and asset managers should strive for a balanced ratio between male and female portfolio managers, i.e., introduce a specific gender quota, for example a 50% women's quota.
7. Price Anchoring has a negative impact on investment performance. Portfolio Managers are advised to carefully evaluate their investment decisions, but not to use it as a concrete reference point for future decisions. Sometimes the fundamental value of a company is not comparable to the past. This can limit good investment opportunities and negatively impact investor psychology, resulting in poor investment performance. In addition, market participants should avoid selling their securities below or above their reference prices.
8. The investment performance can be improved by improving the heuristic and herding behaviors of the investors while considering the negative impacts of price anchoring carefully. One astonishing fact of this study is that behavioral factors have high impact on the investment decision making but they do not influence the investment performance significantly.
9. Besides the importance of this research for individual investors and Portfolio Managers, security corporations (for instance, asset management, investment banking companies or brokers/traders) can make use of these findings as a reference for their analysis and forecast of specific security market trends. Moreover, a joint-stock company or a public company and their investor relations teams should understand the behavioral characteristics of their stockholder and, therefore, can use the outcomes of this research to have good decisions to invite investors to participate in an IPO and buy their stocks.

Suggestions to economics / finance schools:

10. Behavioral Finance is much more than only about investment into stock, it is versatile to use. Therefore, behavioral finance should be given more attention in the academic curricula. Educational facilities do a great job equipping students with knowledge about sciences and various techniques, which can serve as a foundation for a great career. If they are equipped with excellent knowledge in the field of

behavioral finance, the psychological aspect of the field would have already helped them achieve a greater self-understanding. Consequently, decision-making under uncertainty might not be as challenging to them as it would be otherwise. Knowing what is to be done is great. However, information about knowing when is to be done is unaffordable.

11. Finance schools and economics should have in mind that Price Anchoring has a negative impact on investment performance. Therefore, investment decision based on a specific reference point for future decisions need to be reviewed more closely. Sometimes the fundamental value of a company is not comparable to the past. This can limit good investment opportunities and negatively impact investor's psychology, resulting in poor investment performance. For this reason, finance schools have to teach investment decision-making more detailed and more practically than only pure valuation models.

Suggestions to the scientific community and researchers in the field of behavioral Finance Research:

12. Further researchers should use the SEM developed in this work to gain more empirical evidence in other geographical regions, e.g., Africa, America or Asian Stock Markets. The contextual variables used in the causal model will help classify and compare each geographic region with related research, and ultimately help expand the stream of knowledge about behavioral finance and decision-making processes.
13. This study represents Portfolio Managers and represents a approach to understand the main behavioral factors that influence the decision making process and the investment performance. The consistency of the results in the empirical part of this dissertation could encourage other countries to draw conclusions from it, especially for Emerging Markets and the most important stock market, the United States of America. Further analysis may highlight the difference in the process of making investment decisions and the different behavioral factors in developed markets compared to emerging markets.
14. The general research model with its causal dependencies between variables is very general, while some of the measurement points have been explicitly developed for

the stock market. A refinement of the measurement items for other areas, such as private equity or even Portfolio Managers for bonds, might be necessary.

15. Extensive research in the topic may lead to new idea about different models of investments which certainly provides more explanation about various behavioral factors and biases that affects decision making process of investors in European stock market.
16. Extensive research in the field may also investigate the association between religion and investment decision making.
17. In addition to the quantitative analysis done by the questionnaires and the qualitative research through semi-structured interviews, a laboratory experiment should be conducted because the internal validity in the verification of the ceteris paribus assumption is maximal.

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R. Steps and framework for a better understanding of behavioral factors affecting Portfolio Managers

A. Most common financial ratios

Ratio	**Equation**
Profitability ratios	
Gross profit margin	$\frac{\text{Gross profit}}{\text{Sales}}$
Operating profit margin	$\frac{\text{Operating profit}}{\text{Sales}}$
Net profit margin	$\frac{\text{Net income}}{\text{Sales}}$
Return on assets (ROA)	$\frac{\text{Net income}}{\text{Total asset}}$
Return on equity (ROE)	$\frac{\text{Net incomet}}{\text{Stockholders' equity}}$
Liquidity ratios	
Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$
Quick ratio	$\frac{\text{Current assets} - \text{Inventory}}{\text{Current liabilities}}$
Net working capital	$\text{Current assets} - \text{Current liabilities}$
Debt ratios	
Debt to assets	$\frac{\text{Total liabilities}}{Total\ assets}$
Debt to equity	$\frac{\text{Total debt}}{Equity}$
Times interest earned	$\frac{\text{Income before interest and taxes}}{Interest}$
Asset utilization ratios	
Inventory turnover	$\frac{\text{Cost of goods sold}}{Inventory}$
Receivables turnover	$\frac{\text{Sales (credit)}}{Receivables}$
Fixed asset turnover	$\frac{\text{Sales}}{Fixed\ assets}$
Total assets turnover	$\frac{\text{Sales}}{Total\ assets}$
Market Value Ratios	

Capitalization	$\text{Numbers of common stocks} \times \text{Market price of common stock}$
Earnings per share (EPS)	$\frac{\text{Net Income} - \text{Cash Dividends of Preferred stock}}{\text{Number of common stocks}}$
Price / Earnings ratio (PER)	$\frac{\text{Market price of the stock}}{\text{Earnings per share}}$
Book value of the stock	$\frac{\text{Equity} - \text{Preferred stock} - \text{Preferred stock dividends}}{\text{Number of common stocks}}$
Market price to Book value	$\frac{\text{Market price of the stock}}{\text{Book value of the stock}}$
Dividends per share	$\frac{\text{Dividends} - \text{Preferred stock dividends}}{\text{Number of Common Stock}}$
Payout Ratio	$\frac{\text{Dividends per share}}{\text{Earnings per share}} = \frac{\text{DPS}}{\text{EPS}}$

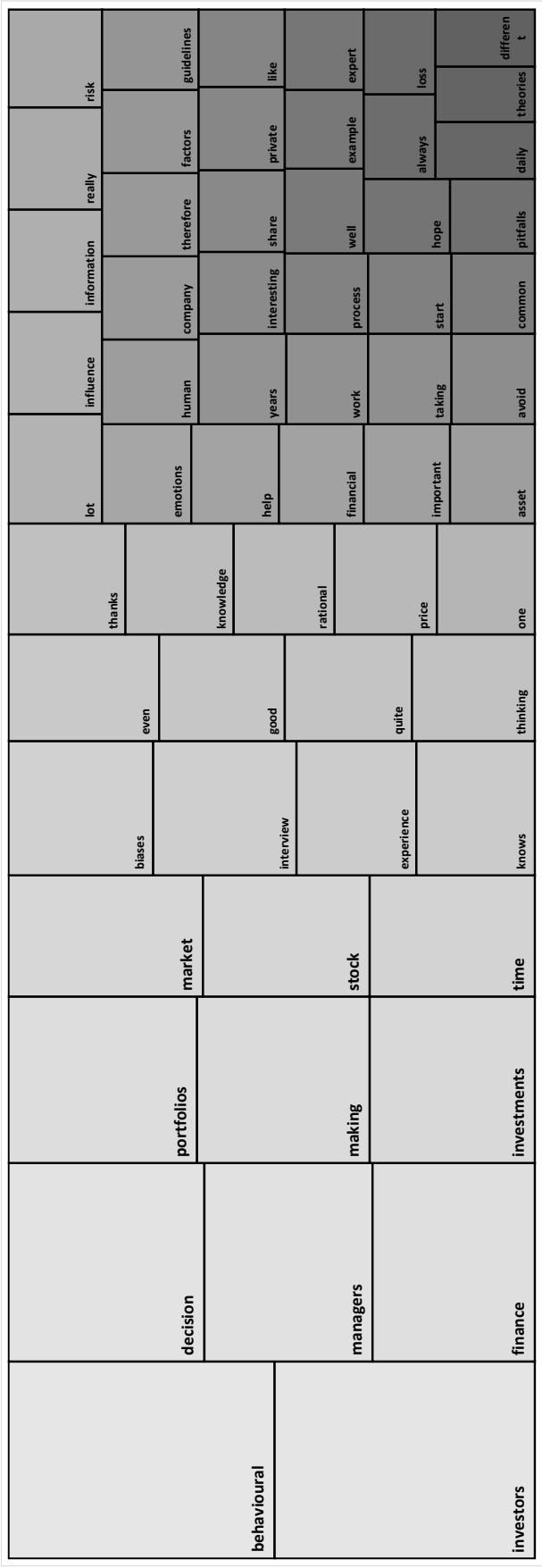
Appendix Table A: Most common financial ratios

B. Number of mutual funds, which outperform their benchmark

Year	Number of mutual funds, which outperformance their own Benchmark	Number of mutual funds, which underperformance their own Benchmark	Number of all mutual funds in Europe
2016	565	968	1533
2017	652	881	1533
2018	481	1052	1533
2019	602	931	1533
2020	819	714	1533
2016 - 2020 accumulated	571	962	1533

Appendix Table B: Number of mutual funds, which outperform their benchmark

C. Word Frequency Tree



Appendix Figure A: Word Frequency Tree

D. Structured Expert Interview

Name of the Interviewee:	**B.G.**
Age:	**67**
Education:	**Diploma in Business Administration**
Experience:	**39 year in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 375 Mio. €**
Place of the Interview:	**virtually (via Microsoft Teams)**
Date and Time of the Interview:	**18th of March 2021, 19:00 -19:38 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. First of all, thanks a lot for taking the time for my expert interview. I really appreciate that even in this quite volatile market environment with all the covid-19 news.

B.G. (BG):

Hi Max. Yes, Covid-19 is really special for us. Hope we are getting through that as soon as possible.

MK:

Totally agree, but lets start to our interview. I hope you have received my guidelines for the interview. The interview should last for less than half an hour. The starting question is what's your knowledge about behavioral finance and your experience in that field.

BG:

First time, I got your guidelines and must say, it is a really interesting and up-to-date topic. Perhaps I will start with my knowledge about behavioral finance and how it is developed: More than 50 years, academics argued it was futile to search for undervalued stocks because prices always incorporate and reflect all relevant information and one cannot get excess returns. But why do we have then active fund managers and why do some fund managers outperform the market? Therefore, the idea and cornerstone of traditional finance theory – the efficient market theory – is quite controversial.

It was Kahneman (nobel price in 2002), who combine behavioral and cognitive psychological theory with those traditional finance theories. The main idea of Kahneman was to explain the irrational behavior of investors. Because, one of the main critiques of traditional finance theories is its assumption that investors always act rationally. But in reality – as we both know- there are many situations where emotion influence our investment-decisions, for instance speculative price bubbles.

MK:

Thanks! That was quite detailed. Can you share some experience with us?

BG:

Sure – sorry for missing the experience question. I think the most infamous financial events in my memory was the bursting of the Technology-Bubble – or Dot.Com - in early 2000. A bubble – if the efficient market theory holds – cannot exist. But from my view, this bubble was attributed to herd behavior. Those days, I came to the office and nearly every day, a new company went public and everyone believed in everything. Newspapers and even private – unexperienced – investors were talking about listed companies and how interesting everything is. Valuation – nobody cares! It was all about – do you dare to miss this massive opportunity? So even professional investors – we as fund managers -adopting the same position in fear to underperform our peers. Everyone joint the rally and of course, the burst.
Therefore, benchmarking is one manifestation of this and in my view, a reason for Herding behavior even in the professional daily life.

MK:

That's really interesting. Do you know other behavioral biases and can you share your experience as well?

BG:

Of course, but probably, then the 30minutes won't be enough. Of course, but probably, then the 30minutes won't be enough. One of the most significant risks of investments and investment decision-making comes from human Overconfidence. Investors irrationally overestimate their capabilities. In other words, as Keillor mentioned: All the women are strong, all the men are good looking, and all the children are above average, and of course, investors are total rationally. One of the consequences of this Overconfidence is that most Portfolio Managers

continue to place forecasting and financial modelling at the core of their investment process, despite repeated studies showing they are not very good at predicting the future. Investors need to get comfortable with uncertainty.

Another quite common behavior error is confirmation bias. Many people may say they carefully collect and evaluate information before making decisions; the reality can be very inconsistent. For instance, it is a broadly believed view within the asset management industry that meeting a company's management board - like CEO, CFO etc. - can add significant value to the investment process. I have mixed opinions about this. On the one hand, there are benefits from asking technical questions linked to a company's business model and learn perspectives on industry developments. Those meetings had helped inform my investment-decisions. For instance, when a CFO declared he was worried about a potential new competitor to the industry. On the other hand, those management conversations need to have a specific purpose. Otherwise, as Portfolio Managers, we run into the risk of being on the lookout for information that confirms our investment case rather than seeking out information that confronts it. The danger is that those Portfolio Managers who already own the stock may hold onto positions they might otherwise sell.

Lastly, I will mention the anchoring biases. To make a decision about a stock purchase, we need a starting point -an anchor of our investment. So if you bought a stock at a price level of 10€ a share and it drops significantly - let say - to 5€. You have in your mind always this 10€, and you will think that the stocks real value is 10€. Therefore, you argue that it should come back to that level again. As you know, the stock's real value is based on its fundamentals and comparable investments, not on past prices. This phenomenon occurs quite often at younger Portfolio Managers.

MK:

That's really interesting and thanks a lot for sharing your experience and your knowledge with me. So we talked about the different factors which influence investors decision making, but how can investors avoid those emotional pitfalls that can negatively impact their decisions?

BG:

Uh, that a difficult one. In general, I would advice every investor to follow strict rules and always be honest with themselves.

Furthermore, I think that every problem has as well a solution. For instance, taking the Overconfidence bias: If you have doubts about a specific investment or decision, do more work,

or don't invest. It is essential to take the time to check your decisions-making. Another quite important rule is to remember and learn from your mistakes. Regarding the anchoring biases, force yourself to evaluate an investment only as if it were a new investment - not about past prices of a stock. General, all investors - private or professional - face the same biases and emotions that contribute to unsuccessfully founded investment decisions. One of the reasons it is critically important to find Portfolio Managers with clearly defined, consistently applied investment strategies is that they are less likely to be prone to decision errors.

MK:

That was really helpful. Thank you so much for your time!

BG:

You're always welcome and stay safe.

MK:

You too, thanks again and Bye.

Name of the Interviewee:	**Dr. A. H.**
Age:	**59**
Education:	**PhD. in Economics**
Experience:	**28 years in the finance world**
Job Prescription and Asset under Management:	**Head of Portfoliomanagement; 5 bn.€**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**15th of March 2021, 18:01 -18:32 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. Thanks a lot for taking the time for my expert interview. I hope you have received my guidelines for this interview?

Dr. A.H. (AH):

Hi Max and good evening. Yes, I received your mail. I am always interested into behavioral finance and other factors which can influence our investment decision-making process.

MK:

Perfect. The interview should last for approximately half an hour. That said, perhaps we can start with a small introduction about your knowledge about behavioral finance and your experience in your daily work.

AH:

I must say the theoretical background is probably not the best, because it is now more that 30 years ago, where I visited the university. The main idea started with the discussion are financial market efficient? The traditional finance theories like the Efficient Market Theory argues, that all information is included in the current share price of a company and therefore, no abnormal returns are possible. But this does not hold in a real world, otherwise, we as Portfolio Manager will never outperform the stock market and our benchmark. Another important issue is, that traditional finance argues that investors are rational and they make rational decisions. But how can one than explain stock market anomalies? It is quite obvious, that investors are not rational, have limits to their Self-Control, and are influenced by their own biases. Behavioral finance

tries to close that gap and as the name says, it deals about the behavior of human beings in the investment decisions-making.

MK:

Can your share some experience with behavioral finance in your daily work as a Portfolio Manager? As the head of portfolio management in your company, why should Portfolio Managers care about the behavioral finance?

AH:

Oh sorry for missing the part of my experience! What you see quite often is that investors seems to be Overconfidence about their decision and their investments. They belief that they are better than they actually are. I think it was James Montier, who did a survey of Portfolio Manager, asking if they believe themselves to be above average in their ability. More than 2/3 of the Portfolio Managers believed that they were above average at investing and the rest thought they were are average. No one thought they were below average! And honestly, I totally retrace that and from my experience: As more work experience a Portfolio Manager have the more Overconfidence he is. Younger Portfolio Managers are less confidence about their abilities than elderly. They don't have that much experience in investment in stocks and therefore, are less overoptimism.

Another quite common behavioral biases is anchoring. In my view this is more common at younger Portfolio Managers. For instance, if you ask elderly Portfolio Managers and a quite young Portfolio Manager: Where do you think will be the stock of Microsoft be in 6 months? The elderly Portfolio Manager will argue with DCF-methods or other fundamental theories. The young Portfolio Manager will make their investment decision based at which level the stock is currently trading and consequently, many young Portfolio Managers will answer my question with a counter question: Where is Microsoft now trading?

MK:

That is really interesting and why should Portfolio Managers care about the behavioral finance?

AH:

I think if an investor knows the different behavioral factors which can influence the decisions making, it can help them and they will make more rational decisions. But I think it is really

important to refresh this knowledge in a specific time frame. Because – we all are human beings- we tend to forget. If you do for instance every year a specific course about behavioral finance, it will help the decision-making process and protect investors for specific errors.

MK:

As the head of portfolio management, do you already offer this kind of seminar to your team-members? You mentioned already some behavioral biases, what others do you know?

AH:

Good Point! We do not offer those kinds of seminars, yet. But I know that some of our competitors have their own behavioral finance manager, who offers those courses as well control the decision-making process of the Portfolio Managers.

Regarding other behavioral biases, we all know Herding or even self-serving biases. Herding bias refers to investors' tendency to follow and copy what other investors are doing. They are largely influenced by emotion and instinct, rather than by their own independent analysis. Self-serving biases s a tendency in behavioral finance to attribute good outcomes to our skill and bad outcomes to sheer luck.

Another interesting behavioral biases is confirmation bias. We all have the natural tendency to listen to people who agree with us. It feels good to hear our own opinions reflected back to us. This is even quite common in our daily life, where Portfolio Managers like to talk to other financial analysts to affirm a specific investment decision.

MK:

How can investors avoid those emotional pitfalls that can negatively impact their investment decision? What would be your advice to young Portfolio Managers as the head of portfolio management?

AH:

As I said already earlier, if an investor knows about behavioral finance and the factors which can influence the investment decision-making, the investor will perhaps avoid some errors. But you have to renew your knowledge in a specific time-frame, for instance every year.

Another important step is, that if the investor made some errors, someone has to show him those errors. Otherwise, the learning effect will be zero. This can be done by an internal behavioral finance manager.

Furthermore, an investor can avoid some behavioral errors by a standardised decision-making process. For instance, that you do have a specific guideline if you invest in a company. Using a DCF analysis or another evaluation modelling, can help as well.
Lastly, I have seen another interesting method to avoid pitfalls. A good colleague of mine is keeping an investment diary, he writes down his reason why and when he invest into a specific stock, and then he matches it to the outcomes whether good or bad. But I think, this can be to complex and is only interesting for those Portfolio Managers, who only have 25-30 positions in their funds.

MK:
That was really helpful and thanks a lot for your time.

AH:
Welcome and let me know if you need a further follow-up call.

MK:
Thanks. I really apricate that!

Name of the Interviewee:	**D.R.**
Age:	**42**
Education:	**Diploma in Economics**
Experience:	**16 year in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 190 Mio. €**
Place of the Interview:	**virtually (via Microsoft Teams)**
Date and Time of the Interview:	**11th of March 2021, 18:45 -19:09 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. First of all, thanks a lot for taking the time for my expert interview. I really appreciate that even in this quite volatile market environment.

D.R. (DR):

Hi Max. Yes, markets are really volatile, but I think it is even a quite interesting correlation with your topic. Those days with stimulus in the US, everyone wants to invest into the stock market and doesn't care about potential risk anymore. It seems like that everyone has the fear to miss a substantial gain.

MK:

Totally agree and a perfect start to our interview. I hope you have received my guidelines for the interview. As you know we do not have to retain on those guidelines, it just should give a leitmotif to my topic. The interview should last for less than half an hour. That said, time is money, so let's start with your knowledge about behavioral finance and your experience in that field.

DR:

First time, I learned about behavior finance was at university – so nearly 20 years back. The main idea from traditional finance is Fama's Efficient Market Theory, where all information is included in the stock price. And the stock will only move by new information. Holding that and in a more real world, we as Portfolio Managers can not get any excess returns. This is in my view to theoretically. Because, as we learned from the past, stock market bubbles – like the DotCom bubble – couldn't exist. Therefore, there is a lack of explanations of those anomalies by traditional finance theories.

Behavioral finance is trying to close that gap by trying to understand the fundamentals of investor decision-making and found out that psychology is quite important in the decision-making process.
Regarding my experience so far and really depending how one invest into stocks and make one's investment decisions. Active portfolio management refers to a portfolio management strategy where the manager so a human being makes specific investments. Therefore, one will find more human errors. On the other hand, there are even active Portfolio Manager who acts through strict models – like quant investments. Here I see less human interaction and consequently, less errors.

MK:
Well, can your share some experience with behavioral finance in your daily working time, for instance with a short example? Why should investors care about behavioral finance and what behavioral factors do you know?

BR:
That is a good question. I think if an investor has some knowledge about behavioral finance it will help him to be more rational and make better investment decision. A lot of young Portfolio Managers had a course about behavioral finance at the university and even it our company, we have once a year a behavioral finance seminar, where we are getting taught about the major errors and behavioral factors. Knowing about those factors, can help to avoid those and try to minimize the human behavioral influencing the decision making.
Regarding examples, that quite easy those a day. Let have a look at stock exchange and there, at the stock named GameStop. In a stock market forum, this company was discussed along other private investors to own, because it was shorted by a lot of hedge funds. A lot of private investors followed the advice to buy this specific stock. Therefore, the stock price increased significant. The chain reaction started, because the hedge funds needed to close their short position and therefore, they needed to bought those shares back. I personally doubt about the knowledge about those private investors and this behavior is typically called Herding. But Herding is in my view not only a typically stereotype of private investors, it can be seen even under professional Portfolio Managers. For instance, if a lot of professional Portfolio Managers buy a specific company stock, other Portfolio Manager will follow. It looks like, that those investors are believing in knowledge of others and won't miss the potential opportunity.

Another quite common factor which influence the decision making is anchoring. My observation is, that a lot of elderly Portfolio Managers anchor on the stock price, where they bought the share and constantly compare the current level with this entry point. Perhaps you link this to Loss Aversions, another quite well-known behavioral factor. Meaning, investors have the tendency to prefer avoiding losses to acquiring equivalent gains. A good example is those from Kahneman with 100$-bill. If a person loses $100 will lose more satisfaction than the same person will gain satisfaction from a $100 gain. As you know, in active Portfolio Managers it is all about outperforming the benchmark, so reducing the risk is a quite important part.

MK:

That's really interesting and thanks a lot for sharing your experience with me. So we talked about the different factors which influence investors decision making, but how can investors avoid those emotional pitfalls that can negatively impact their decisions? What would be your advice to avoid those pitfalls? What advice were you taught at your behavioral finance seminar?

DR:

I can share my notes and the presentation of our behavioral finance seminars, if you like. In general and this was one of the main conclusion of those seminars, we are human beings and won't eliminate those emotions, but one should know those. Private investors and young Portfolio Managers tend to make decisions irrational, because of to many behavioral errors. On the other hand, as we have learned in our seminar, even experienced Portfolio Managers tend to have some behavioral factors which influenced the investment decision making negatively. For instance, a lot of experienced Portfolio Managers tend to argue that with 10 or more work experienced, they know what to do and consequently are quite Overconfidence about their knowledge and performance.

Taking about advice and how to reduce those affecting behaviors, Portfolio Managers should follow strict rules. For example, we do have following internal rule: If a stock position in your fund is more than 15% down, you have to argue why you should hold / sell / buy this position. Talking about a specific position and therefore, knowing about the pro/cons about the competition, can eliminate Overconfidence. For that reason, we have hired an internal risk managers to monitor our Portfolio Managers and their behavior.

Furthermore, as you know, our portfolios do have a quantitative part as well and therefore, are not that much affected by behavior factors.
If you compare, private investors to professional Portfolio Manager, you will find a quite different knowledge about factors which influence the decision-making process. Private investors do not have the time to spend their time on research, analyzing balance sheet or talking to companies. They absorb information from friend or the internet and consequently, the should be more affected by the behavior factors.
So my advice would be as following: Trying to expand the knowledge about behavioral finance. One can do this by seminars or webinars. For private investors, the banks or online brokers should send out information brochures. I think in professional life, an internal behavioral finance manager can help even quite a lot. Lastly, an investor should always have strict and consistent rational decision-making rules.

MK:
That was really helpful. Thank you so much for your time and sharing your experience.

DR:
Welcome and all the best

MK:
Thanks and stay safe.

Name of the Interviewee:	**Dr. D.H.**
Age:	**53**
Education:	**PhD. in Finance**
Experience:	**24 year in the finance world**
Job Prescription and Asset under Management:	**Head of Portfoliomanagement; 38 bn.€**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**9th of March 2021, 19:03 -19:28 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. First of all, thanks a lot for taking the time for my expert interview. I really appreciate that. Before we are going to start, a short question from myside regarding the guidelines – you hopefully received. Did you get my mail?

Dr. D.H. (DH):

Hi Max and good evening. Yes, I received your mail with the guidelines and must say, behavioral finance is a really interesting topic and even in those days of bullish market quite relevant.

MK:

Perfect. The interview should last for approximately half a hour. That said, time is money, so let's start with your knowledge about behavioral finance and your experience in that field.

DH:

Behavioral Finance consists of three major elements in my view: Psychology, Sociology and as well as Finance. Psychology is about behavior of human beings. Sociology is about how humans are behaving in group of people and the interactions between a group. Lastly, Finance is about the decision-making process to maximize your profit. Probably everyone learned at university the main standard of finance hypothesis, the Efficient Market Hypothesis. All information is reflected in a stock's price and the current price of the stock is it's fair value. But then we would only see stock movements theoretically with new information. An assumption made by a lot of classical economic theories are that investors and their decisions act rationally. But in reality, they are acting quite irrational.

Therefore, behavioral finance can be seen as a study of financial decision-making in our real world. It attempts to look beyond classical economic theory which only really works if we all put our emotions & personal behavior to one side and behave like the mythical Homo Economicus, a creature that obeys all the investment rules but doesn't really exist.

MK:

And why should investors care about behavioral finance? Can your share some experience with behavioral finance in your daily working time?

DH:

Being aware of the precepts of behavioral finance can help investors to check their perceptions against facts and make more rational decisions regarding stock investments. From my experience, a typically and often occurred example is anchoring. This is when an investor anchors on the price level of a previous stock value, and constantly compares the previous, value to the current value, without taking into account any changes in the market environment. This is quite common in our industry, that we often compare the entry level into a position to the current price level of a stock. I think this is mainly to justify our investment decision.

An investor anchor on this price paid for this particular stock, and refuse to sell it despite poor performance, hoping to at least break even rather than suffer a loss without carefully assessing the reasons behind its loss and his wrong decision making. But this brings us to the next quite often occurred behavior, most Portfolio Managers seem to be quite confidence regarding their portfolio and their own investment decisions.

In my 24 years career, I rarely met a Portfolio Manager, who said: "This was my fault", or "This was my bad decision". So Overconfidence is even a quite common behavior along Portfolio Managers.

MK:

That's really interesting! How relevant is the knowledge of behavioral finance in your job?

DH:

Probably the knowledge of behavioral finance in our industry is quite high and a lot us people had the theoretical background from the university. But as it comes to the real world, where one invest into stock markets, electrify by bull or bear market, the investment decision is made by human beings and therefore is often irrational.

MK:

You mentioned already some behavioral biases like Overconfidence and anchoring, what others do you know? And what others factors impact the investment decision?

DH:

Another quite common behavior error is Herding and affect the decision making negatively. Herding is demonstrated exactly in the same way you would think - following the crowd. This is how less sophisticated investors often get into trouble. If everyone is buying a particular stock, without looking into why, only the fact its price is rising, often investors jump in, because they don't want to be left out of a good thing or idea. This is exactly how market bubbles form. Moreover, it shows how investors and their decision making are irrationally. Even as a professional Portfolio Manager, I am affected a little bit as well to that phenomena. Therefore, Herding can cause even a professional investor to buy into investments that may not be appropriate for their financial goals or risk tolerance.

MK:

How can investors avoid the most common thinking and emotional pitfalls that can negatively impact their financial goals? What would be your advice to avoid those pitfalls?

DH:

My personal view and advise would be that an investor should act and become less human. By a standardized decisions-making process for stock investments, one can avoid those pitfalls and the investment decision would be more rational.

Another important step is, that you must ask yourself whether you have all of the information you need to make the right investment choices. It's impossible to know everything about a stock before making the investment decision. A good bit of research will help to ensure your investment is based on logic and objective knowledge rather than your own biases and emotions.

MK:

Thanks. I know we are running out of time. Therefore, thanks again for your time and sharing your knowledge about behavioral finance

DH:

Always, welcome. We are staying in touch!

MK:

Bye and stay safe!

DH:

Thanks!

Name of the Interviewee:	**Dr. M. E.**
Age:	**65**
Education:	**PhD. in Economics**
Experience:	**31 years in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 15 Mio. €**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**19th of March 2021, 15:31 -16:05 CET**

Maximilian-Benedikt Koehn (MK):

Good afternoon. Thanks a lot for taking the time for my expert interview. I hope you have received my guidelines for this interview.

Dr. M.E. (ME):

Hi Max and good afternoon. Yes, I got your mail.

MK:

Perfect. The interview should last for approximately half an hour. That said, perhaps we can start with a small introduction about your knowledge about behavioral finance and why should investors care about it?

ME:

Sure Max. For me, behavioral finance discusses the balance between psychology and the decision-making of a financial analyst, individual investors, or even regular consumer. It discusses the thesis that even people who have deep knowledge in financial analysis or economics, cannot always decide rationally because of psychological barriers, no matter how good they are trained and educated.

Behavioral Finance has a significant influence on our daily decision-making, even if we do not realize it. Most of the economic models are based on the perfect market thesis, in which all participants make rational decisions. We see the opposite in the real world, the imperfect market. It is important for us to analyze and identify the main sources of our daily news consumption and ask ourselves how those news flows, whether its TV, Internet or even developments from private life, manipulate our decision-making. Only if we identify those weak spots in our own psychological system, we can treat them or avoid them. However, we also

must be realistic and acknowledge that we will never make perfectly rational decisions, regardless of our understanding of our decision-making, simply because we're human.

MK:

Can your share some experience with behavioral finance in your daily work as a Portfolio Manager and how relevant is your knowledge for your job?

ME:

I mainly recognize the existence of behavioral finance if I take a step back and ask myself how I made my latest decision.

I think that I can mainly be influenced by newsfeeds. Whether its Bloomberg, Twitter or any other News Channel I use, I think those have the biggest influence on my daily decision making if it comes to finance. To confirm those news snippets, I collect during the day, I almost every time make a quick search to check the appearance for correctness. Simplified trading or investing is just about knowing when to buy and when to sell an asset but the mistakes we can make in midst of the decision process, based on psychology, are many. Besides that, I would say that I am pretty good in the way I separate my private and work life and as a result I do not take any burdens from my social life with me to work or in my investment thesis.

Regarding the relevance: I believe it is quite an important topic if you are working in a research team or as a Portfolio Manager. So, part of your job is to search the internet to find new information or take the existing information and put it into the right context. In addition, it is often a matter of evaluating current developments and the opinions of other analysts and creating a new overall picture from these pieces of the puzzle. The job as a research Analyst or as an Portfolio Manager also means to make decisions. And those decisions are based on facts but can also be based on psychology of the market participants.

MK:

That is really interesting and what kind of behavioral biases do you know?

ME.

The most common behavioral biases are Overconfidence and overoptimism. So Some example would be:

1. *A tendency to be over-reliant on the first piece of information you hear or get.*
2. *An individual adopts a new belief only because the belief is held by many other people.*

3. *The resistance to change and a preference for things to stay the same, leading to inaction.*
4. *being too confident in your abilities, which can lead to taking too much risk.*

All those points are direct or indirect related on the illusion that we think we know more than we actually do, we make information-processing errors, we put our own emotional status in line, or we may be influenced by our social environment.

MK:

What are some of the most behavioral errors you see negatively impacting investors?

ME:

I would say that many investors pick up opinions too quickly without adequately questioning them. This is something I see in my daily life. In addition, they often get carried away by the crowd and throw different points into the same pot without making the necessary research on their own. Social Media is already a big factor in this game, and it will become even bigger. Trends like social investing can work well, but it can also go extremely bad for example in the case of Reddit and the GameStop Mania. Therefore, it is so important to do your own research so as not to have to rely on the crowd.

For an institutional investor it might be the fear about missing the self-imposed goal for the year, to underperform the index or the product from a close competitor. For a private and often not experienced enough investor it is often it about the "this time everything is different mentality" although almost all crises on the stock exchanges have so far followed a certain pattern. This mentality is often followed by panic selling in midst of a volatile market phase.

MK:

How do behavioral biases affect investor's decision making and performance?

ME:

I think mostly negative. By staying to long in a trade because we want to be right, even the fundamental data situation has changed dramatically or by taking profits to early because we love to cut the risk, even we know the fundamental data situation has not changed at all.

MK:

How can investors avoid the most common thinking and emotional pitfalls that can negatively impact their financial goals?

ME:

By learning and by doing your own research to certain topics. I think in extreme situations like a crash/ bear market it is helpful to become a contrarian thinker. Especially when there is panic at the markets. I am certain it is always a good guide to buy when the mainstream media is telling us to sell because we will enter a big crisis. In the end we can avoid a lot of the trouble if we have a clear plan, based on fundamentals or statistics. This plan then must be executed whatever happens. I believe a good strategy would be also to automate certain parts of the investing process.

MK:

Thanks, that was really helpful. I think we are more or less done. So thank you very much for your team and sharing your view.

ME:

Welcome and let me know if you need further help.

MK:

Thanks and stay safe!

Name of the Interviewee:	**K.T.**
Age:	**57**
Education:	**Diploma in Economics**
Experience:	**28 years in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 1,4 Mrd. €**
Place of the Interview:	**virtually (via Teams)**
Date and Time of the Interview:	**6th of April 2021, 19:01 -19:42 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. Thanks a lot for taking the time for my expert interview. I hope you had a good over the eastern holiday.

K.T. (KT):

Good Evening and Happy Eastern. Hope you took some days off as well.

MK:

Sure – a little bit. As far the Covid-19 Pandemic has allowed that.

KT:

Agree – interesting times those days, but hopefully we are over it end of this summer!

MK:

I hope so, too. So thanks a lot for taking the time for my interview. The interview should last for approximately half an hour. That said, perhaps we can start with a small introduction about your knowledge about behavioral finance and why that field is still important?

KT:

Behavioral finance explains the human behavior in the financial world. It describes the decision-making process of human beings and how investor's behavior influences the financial markets. Behavioral finance can help to overcome biases and the irrational behavior of investors.

I think it is crucial and really important for every professional investor to know about their own behavior and as well about other human behaviors, because behavior can influence markets.

If one knows about some common behaviors, risks can be reduced and your performance can be optimized.

MK:

Interesting - What is your experience with behavioral finance in your daily working time?

KT:

In my daily work, it is noticeable that customers are not only focused on profit maximization. For example, some European clients prefer European stocks or bonds in their portfolios because they know the companies and this gives them a sense of familiarity and security. Another aspect is the constantly growing attention of ESG ratings. Over the years, clients have become increasingly concerned about the social and environmental footprint of the companies they invest in, honoring human rights, protection of the environment, and a fair working environment for their employees. For a rational investor, these aspects do not play a role, as he only uses the risk-reward ratio for evaluation.

MK:

Totally agree, ESG is getting more and more important and we see the high demand as well. Talking about rational investors, what is your view about market efficiency and rational investors?

KT:

In efficient markets, asset prices perfectly reflect all available information. This includes financial information about the company, but also political and social conditions. All investors react to news in the same way because they have the same forecasts and calculations for future price developments. Consequently, there is no asymmetric information, meaning that no market participant has an information advantage. Consequently, permanent excess returns compared to the market are not possible, but short-term excess returns are possible but random. These markets are called price-equals-value markets.

However, this is a purely hypothetical model and in reality, markets are so-called "hard-to-beat markets" in which not all available information is reflected in asset prices and some market participants have more information than others. Thus, markets are not efficient and

persistent excess returns of investors are possible due to asymmetric information. For example, more accurate calculation tools or insider knowledge.

Efficient markets require rational investors. Rational investors know the difficulty to earn higher returns than the market on a long-term basis. Investors are not rational, and active investing generates lower returns on average than passive investing. But investors are still investing actively. The reasons for this are manifold. Many investors do not know that passive investing generates higher returns on average. Experienced and well-informed investors are aware of this fact, nevertheless, they invest actively. This can be explained by the theories of Behavioral Finance. For example, investors may enjoy active investing and enjoy the thrill of falling and rising stock prices. This benefit of the joy outweighs the lower average returns from active investing and the individual benefit is higher for the investor.

MK:
And what kind of behavioral biases do you know?

KT:
Cognitive and emotional shortcuts occur when drawing incorrect conclusions based on an ill-conceived heuristic to make bad decisions.
The most common one would be Loss Aversion. Loss Aversion means, that you have a much greater desire to avoid any risk that could bring about a loss, rather than to acquire a similar gain.
Another behavior is familiarity bias. Investors have a familiarity bias, where they prefer stocks in companies that they buy products from or where they have a family connection. For instance, Coca Cola, Daimler, BMW or Nestle.
Lastly, framing is well a behavior, I have observed quite often. Framing is the belief that the market must be defeated, thereby an advantage over the other market participants must be worked out.

MK:
What are some of the emotional issues that influence investors, especially in uncertain times?

KT:

When prices fall, investors are reluctant to sell their assets at a loss. This is due to 5 reasons. First, they naturally want to recoup their losses and make money.
Second, sales with losses have emotional costs, because investors have to admit that they made a wrong decision. People feel uncomfortable in these situations.
Third, they wait for the good feeling when the prices go up again. If the value of the asset goes down and rises afterward, it feels positive to investors even though the asset has lost value. Fourth, some investors don't want to sell assets at prices lower than the purchase price, so they don't react at all.
And fifth, investors do not feel responsible for their losses and blame the price development on macroeconomic influences, for example. Thus, responsibility is shifted.

MK:
And how can investors avoid the most common thinking and emotional pitfalls that can negatively impact their financial goals? Do you have any advice?

KT:
Great questions. Honestly, my personal view is learning by doing and every Portfolio Manager has to have the knowledge about the different behaviors factors which can influence their decision-making process. Therefore, we as a Portfolio Manager in our company have to visit a behavioral finance seminar every 6 months.
Consequently, I can share some of our outcomes:

To improve investors' decision-making behavior, it is necessary to understand how normal investors make decisions. They are two different systems. System 1 explains the decision-making, that decisions are taken intuitively. This system is known as well as the BLINK system, because the decision is made quickly. System 2 is called the THINK system and describes the reflected decision, after weighing the different options. System 1 is always at the beginning of the decision process, system 2 follows when there is enough time to evaluate the options. Rational investors always use system 2 when it is possible and when system 1 leads to the wrong option. Normal investors do not have the cognitive capacity to make every System 2 decision, therefore should be guided by System 1 and use System 2 only when the System 1 decision would lead the investor astray. The identification of the wrong decision is based on the financial situation, basic knowledge about human actions, and experience.

MK:

Thanks really interesting and the idea with behavioral finance seminars is quite advanced. What would be your advice for young Portfolio Managers?

KT:

Yeah. We were one of the first, who said that those seminars are mandatory for every employee at our company. I think a lot of investors or analysts have some knowledge about behaviors finance from their school or university. But it is not anymore fresh in our mind, look at myself. I had that at university, but it is now more than 30 years ago.

Young Portfolio Managers have the knowledge and it is probably at the back of one's mind, but they do not have any practical experience with that. So in our company, every young Portfolio Manager get a experienced supervisor. At the end of the year, they have a discussion about some of their good and bad decision-makings. I think, this will help to understand the behaviors being even more. Because you can change more or less everything, but not that we are human beings.

MK:

Wow, what a great finish to our interviews. We went through all of questions. Thanks a lot for your time.

KT:

You're welcome and let me know if you need further help.

MK:

I will. Thanks again and stay safe. Bye bye.

KT:

Bye.

Name of the Interviewee:	**M.S.**
Age:	**62**
Education:	**Law Degree (LLB)**
Experience:	**35 years in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 355 Mio. €**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**1th of April 2021, 19:30 -20:03 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. Thanks a lot for taking the time for my expert interview – even before the eastern holiday.

M.S. (MS):

Hi, Max. Hope you're doing fine and thanks for the guidelines. I must say, behavior finance was and is always a field, I am really interested in. That said, please interrupt me if I am talking to long.

MK:

That sounds amazing. Don't worry about my interruption. The interview should last for approximately half an hour, but we can extend this a little bit. That said, perhaps we can start with a small introduction about your knowledge about behavioral finance and why that field is still important.

MS:

Sure, Max. Behavioral finance provides explanations for human behavior in financial markets. It explains how normal people make their decisions, how they think and feel, and how their behavior affects the financial markets. In the early 1980s, the 1st generation of Behavioral Finance was developed, focusing on rational behavior, meaning that only the utilitarian decision criteria were taken into account. These are mainly high returns with low risk. Currently, we are in the 2nd generation of Behavioral Finance and aspects such as hope for wealth, freedom from worries, retirement security, and social standing are just as important decision criteria as the risk-reward ratio. A utility function can be set up, which, apart from the

purely utilitarian decision criteria, also includes emotional and expressive decision criteria. Behavioral Finance is finance for normal, irrational people.

The question about why it is still important is quite simple: By understanding how ordinary investors behave, market observations can be explained and future changes better predicted. This allows investors to make the right decision and maximize their personal benefit. Furthermore, they can improve their investment behavior. If the investors know that emotions, for example, can lead to bad decisions, they can try to behave rationally and take their decisions without emotion.

MK:

Wow that was really interesting. How relevant is the knowledge of behavioral finance in your job?

MS:

As you know, I am Portfolio Manager of a big European mutual funds. Therefore, it is now my own money it is the money of our customers. Knowing what customers want is crucial to success. First and primary, our customers expect us to increase their capital. To do this, it is important that we understand how the market works and why prices develop in the way they do. Since financial markets are not perfect and investors do not behave rationally, deep knowledge in Behavioral Finance is important to make the right decisions and increase clients' capital. In addition to the primary goal of wealth accumulation, origin and ESG ratings of companies, the protection of their investment, and investment horizon are important goals that should be considered when constructing portfolios. These different needs and objectives of customers must be weighed against each other and either tailored to the individual customer or aimed at the general public.

MK:

What kind of behavioral biases do you know and do you have some examples from your work experience?

MS:

People are not able to consider all decision criteria at the same time and make the best decision for themselves. Therefore, shortcuts are used to simplify the decision-making process. By

setting limits, the decision options are filtered, and the choice is thus limited, which simplifies the decision-making process. However, these shortcuts can also lead to the wrong decisions. Examples are Availability and Self-confidence:
Availability: The trading volume of assets increases after the media reports about the asset. Since normal investors are not able to keep track of all investment opportunities, they react to external impulses and sometimes buy or sell the asset.
Self-Confidence: If one's own abilities are misjudged, some situations will not be assessed correctly, and a poor risk-reward ratio will result. In my view, quite common for all professional investors.

Talking about my experience: Investors overestimate their abilities and think they can outperform the market. As a result, the risk-reward ratio is no longer optimal and lower returns may be achieved. In addition, some investors are too proud to realize losses. They don't want to admit that they made a mistake in selecting the asset and have unjustified hopes that the asset will recover. On the other hand, many investors miss out on opportunities when they are too timid and reactionary. Doubts about their own ability to choose the right stocks should not exist, nor should Overconfidence lead to mistakes.

MK:
How do behavioral biases affect investor's decision making and performance?

MS:
If the self-confidence is too high, chances are overvalued and too much risk is taken. If the investor's self-confidence is too low and he doubts his ability to select the right investments, investments with great growth potential may be missed because the risk is overestimated.

MK:
How can investors avoid the most common thinking and emotional pitfalls that can negatively impact their financial goals?

MS:
Great question, Max. To improve investors' decision-making behavior, it is necessary to understand how normal investors make decisions. The decision-making of buying or selling stocks should be done by strict rules. They can be binary, they can be fundamentally, they can

be technically, but they have to be strict and always fulfilled. Otherwise, the investor will tend to react irrationally and will do behavior mistakes.

MK:

Knowing behavioral finance and its pitfalls, do you think that you do have an advantage over private or non-experienced investors?

MS:

Access to databases and in-house analyses give us an information advantage over private and non-professional investors. This information advantage allows us to better assess the real value of an asset and thus optimize the risk-return ratio of our portfolios. Besides, we have more capacity to evaluate new investment opportunities and are therefore able to identify assets that are not mentioned in the media and private investors never heard of. Our biggest advantage, however, is our accumulated experience. Through years of investing, we are able to correctly assess the impact of macroeconomic changes, provide detailed company analysis and react appropriately to market fluctuations. Private investors usually do not have the experience we have and therefore cannot always react appropriately.

MK:

What is your advice for junior Portfolio Managers?

MS:

Young Portfolio Managers should be guided by the needs of their customers and design their portfolios accordingly. The Portfolio Manager should find out which aspects, besides the risk-reward ratio, are important to the client and design the portfolio based on these preferences. Once the portfolio has been created, he should make his decisions unemotionally and evaluate the situations rationally.

MK:

Amazing. Thanks a lot for your time.

MS:

Perfect and thanks Max for the time. Always great to speak to you.

MK:

Thanks and have a good evening.

Name of the Interviewee:	**T.C.**
Age:	**42**
Education:	**Diploma in Business Administration**
Experience:	**15 years in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 145 Mio. €**
Place of the Interview:	**virtually (via Teams)**
Date and Time of the Interview:	**26th of March 2021, 07:00 -07:27 CET**

Maximilian-Benedikt Koehn (MK):

Good Morning. Thanks a lot for taking the time for my expert interview – even that early. I hope you have received my guidelines for this interview?

T.C. (TC):

Good Morning, Max. Yes, I received your mail.

MK:

Perfect. The interview should last for approximately half an hour. That said, perhaps we can start with a small introduction about your knowledge about behavioral finance and why that field is still important - even in those days with high volatility.

TC:

It all starts with the fact that we are all human beings. Human beings and their nature are complex, and behavioral finance studies how emotional, cognitive, and psychological factors influence investment decisions. As you know, hundreds of studies have confirmed that human beings are irrational in their decision-making. Behavioral finance helps to explain the difference between efficient expectations, rational investor behavior and current behavior.

In those days of high market volatility, we as professional investors will need to focus on portfolio management's behavioral aspects and develop a greater understanding of how biases can impact investors' investment decisions.

Behavioral finance proposes psychology-based theories to explain stock market anomalies and identify why people make certain financial decisions. Individual behaviors and thoughts impact

more or less everything: Spending, investing, trading, financial planning and portfolio management. The market is not one person, but it represents the collective actions of individuals investors whose personal behavioral biases may be more or less dominant depending on their unique experiences.

MK:

And can your share some experience with behavioral finance in your daily work as a Portfolio Manager?

TC:

Of course - I think investors differ in age, experience as well as education level. From my experience and I think there was even a paper about this fact- I would summarize investors biases as follow:

Millennials or Generation Y are most likely to fall prey to Herding bias, which is the propensity to gravitate to the latest investment trend for fear of missing out. Herd Behavior occurs when a large group of investors behave similarly. Investors are copying the behavior of other investors. The most recent example at the stock exchange is GameStop.

Baby Boomers tend to have anchoring bias. Anchoring bias is the tendency to focus on specific reference points when making investment decisions. A good example would be the price level of a stock, where you have bought the stock. You will always compare this price level with the current price level. But this is fatal because the initial value or the actual value of a stock can change because of external or internal factors - like a new massive order intake or an economy recession.

Baby boomers tend to be even quite overconfident. They like to take risks and believe that markets will eventually deliver positive performance.

The generation, which followed the Baby Boomers, is Generation X. This generation tends to exhibit recency bias, which means they are easily influenced by recent news events or experience. Recency bias is the tendency to place too much emphasis on experiences that are freshest in your memory. Investors display recency bias when they make decisions based on recent events, expecting that those events will continue into the future. It can lead them to make irrational decisions, such as following a hot investment trend or selling stocks during a market downturn.

Finally, the Silent Generation - defined as people born from 1928 to 1945- tends to be affected by home bias. Home bias is the tendency to stick with what feels comfortable. It can lead to

personal experiences and allegiances playing an outsized role in the decisions we make. Home bias is exhibited by an investor's preference for domestic stocks or a concentrated exposure to their employer's stock. The reason is quite simple; Max. Older generations grew up during times when investing overseas often entailed a lack of transparency that brought greater risk. But times have changed, and the experience of investing internationally has become much more transparent and regulated.

MK:

Perfect. You mentioned quite a lot of behavior factors, do you know even more behavioral biases?

TC:

Sure, Max. I think other essential factors to mentioned are narrow framing and Loss Aversion. Narrow framing is when investors are not considering investments in a portfolio context and overestimating the risk. Loss Aversion is a behavior where investors are more sensitive to losses than gains.

There are two types of narrow framing that are important here. Firstly, the tendency to evaluate investments one by one, ignoring portfolio effects and the larger context. Secondly, narrow framing more in a time context. The bias to focus on the short term, despite your objectives are long term. These naturally lead investors to overlook diversification beyond the individual components of their portfolio or diversification over time.

MK:

How can investors avoid those emotional pitfalls that can negatively impact their investment decision? What would be your advice to young Portfolio Managers as the head of portfolio management?

TC:

To mitigate these risks and behavioral factors, investors have to frequently refresh their knowledge about these different behavioral factors. Moreover, I think it is helpful to show investors some straightforward examples, perhaps even from their own mistakes in the past. A robust portfolio construction process with a disciplined and systematic implementation plan can help provide a solid framework to mitigate behavioral biases and probably enhance investors outcomes..

MK:

That was helpful and thanks a lot for your time.

TC::

Welcome and have a good start into the day.

MK:

Thanks. You, too.

Name of the Interviewee:	**U.W.**
Age:	**47**
Education:	**Diploma in Engineering**
Experience:	**22 years in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 745 Mio. €**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**7th of April 2021, 07:55 -08:27 CET**

Maximilian-Benedikt Koehn (MK):

Good Morning to London. Thanks a lot for taking the time for my expert interview – even that early. Hope live is getting better in London. It looks like you are getting closer to the herd immunity for Covid-19 than we do here in Germany.

U.W. (UW):

Good Morning, Max. Indeed, I think we doing quite fine with the vaccination. I already got my second shoot and everything went fine.

MK:

That sounds great. The interview should last for approximately half an hour. I have sent you the guidelines for the interview and hope, you have received that?

UW:

I am just fine with the 30 minutes, unfortunately I did not get your guidelines. Probably, your mail went to the spam folder…

MK:

Oh, I am sorry about that. But let's start then with the first question: What is behavioral finance for you?

UW:

Behavioral Finance is an economic theory and a toolbox to overcome behavioral biases. It shows how investors are influenced by their behavior when selecting securities or reacting to events/ news flow.

MK:

Why should investors care about behavioral finance?

UW:

Behavioral finance can help to overcome biases and the irrational behavior of investors. Because investor's behavior strongly influences markets. If those behaviors are taken into account, risks can be minimized and opportunities can be used.

MK:

What is your experience with behavioral finance in your daily working time?

UW:

Irrational behavior dominates the daily routine of many private and professional investors. Knowing the different behaviors is really important because market sentiment has an influence on the equity share quote, for instance.

MK:

How relevant is the knowledge of behavioral finance in your job?

UW:

It should be relevant. Unfortunately, it is currently not. It is crucial to analyze exaggerations and volatilities in the stock markets. For instance, the share price reaction of GameStop, is this fundamentally justified or not?

MK:

Are financial markets efficient and investors react rationally?

UW:

There is an ongoing discussion about whether or not markets are efficient. In my opinion, the market is some kind of efficient. My best guess would be an efficiency between the weak and the semi-strong efficient market form. In the short term, markets can be inefficient and mispricing things and events. In my opinion, investors are not 100% rational because, in particular market phases, they do not behave as rationally as is assumed in science.

MK:

What kind of behavioral biases do you know?

UW:

Inter alia confirmation biases, Loss Aversion, moral hazard, familiarity bias and Overconfidence.

Going more deeply: Confirmation bias refers to a type of selective perception that emphasizes ideas that confirm our trading beliefs. While devaluing whatever contradicts our view of the financial markets.

For example, you may believe that stocks do better in the summer than during any other time of the year, maybe because you like summer more than the different three seasons. However, this belief may be due to also confirmation bias, which causes you to notice more stocks that follow rallying during the summer while overlooking them during other months.

A moral hazard is a situation in which one party engages in risky behavior or fails to act in good trust because it knows the other party bears the economic consequences of their behavior.

MK:

What are some of the most behavioral errors you see negatively impacting investors?

UW:

The most behavioral errors I have seen were confirmation biases, familiarity bias and home bias. Home biases are pretty common in Europe. Portfolio Managers of the southern part of Europe, such as Italy, Spain, or Portugal, tend to like more companies from their own regions or countries. They avoid other companies. In a sell-off phase, they sell foreign stocks faster than their companies from their nationality.

MK:

What are some of the emotional issues that influence investors, especially in uncertain times?

UW:

Behaviors issues differ in certain situations. In bullish times, you see other behaviors than in bearish phases. In bearish times, where stock markets are highly volatile, one of the most common behavior is the fear of loss and, therefore, the fear of underperforming its benchmark.

Moreover, investors overestimate their own abilities, which ends with a high arrogance - a phenomenon which I have seen, especially at professional Portfolio Managers.

MK:

How do behavioral biases affect investor's decision making and performance?

UW:

In my opinion, investors make mistakes when trying to chase a market or make up for a missed opportunity with bends and breaks. If an investor gets into a pressure situation due to underperformance, among other things, the risk is high that he tries to make up for the underperformance with a "bet", which can go wrong.

Moreover, every behavior biases affect decision-making in most parts negatively and lead to worse performance.

MK:

How can investors avoid the most common thinking and emotional pitfalls that can negatively impact their financial goals?

UW:

Overcoming behavioral biases is person dependent. For me, focusing on numbers and analyzing data will help to overcome the pitfalls.

In my opinion, an investor should never react and trade in the heart of the momentum. The decision-making of an investor should be viewed soberly and rationally. As a rule, a Portfolio Manager has a balanced portfolio in order to counteract such fluctuations. If the portfolio is highly concentrated with a few individual stocks, the investor usually knows them very well and knows whether or not it is a volatile market.

MK:

Knowing behavioral finance and its pitfalls, do you think that you do have an advantage over private or non-experienced investors?

UW:

The question is rather whether one has a grip on the emotions in the situations in which it matters (sharp price drops, ad-hoc reports, etc.), remains rational and does not overreact. If

you stick to it, you do have an advantage. Moreover, I hope that I have an advantage over private or non-experienced investors with my experience and knowledge.

MK:

What is your advice for junior Portfolio Managers?

UW:

Get a mentor who helps you to overcome these pitfalls and shows you how to deal with these pitfalls. Generally, an investor should let out any feeling. Moreover, various parameters and rations (greed & fear, put/call ratio, etc.) should be taken into account when assessing a portfolio's risk.

From a fundamental as well as from a technical point of view, a recommendation should then be derived and behavioral patterns should not guide one.

MK:

Amazing, we went through every question. Thanks a lot for your time.

UW:

Perfect. Timewise, we were even on-time. So, thanks Max for the interesting questions and have a good start into the day.

MK:

Thanks, and stay safe.

Name of the Interviewee:	**Dr. R. K.**
Age:	**61**
Education:	**Doctor in Medicine**
Experience:	**39 year in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 117 Mio. €**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**28th of January 2022, 18:15 -19:01 CET**

Maximilian-Benedikt Koehn (MK):

Good Evening. First of all, thanks a lot for taking the time for my expert interview. I really appreciate that even in this quite volatile market environment with all the covid-19 news.

Dr. R.K. (RK):

True, it can all be a bit challenging lately, but I still wanted to take the time to do the interview as I find the topic very interesting.

MK:

So let´s start to our interview. I hope you have received my guidelines for it The interview should last for less than half an hour. The starting question is what's your knowledge about behavioral finance and your experience in that field.

RK:

My knowledge of behavioral finance is primarily based on the efficient market theory and its weaknesses. As you surely know, it is considered the cornerstone of traditional finance theory. It states that all prices always reflect all relevant information. For this reason, it should be impossible to achieve excess returns. But if one fully relies on this theory, it would be pointless to search for undervalued stocks and active fund managers would therefore also be irrelevant. Therefore, in nowadays behavioral and cognitive psychology are combined with traditional financial theories to explain existing and repetitive phenomena such as speculative bubbles or fund managers outperforming the market. Finally, many investment decisions are guided by emotions. These can be divided into certain categories, which underlie the so-called behavioral finance theory.

MK:

Thanks! That was quite detailed. Can you share some experience with us? Perhaps you can also think of examples that are related to the recent development of the stock markets with regard to the Covid-19 pandemic since we had already talked about this briefly at the beginning?

RK:

Sure – The COVID-19 pandemic has led to dramatic economic effects characterized by excessive volatility in stock prices and market collapse. As also explained at the outset, in my view, some of the phenomena that occurred during the crisis, such as the excessive volatility and the unshakable confidence of financial institutions, can also be inadequately explained by traditional financial paradigms. I believe that such phenomena can be better explained from the perspective of behavioral economics.

The first example that comes to mind is overconfidence. It has been shown to lead to volatility in stock prices and since volatility is one of the main features of the markets during the COVID-19 crisis, I would like to go into more detail about overconfidence. Overconfidence can be defined as a specific type of miscalibration, a cognitive bias, in which the confidence is higher than the accuracy. This cognitive bias is glaringly reflected in the GDP growth projections across the globe as the pandemic became more widespread. Specifically, in the case of India, GDP growth projections for 2020 were mis calibrated as much higher than the actual likely figure even as investors witnessed the crisis unfold in other developing and developed nations. Moody's revised its GDP growth projections for India multiple times from February through April, slashing the projections from 5.4% on February 17, 2020 to 0.2% on April 28, 2020. The growth rate projections for India remained relatively high, even though India was at a high risk of importing COVID-19.

Incidentally, overconfidence also includes the fact that people have an unrealistically positive image of themselves and think they are better than the rest, In the context of financial markets, the better-than-average effect has been shown to correspond with higher trading volumes, as traders think their information is better than their peers. More specifically, overconfident CEOs and managers consider their capabilities superior, which has been shown to affect corporate policies and overinvestment. Overconfident managers often overestimate the sustainability of a positive state, which leads them to underestimate the risk profile of their investments. These biases lead "confident banks" to relax lending standards, increase lending, increase leverage, and take on additional debt. However, once a financial crisis erupts, overconfident banks suffer higher capital losses, more capital losses, a greater decline in their net worth, and a higher

likelihood of CEO changes and insolvencies than non-confident banks. Overconfident financial institutions, as characterized by the riskiness of their investments before the 2020 stock market crash, are therefore likely to suffer higher losses and insolvencies after the crisis. In my view, this will also set a precedent for the years to come, which will then be characterized by more conservative and riskier investments.

MK:

That's really interesting. Do you know other behavioral biases and can you share your experience as well?

RK:

For example, I can think of the optimism bias, which is closely related to the better-than-average effect. People believe they are more likely to experience positive events and less likely to experience negative events, especially if those events are viewed as "controllable." In the context of finance, for example, fund managers believe that their chances of financial success are greater than those of others. Optimism Bias was also prevalent during the 2008 financial crisis, when untested models were justified with an optimistic attitude while negative possibilities were downplayed.

Optimism Bias is also evident in the current scenario. Even as banks saw their profits plummet during the 2020 stock market crash and expected billions of dollars in credit losses, investors remained optimistic, expecting the U.S. Federal Reserve System to lower interest rates, buy bonds, provide aid, and prop up credit markets.

I can also think of a cognitive bias which is known as the illusion of control. People often tend to believe that they are able to influence events that may be determined only by chance. This facet was particularly characteristic of the 2008 financial crisis - the over-reliance on risk management models that led to the bursting of the financial bubble is an example of the illusion of control.

This illusion of control is also prevalent in corporate responses to the current crisis. In a study by Wang et al, an information analysis of companies' disclosures in the first quarter of 2020 shows a negative market reaction. This suggests that the market has underestimated the impact of the COVID-19 outbreak on companies.

MK:

That's really interesting and thanks a lot for sharing your experience and your knowledge with me. So we talked about the different factors which influence investors decision making, but how can investors avoid those emotional pitfalls that can negatively impact their decisions?

RK:

In times of global crisis, such as the current pandemic, we tend to focus on what is most readily available, leaving information unreflective as we adjust to the crisis. Ironically, however, a crisis is precisely the time when we need to be most cautious. It is of great importance to act as rationally as possible precisely then, to question and consume news with caution, and to be aware of our psychological shortcomings. Only in this way can we cope better with the crisis.

MK:

That was really helpful. Thank you so much for your time!

RK:

You're always welcome and stay safe.

MK:

You too, thanks again and Bye.

Name of the Interviewee:	**W. A.**
Age:	**48**
Education:	**Diploma in Economics**
Experience:	**24 year in the finance world**
Job Prescription and Asset under Management:	**Portfolio Manager; 3.247 Mio. €**
Place of the Interview:	**virtually (via Zoom)**
Date and Time of the Interview:	**2nd of February 2022, 6:35 -7:13 CET**

Maximilian-Benedikt Koehn (MK):

Good Morning. First of all, thanks a lot for taking the time for my expert interview and I think it is not to late to wish you a Happy New Year as well.

W. A. (WA):

Hi Max. I'm not going to lie, the last two years have been quite challenging in terms of the Cocid-19 pandemic. I hope it all comes to an end soon.

MK:

Totally agree but let's start to our interview. I hope you have received my guidelines for the interview. The interview should last for less than half an hour. The starting question is what's your knowledge about behavioral finance and your experience in that field.

WA:

First, of course, I am familiar with the efficient market theory. However, it has some shortcomings, which the psychologist Daniel Kahneman also dealt with. His goal was to explain the irrational behavior of investors, since it has been shown that many investment decisions are guided by emotions. This is virtually contradicted by the efficient market theory. After all, if the price of a stock reflected all relevant information, investors would not be able to outperform the benchmark or the stock market. Kahneman combines behavioral and cognitive psychology with traditional financial theories to look at and explain this phenomenon scientifically. So, in summary, behavioral finance explains certain inconsistencies in efficient market theory and deals with human (mis)behavior in investment decisions.

MK:

Thanks! That was quite detailed. Can you share some experience with us? Perhaps you can also think of examples that are related to the recent development of the stock markets with regard to the Covid-19 pandemic since we had already talked about this briefly at the beginning?

WA:

That's a very interesting question in this context. Let me think for a moment: representation bias comes to mind, for example. In this, investors often compare one thing to another and based on their associations they create analogies based on which they also try to predict future events.

This bias has been shown to affect the quality of investments. Investors often view past returns as representations of potential future returns and therefore make decisions based on the assumption that past price performance is representative of future price performance. The 2020 stock market crash is often compared to the 2008 financial crisis and the Great Depression of the 1930s. Such comparisons are examples of representation bias. However, it is often wrong and even dangerous to simply rely on such assumptions and speculations when making investment decisions.

Then risk aversion comes to mind. This refers to the reluctance to take higher risks and instead prefer alternatives with lower risk. It is well known that risk aversion is significantly affected in exceptional situations. Especially after the financial crisis of 2008, investors sold more stocks and risk aversion increased significantly. During the COVID-19 pandemic and the resulting stock market crash in 2020, financial risk aversion will certainly change as well. Gold, for example, is often seen as a safe investment and gains value when risk aversion increases. The price of gold has increased by 7% (USD) / 7.5% (EUR) / 12.72% (INR) between February 2, 2020 and May 1, 2020, which is additional evidence that risk aversion has increased as a result of the global COVID-19 crisis.

MK:

That's really interesting. Do you know other behavioral biases and can you share your experience as well?

WA:

Perhaps availability bias might still be a good current example. It is a cognitive deficiency, which leads to judgments being influenced on the basis of appropriate examples that come to

mind. For example, it happens that both investors and financial institutions believe in banks' risk management capabilities after a long series of positive results. This overestimation of risk management capabilities and overconfidence in investors and markets leads to an underestimation of actual risk. Eventually, there is increased market entry, more buyers of credit, access to cheap financing, lax regulation, and riskier investments, which eventually leads to a crisis. The run-up to the 2008 financial crisis was also shaped by this theory.

While the literature on public confidence in financial institutions after the 2020 stock market crash is limited, it is critical to recognize the availability bias and recalibrate investor expectations. Financial market turmoil and crises have been shown to lead to a significant decline in public confidence, and the so-called recency bias causes investors to attach more importance to recent events. Thus, if the impact on markets continues to significantly affect financial institutions in the coming months, confidence in the financial system will decline, which will shape markets in the coming years.

MK:

That's really interesting and thanks a lot for sharing your experience and your knowledge with me. So we talked about the different factors which influence investors decision making, but how can investors avoid those emotional pitfalls that can negatively impact their decisions?

WA:

I would say the most important thing is to make rational investment decisions and not to be influenced too much by external factors and influences.

For example, it is understandable that when there is a crisis, investors spend many hours reading or following the news to stay informed and up to date. It is also natural for investors to pay more attention to the markets when volatility is high.

This impulse to look more closely can be counterproductive to making good decisions. Although we live in an age where we have almost unlimited access to information, it has become more difficult to find meaning and context. Watching more news doesn't give you more context. Not only does the news focus on negative aspects, but it also conveys a sense of urgency that can exacerbate our anxieties. Suffering from behavioral patterns such as recency bias, we tend to overreact to breaking, prominent, or easily accessible news - focusing on information that confirms our biases because of confirmation bias.

MK:

That was really helpful. Thank you so much for your time!

WA:

You’re always welcome and stay safe.

MK:

You too, thanks again and Bye.

E. Questionnaire of quantitative research

Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Introduction

Dear Sir or Madam,

First of all, I want to thank you for participating in this survey and taking the time to fill out the questionnaire.

The objective of the study is to find out more about the correlation and impact of behavioural factors on the investment decision and performance of European Portfolio Managers.

This survey is conducted within the course of an academic research study, and your data will be handled confidential and anonymous. It will take you about 10 minutes to complete the questionnaire.

· A requirement is that you work as a European Portfolio Manager.

· Please indicate how much you agree or disagree with each of the following statements.

· There are no correct or wrong answers.

· Please make sure not to miss a statement.

If you have any questions regarding the content of the questionnaire, please contact +49 (172) 51 666 41.

Thank you very much,

Maximilian-Benedikt Köhn

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Personal Questions

1. What is your gender?

- ◯ Male
- ◯ Female
- ◯ Divers

2. What is your age?

- ◯ 18 to 24
- ◯ 25 to 34
- ◯ 35 to 44
- ◯ 45 to 54
- ◯ 55 to 64
- ◯ 65 or older

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3. Please choose your education group:

- ◯ Without diplomas
- ◯ Certificates or Diplomas
- ◯ Bachelor
- ◯ Master, Engineer
- ◯ Doctorate

4. For how many years have you been investing professional in the stocks market?

- ◯ 1 to 3 years
- ◯ 4-6 years
- ◯ 7-9 years
- ◯ >9 years

5. Please estimate the amount, which you are in charge of and is invested into stocks:

- ◯ < 1 million €
- ◯ 1-15 million €
- ◯ >15-50 million €
- ◯ >50-100 million €
- ◯ >100-250 million €
- ◯ > 250 million €

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6. What is your average net income per month?

- ◯ < 4.500 €
- ◯ >4.500-7.000 €
- ◯ >7.000-8.500 €
- ◯ >8.500-10.000 €
- ◯ > 10.000 €

7. What is your investment horizon?

- ◯ Day trader
- ◯ Short term investor
- ◯ Long term investor

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Overconfidence

1. I am an experienced investor.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. I feel more confident in my own investment opinions over the opinions of my colleagues or competitors.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. I have the ability to choose the stocks which performance will be better than the market performance.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. I trade stocks excessively.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. My investing profits can be attributed to my successful investment strategy.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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6. I believe that my skills and knowledge of the stock market can help me to outperform the market.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

7. I can pinpoint the major reversals in the stock market.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Loss aversion

1. I am more concerned about a large loss in my stock than missing a substantial gain.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. I feel nervous when I have large paper losses in my invested stocks.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. I will not increase my investment when the market performance is poor.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. When it comes to investment, avoiding a capital loss is more important than returns.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. I sell stocks that increased in value very rapidly.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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6. I keep stocks that decreased in value for long time.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

7. I avoid selling shares that have decreased in value and quickly sell shares that have increased in value.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Herding

1. Other investors' decisions of choosing stock types have an impact on my investment decisions.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

2. Other investors' decisions of the stock weights in their portfolio don't have impact on my investment decisions.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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3. Other investors' decisions of buying and selling stocks have impact on my investment decisions.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. I usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Representativeness

1. I try to avoid investment in companies with a history of low earnings.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. I rely on past performance to buy stocks because I believe their good performance will continue.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. Good stocks are companies with past consistent earnings growth.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. I buy hot stocks and avoid stocks that performed poorly in the near past.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. Analysis of a portfolio manager's track record for the past six month suggests, that on average this portfolio manager has performed better than the market. Thus, you are likely to conclude that his performance is the result of skilled allocation and stock selection.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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6. Suppose you analyzed the performance of a stock for the last ten quarters. You found out that its performance during the initial five to six quarter has been poor but for the last four quarters is has been excellent, so you expect the same outstanding performance from this stock in the future.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Price anchoring

1. I compare the current stock prices with their recent year high and low prices to justify my stock purchase.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. I am likely to sell my stock after the price hits recent year high.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. I am unlikely to buy a stock if it was more expensive than last year.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. I see the stock price as high if the price has increased to the current year high.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. I believe that the position of the year high and low price defined the current stock price movement range.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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6. I use the stock buying price as a reference point for trade.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Availability

1. If I heard from a friend about a stock that achieved high returns, I would buy it.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. If I want to invest in the stocks of a particular company, I will rely on my co-workers opinions.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. If I want to invest in the stocks of a certain company, I will rely on information from the internet.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. If I want to invest in the stocks of a certain company, I will rely on information from the same company.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. If I want to invest in the stocks of a certain company, I will rely on information from financial experts.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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6. If a friend advised me to purchase a stock of a certain company then news arrived me about the probability of that stock's price rising, I will invest in these stocks.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

7. During a visit to a HighTech company, you meet many of your college fellows who studied mathematics at college and were very good at it. You can conclude from this experience that good mathematics students tend to join HighTech companies.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Mental accounting

1. I tend to treat each element of my investment portfolio separately.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. I hesitate to sell stocks that had high returns in the past even though their prices decrease nowadays.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. I don‘t care about the performance of my investment portfolio as a whole but I care about the return of each account separately.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Regret aversion

1. I invest in companies with low risks.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. I keep the stocks that decreased in value.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. I sell the stocks that increased in value faster.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. I don't buy the stocks that decreased in value.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. I buy the stocks that a group of investors owns.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Self-Control

1. I can achieve profits out of my stocks by consulting expert always.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. If I believe that some details about a certain stock are not available to me, I don't buy that stock.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. Whatever my investment goals are in the stock market, I can achieve them.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4. I care about spending on my daily obligations more than caring about saving for the future.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

5. I divide my money to capital for investment and money for daily spending.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Investment performance

1. The return rate of your recent stock investment meets your expectation.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

2. Your rate of return is equal to or higher than the average return rate of the market.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

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3. You feel satisfied with your investment decisions in the last year (including selling, buying, choosing stocks, and deciding the stock volumes).

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

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Behavioural Factors Influencing Portfolio Manager's Investment Decision and Perfomance

Thank you for taking the time to complete this survey!

Please press "DONE" to finish the survey

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F. Questionnaire of quantitative research Independent Samples Test for Gender and differences in investment decisions of Portfolio Manager

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Overconfidence	Equal variances assumed	.116	.734	2.253	137	.026	.24137
	Equal variances not assumed			2.602	25.109	.015	.24137
Loss Aversion	Equal variances assumed	.900	.344	.009	137	.993	.00131
	Equal variances not assumed			.010	24.354	.992	.00131
Herding	Equal variances assumed	.044	.834	1.157	137	.249	.20122
	Equal variances not assumed			1.239	23.510	.228	.20122
Representativeness	Equal variances assumed	13.138	.000	-.568	137	.571	-.10912
	Equal variances not assumed			-.958	45.531	.343	-.10912
Price Anchoring	Equal variances assumed	.989	.322	-1.176	137	.242	-.24541
	Equal variances not assumed			-1.330	24.638	.196	-.24541
Availability	Equal variances assumed	1.297	.257	.943	137	.347	.16011
	Equal variances not assumed			1.150	26.515	.260	.16011
Mental Accounting	Equal variances assumed	3.621	.059	-.444	137	.658	-.08938
	Equal variances not assumed			-.556	27.345	.583	-.08938
Regret Aversion	Equal variances assumed	9.023	.003	-.921	137	.359	-.15399
	Equal variances not assumed			-1.356	34.347	.184	-.15399
Self-Control	Equal variances assumed	.004	.948	.514	137	.608	.04848
	Equal variances not assumed			.504	22.085	.619	.04848

Appendix Table C: Independent Samples Test for Gender and differences in investment decisions of Portfolio Manager

G. ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their net income

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	.882	5	.176	.952	.450
	Within Groups	24.669	133	.185		
	Total	25.551	138			
Loss Aversion	Between Groups	5.665	5	1.133	3.686	.004
	Within Groups	40.879	133	.307		
	Total	46.544	138			
Herding	Between Groups	14.021	5	2.804	7.237	.000
	Within Groups	51.538	133	.388		
	Total	65.558	138			
Representativeness	Between Groups	10.921	5	2.184	4.239	.001
	Within Groups	68.523	133	.515		
	Total	79.444	138			
Price Anchoring	Between Groups	9.410	5	1.882	2.941	.015
	Within Groups	85.095	133	.640		
	Total	94.504	138			
Availability	Between Groups	9.584	5	1.917	4.842	.000
	Within Groups	52.647	133	.396		
	Total	62.231	138			
Mental Accounting	Between Groups	10.355	5	2.071	3.584	.005
	Within Groups	76.858	133	.578		
	Total	87.213	138			
Regret Aversion	Between Groups	2.433	5	.487	1.116	.355
	Within Groups	57.997	133	.436		
	Total	60.430	138			
Self-Control	Between Groups	1.171	5	.234	1.732	.132
	Within Groups	17.986	133	.135		
	Total	19.157	138			

Appendix Table C: ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their net income

H. ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their education levels

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	1.637	4	.409	2.294	.063
	Within Groups	23.914	134	.178		
	Total	25.551	138			
Loss Aversion	Between Groups	2.395	4	.599	1.817	.129
	Within Groups	44.149	134	.329		
	Total	46.544	138			
Herding	Between Groups	2.597	4	.649	1.382	.244
	Within Groups	62.961	134	.470		
	Total	65.558	138			
Representativeness	Between Groups	5.570	4	1.393	2.526	.044
	Within Groups	73.873	134	.551		
	Total	79.444	138			
Price Anchoring	Between Groups	2.552	4	.638	.930	.449
	Within Groups	91.952	134	.686		
	Total	94.504	138			
Availability	Between Groups	7.641	4	1.910	4.689	.001
	Within Groups	54.590	134	.407		
	Total	62.231	138			
Mental Accounting	Between Groups	10.252	4	2.563	4.462	.002
	Within Groups	76.962	134	.574		
	Total	87.213	138			
Regret Aversion	Between Groups	1.349	4	.337	.765	.550
	Within Groups	59.081	134	.441		
	Total	60.430	138			
Self-Control	Between Groups	1.007	4	.252	1.858	.121
	Within Groups	18.150	134	.135		
	Total	19.157	138			

Appendix Table D: ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their education levels

I. ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their work experience

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	.170	3	.057	.301	.825
	Within Groups	25.382	135	.188		
	Total	25.551	138			
Loss Aversion	Between Groups	3.390	3	1.130	3.535	.017
	Within Groups	43.154	135	.320		
	Total	46.544	138			
Herding	Between Groups	14.068	3	4.689	12.294	.000
	Within Groups	51.491	135	.381		
	Total	65.558	138			
Representativeness	Between Groups	7.087	3	2.362	4.408	.005
	Within Groups	72.356	135	.536		
	Total	79.444	138			
Price Anchoring	Between Groups	3.974	3	1.325	1.976	.121
	Within Groups	90.530	135	.671		
	Total	94.504	138			
Availability	Between Groups	6.602	3	2.201	5.341	.002
	Within Groups	55.628	135	.412		
	Total	62.231	138			
Mental Accounting	Between Groups	7.347	3	2.449	4.139	.008
	Within Groups	79.867	135	.592		
	Total	87.213	138			
Regret Aversion	Between Groups	2.745	3	.915	2.141	.098
	Within Groups	57.685	135	.427		
	Total	60.430	138			
Self-Control	Between Groups	.764	3	.255	1.870	.138
	Within Groups	18.393	135	.136		
	Total	19.157	138			

Appendix Table E: ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their work experience

J. ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their AUM

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	6.890	5	1.378	9.822	.000
	Within Groups	18.661	133	.140		
	Total	25.551	138			
Loss Aversion	Between Groups	9.872	5	1.974	7.161	.000
	Within Groups	36.671	133	.276		
	Total	46.544	138			
Herding	Between Groups	12.355	5	2.471	6.177	.000
	Within Groups	53.203	133	.400		
	Total	65.558	138			
Representativeness	Between Groups	17.830	5	3.566	7.698	.000
	Within Groups	61.614	133	.463		
	Total	79.444	138			
Price Anchoring	Between Groups	22.212	5	4.442	8.173	.000
	Within Groups	72.292	133	.544		
	Total	94.504	138			
Availability	Between Groups	16.574	5	3.315	9.656	.000
	Within Groups	45.656	133	.343		
	Total	62.231	138			
Mental Accounting	Between Groups	19.065	5	3.813	7.442	.000
	Within Groups	68.148	133	.512		
	Total	87.213	138			
Regret Aversion	Between Groups	14.993	5	2.999	8.778	.000
	Within Groups	45.437	133	.342		
	Total	60.430	138			
Self-Control	Between Groups	1.275	5	.255	1.897	.099
	Within Groups	17.882	133	.134		
	Total	19.157	138			

Appendix Table F: ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their AUM

K. ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their net income

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Overconfidence	Between Groups	4.314	4	1.078	6.804	.000
	Within Groups	21.238	134	.158		
	Total	25.551	138			
Loss Aversion	Between Groups	7.568	4	1.892	6.505	.000
	Within Groups	38.975	134	.291		
	Total	46.544	138			
Herding	Between Groups	10.018	4	2.504	6.042	.000
	Within Groups	55.541	134	.414		
	Total	65.558	138			
Representativeness	Between Groups	8.703	4	2.176	4.121	.004
	Within Groups	70.741	134	.528		
	Total	79.444	138			
Price Anchoring	Between Groups	13.064	4	3.266	5.374	.000
	Within Groups	81.440	134	.608		
	Total	94.504	138			
Availability	Between Groups	5.681	4	1.420	3.365	.012
	Within Groups	56.550	134	.422		
	Total	62.231	138			
Mental Accounting	Between Groups	7.601	4	1.900	3.198	.015
	Within Groups	79.612	134	.594		
	Total	87.213	138			
Regret Aversion	Between Groups	4.481	4	1.120	2.683	.034
	Within Groups	55.949	134	.418		
	Total	60.430	138			
Self-Control	Between Groups	.512	4	.128	.921	.454
	Within Groups	18.645	134	.139		
	Total	19.157	138			

Appendix Table G: ANOVA of the differences in the investment decisions of Portfolio Managers in relation to their net income

L. Results of Factor Analysis for behavioral factors and investment performance

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0,815
Bartlett's Test of Sphericity	Approx. Chi-Square	1.338,3
	df	210
	Sig.	0,000

Appendix Table H: KMO and Bartlett's Test

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6,570	31,284	31,284	6,570	31,284	31,284
2	2,371	11,291	42,576	2,371	11,291	42,576
3	1,630	7,763	50,338	1,630	7,763	50,338
4	1,396	6,648	56,986	1,396	6,648	56,986
5	1,341	6,385	63,371	1,341	6,385	63,371
6	1,124	5,352	68,723	1,124	5,352	68,723
7	1,027	4,890	73,614	1,027	4,890	73,614
8	0,737	3,511	77,125			
9	0,615	2,928	80,053			
10	0,562	2,676	82,729			
11	0,519	2,471	85,200			
12	0,473	2,252	87,452			
13	0,449	2,140	89,592			
14	0,37	1,761	91,353			
15	0,348	1,659	93,012			
16	0,321	1,529	94,541			
17	0,288	1,372	95,913			
18	0,27	1,285	97,198			
19	0,241	1,150	98,348			
20	0,212	1,010	99,357			
21	0,135	0,643	100,000			

Appendix Table I: Total Variance Explained

Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
PA6	0,851						
PA1	0,751						
PA5	0,727						
PA4	0,636						
LA1		0,847					
LA4		0,791					
LA3		0,620					
LA2		0,618					
AVA3			0,818				
AVA4			0,814				
AVA5			0,689				
AVA6			0,638				
OC5				0,833			
OC6				0,801			
OC3				0,781			
MA1					0,880		
MA3					0,630		
MA2		0,546			0,619		
OC1						0,877	
OC2						0,768	
IP3							0,889

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Appendix Table J: Rotated Component Matrix

M. Cronbach's Alpha Test for items of Factors

Cronbach's Alpha Test for items of Factors

1. Price Anchoring

Reliability Statistics

Cronbach's Alpha	N of Items
0,852	4

2. Price Anchoring

Reliability Statistics

Cronbach's Alpha	N of Items
0,781	4

3. Mental Accounting

Reliability Statistics

Cronbach's Alpha	N of Items
0,754	3

4. Overconfidence

Reliability Statistics

Cronbach's Alpha	N of Items
0,654	5

5. Loss Aversion

Reliability Statistics

Cronbach's Alpha	N of Items
0,827	4

Appendix Table K: Cronbach's Alpha Test for items of Factors

N. Structural Equation Modelling for Behavioral Factors and Investment Performance – Regression Weights

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	231
Number of distinct parameters to be estimated:	58
Degrees of freedom (231 - 58):	173

Result (Default model)

Minimum was achieved
Chi-square = 343.753
Degrees of freedom = 173
Probability level = .000

Regression Weights: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
PA6 <--- PRICE_ANCHORING	1.000				
PA5 <--- PRICE_ANCHORING	1.598	0,213	7.488	***	par_1
PA4 <--- PRICE_ANCHORING	1.722	0,218	7.891	***	par_2
PA1 <--- PRICE_ANCHORING	1.815	0,229	7.940	***	par_3
AVA6 <--- AVAILABILITY	1.000				
AVA5 <--- AVAILABILITY	1.451	0,231	6.277	***	par_4
AVA4 <--- AVAILABILITY	1.419	0,217	6.523	***	par_5
AVA3 <--- AVAILABILITY	1.601	0,26	6.147	***	par_6
MA3 <--- MENTAL_ACCOUNTING	1.000				
MA2 <--- MENTAL_ACCOUNTING	0,72	0,089	8.071	***	par_7
MA1 <--- MENTAL_ACCOUNTING	0,493	0,076	6.521	***	par_8
LA4 <--- LOSS_AVERSION	1.000				
LA3 <--- LOSS_AVERSION	1.733	0,198	8.736	***	par_9
LA2 <--- LOSS_AVERSION	1.054	0,138	7.610	***	par_10
LA1 <--- LOSS_AVERSION	0,684	0,092	7.445	***	par_11
OC2 <--- OVER_CONFIDENCE	1.000				
OC1 <--- OVER_CONFIDENCE	0,328	0,241	1.361	0,174	par_12
IP3 <--- PRICE_ANCHORING	-0,304	0,247	-1.233	0,218	par_23
IP3 <--- AVAILABILITY	0,055	0,2	0,274	0,784	par_24
IP3 <--- MENTAL_ACCOUNTING	0,155	0,126	1.233	0,218	par_25
IP3 <--- OVER_CONFIDENCE	0,405	0,306	1.322	0,186	par_26
IP3 <--- LOSS_AVERSION	0,046	0,204	0,225	0,822	par_27
OC3 <--- OVER_CONFIDENCE	1.337	0,392	3.409	***	par_28
OC5 <--- OVER_CONFIDENCE	1.504	0,436	3.450	***	par_29
OC6 <--- OVER_CONFIDENCE	1.416	0,415	3.410	***	par_30

Appendix Table L: Regression Weights of Structural Equation Modelling

Standardized Regression Weights: (Group number 1 - Default model)

		Estimate
PA6	<--- PRICE_ANCHORING	0,642
PA5	<--- PRICE_ANCHORING	0,768
PA4	<--- PRICE_ANCHORING	0,826
PA1	<--- PRICE_ANCHORING	0,833
AVA6	<--- AVAILABILITY	0,621
AVA5	<--- AVAILABILITY	0,710
AVA4	<--- AVAILABILITY	0,761
AVA3	<--- AVAILABILITY	0,687
MA3	<--- MENTAL_ACCOUNTING	0,839
MA2	<--- MENTAL_ACCOUNTING	0,712
MA1	<--- MENTAL_ACCOUNTING	0,579
LA4	<--- LOSS_AVERSION	0,680
LA3	<--- LOSS_AVERSION	0,891
LA2	<--- LOSS_AVERSION	0,731
LA1	<--- LOSS_AVERSION	0,563
OC2	<--- OVER_CONFIDENCE	0,337
OC1	<--- OVER_CONFIDENCE	0,119
IP3	<--- PRICE_ANCHORING	-0,240
IP3	<--- AVAILABILITY	0,034
IP3	<--- MENTAL_ACCOUNTING	0,224
IP3	<--- OVER_CONFIDENCE	0,150
IP3	<--- LOSS_AVERSION	0,048
OC3	<--- OVER_CONFIDENCE	0,694
OC5	<--- OVER_CONFIDENCE	0,760
OC6	<--- OVER_CONFIDENCE	0,695

Appendix Table M: Standardized Regression Weights of the Structural Equation Modelling

O. Structural Equation Modelling for Behavioral Factors and Investment Performance – Model Fit Summary

Model Fit Summary

Chi-Square Statistics (CMIN)

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	58	343,753	173	0,000	1,987
Saturated model	231	0,000	0,000		
Independence model	21	1418,842	210	0,000	6,756

Appendix Table N: CMIN

Resting Metabolic Rate (RMR) & Goodness of Fit Index (GFI)

Model	RMR	GFI	AGFI	PGFI
Default model	0,053	0,815	0,753	0,610
Saturated model	0,000	1,000		
Independence model	0,275	0,350	0,285	0,318

Appendix Table O: RMR & GFI

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	0,758	0,706	0,863	0,829	0,859
Saturated model	1,000		1,000		1,000
Independence model	0,000	0,000	0,000	0,000	0,000

Appendix Table P: Baseline Comparisons

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	0,824	0,624	0,707
Saturated model	0,000	0,000	0,000
Independence model	1,000	0,000	0,000

Appendix Table Q: Parsimony Adjusted Measures

Non-Centrality Parameter (NCP)

Model	NCP	LO 90	HI 90
Default model	170,753	121,840	227,454
Saturated model	0,000	0,000	0,000
Independence model	1208,842	1093,292	1331,853

Appendix Table R: NCP

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2,491	1,237	0,883	1,648
Saturated model	0,000	0,000	0,000	0,000
Independence model	10,281	8,760	7,922	9,651

Appendix Table S: FMIN

Standardized Root Mean Square Residual (RMSEA)

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0,085	0,071	0,098	0,000
Independence model	0,204	0,194	0,214	0,000

Appendix Table T: RMSEA

Akaike Information Criterion (AIC)

Model	AIC	BCC	BIC	CAIC
Default model	459,753	481,753	629,953	687,953
Saturated model	462,000	549,621	1139,863	1370,863
Independence model	1460,842	1468,807	1522,466	1543,466

Appendix Table U: CMIN

Expected Cross-Validation Index (ECVI)

Model	ECVI	LO 90	HI 90	MECVI
Default model	3,332	2,977	3,742	3,491
Saturated model	3,348	3,348	3,348	3,983
Independence model	10,586	9,748	11,477	10,644

Appendix Table V: ECVI

HOELTER

Model	HOELTER 0,05	HOELTER 0,01
Default model	83	88
Independence model	24	26

Appendix Table W: Holter

P. Structural Equation Modelling for Behavioral Factors and Investment Performance – Construct Validity

Construct Validity

a) Convergent Validity
   i. CR> 0,7
   ii. AVE> 0,5
   iii. CR>AVE

b) Discriminant Validity
   i. AVE>MSV
   ii. AVE> ASV

Price Anchoring

Item	Std Loading	Shared Var.				
Factor 1: Price Anchoring			CR	AVE	MSV	ASV
1	0,83	0,54	**0,85**	**0,60**	**0,59**	**0,36**
2	0,83	0,71				
3	0,77	0,26				
4	0,64	0,77				

Appendix Table X: Construct Validity – Price Anchoring

Availability

Item	Std Loading	Shared Var.				
Factor 2: Availability			CR	AVE	MSV	ASV
1	0,75	0,54	**0,8**	**0,51**	**0,31**	**0,21**
2	0,76	0,46				
3	0,71	0,08				
4	0,62	0,56				

Appendix Table Y: Construct Validity - Availability

Mental Accounting

Item	Std Loading	Shared Var.				
Factor 3: Mental Accounting			CR	AVE	MSV	ASV
1	0,68	0,74	**0,79**	**0,56**	**0,55**	**0,35**
2	0,71	0,36				
3	0,84	0,46				
4		0,71				

Appendix Table Z: Construct Validity – Mental Accounting

Overconfidence

Item	Std Loading	Shared Var.				
Factor 4: Overconfidence			CR	AVE	MSV	ASV
1	0,72	0,29	**0,84**	**0,52**	**0,13**	**0,07**
2	0,74	0,36				
3	0,69	0,08				
4	0,76	0,26				
5	0,69					

Appendix Table AA: Construct Validity – Overconfidence

Loss Aversion

Item	Std Loading	Shared Var.				
Factor 5: Loss Aversion			CR	AVE	MSV	ASV
1	0,66	0,29	**0,83**	**0,56**	**0,55**	**0,24**
2	0,73	0,56				
3	0,89	0,74				
4	0,68	0,08				

Appendix Table AB: Construct Validity – Loss Aversion

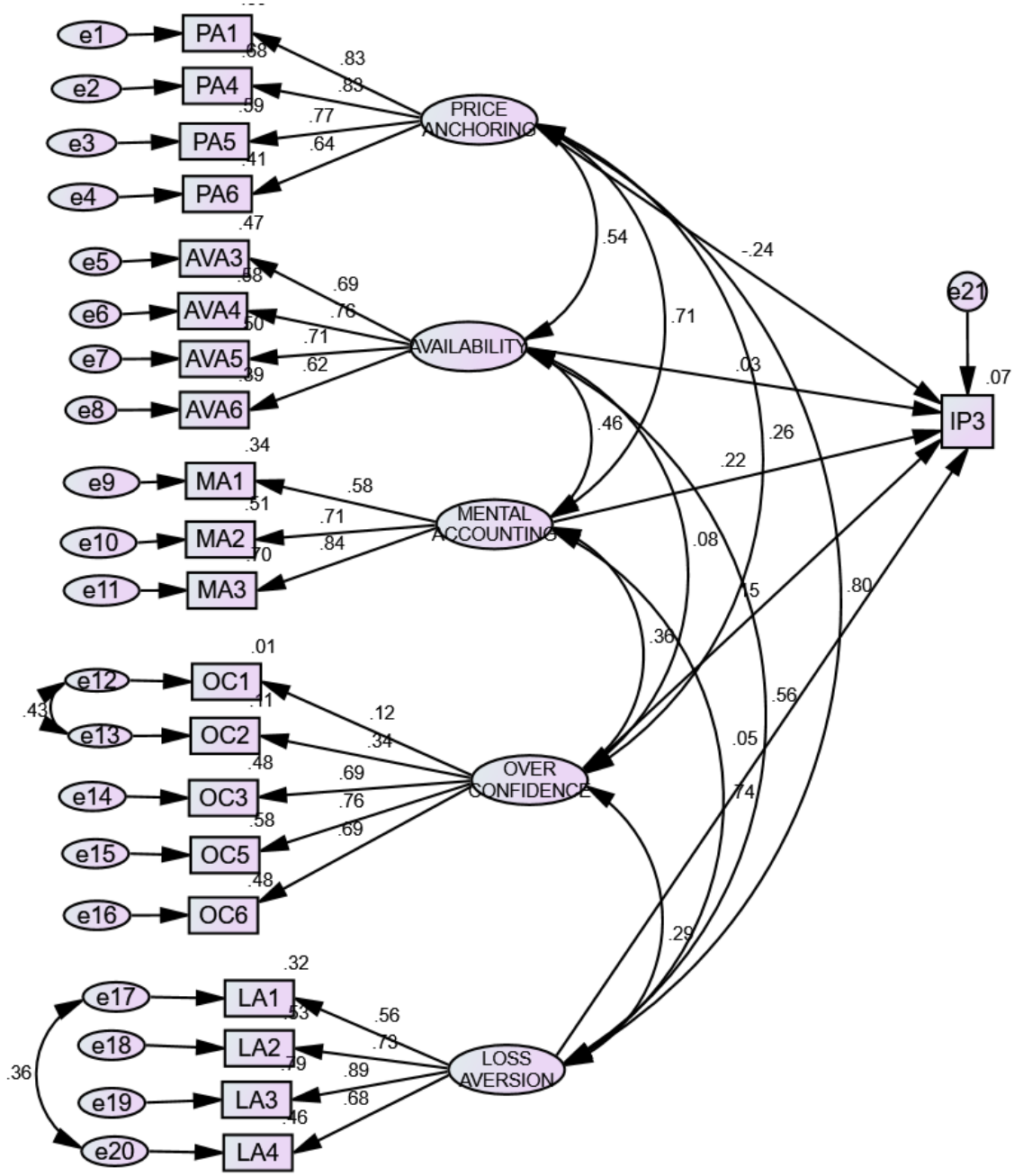
Q. Structural Equation Modelling for Behavioral Factors and Investment Performance – Final Model with drawn Covariances

Covariances

	M.I.	Par Change
e13 <--> e12	24,295	0,187
e19 <--> Overconfidence	16,085	0,079
e20 <--> e17	13,015	0,148
e10 <--> e17	12,395	0,145
e1 <--> e9	10,843	0,135
e2 <--> e19	12,508	0,17

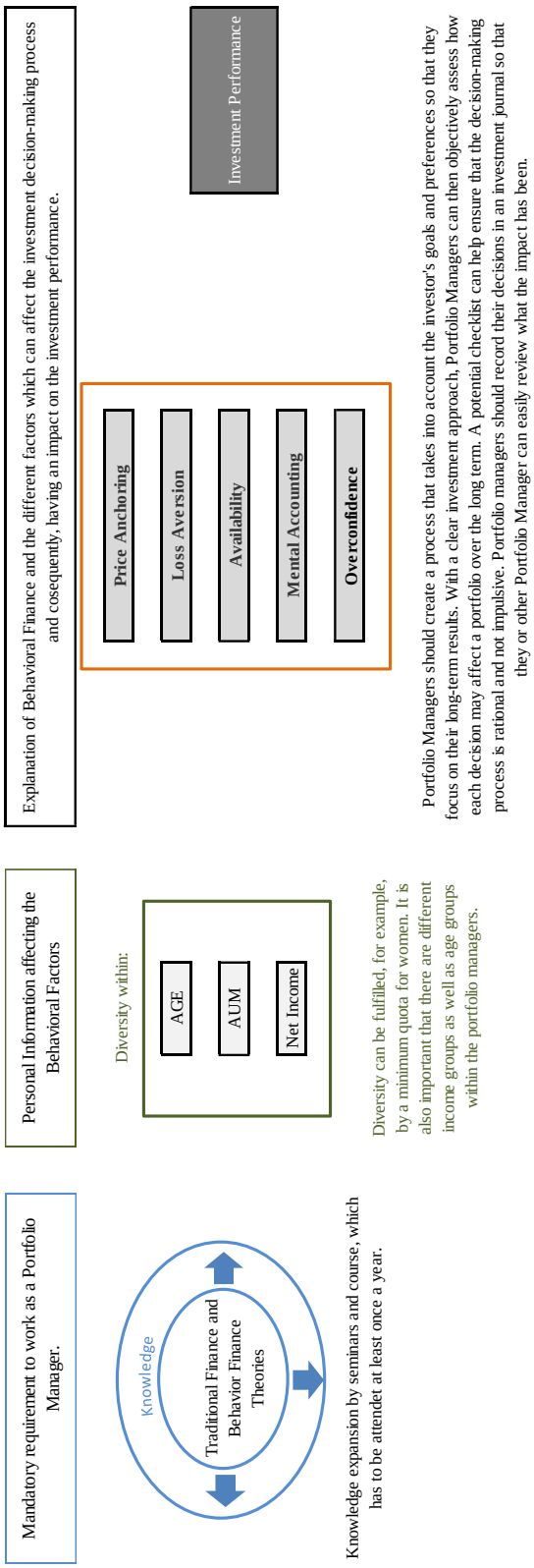
Appendix Table AC: Final Model with drawn Covariances

Modification Indices suggests that a covariance between e13 and e12 as well as e17 and e20 must be drawn in order to increase model fitness by 13.409. so below is the model with a covariance drawn between e13 and e12 as well as between e17 and e20. Drawing other covariances as suggested by modification indices is not possible**.**



Appendix Figure A: Structural Equation Modelling for Behavioral Factors and Investment Performance of Portfolio Managers with drawn Covariances

R. Steps and framework for a better understanding of behavioral factors affecting Portfolio Managers



Appendix Figure B: Steps and framework for a better understanding of behavioral factors affecting Portfolio Managers