

An Empirical study on Overconfidence as a mediator between Past Experience and Disposition effect

Anson K J¹ and Tomy K Kallarakal²

¹ Research Scholar

Bharathiar University, Coimbatore, Tamil Nadu, India

² Research Supervisor

Bharathiar University, Coimbatore, Tamil Nadu, India

Abstract

The context of uncertainty and the reaction towards the same is a very inquisitive area of study. A phenomenon that is usually the opposite of what an investor is expected to do in the context of uncertainty, that is to hold on to a loss making stock while selling or getting rid of the profit making one. This is called disposition effect. And this is usually what is not expected as a reaction of an investor. From the point of view of the literature review, it is found that over the years there have been multiple research works carried out, with reference to this phenomenon. But across all literature, the studies have primarily focused on the behavioral aspect and how it would cause disposition effect, while the trigger for a behavioral outcome, the caused behavior and its effect, by way of disposition has not been carried out. Therefore this study tries to assess the full cycle of cause, effect and outcome. That is, establishing a relationship between past experience and disposition effect as well as studying the mediating relationship of overconfidence with that of past experience and disposition effect. The study is carried out using judgmental sample and a five point scale questionnaire as part of data collection and the tool used for the study is structural Equation modelling. The findings of the study state that there exists full mediation, implying that though past experience has a direct relationship with that of dispositional behavior but over confidence could increase this effect towards dispositional behavior thereby leading to more irrational decisions. The theoretical implication of this study is that, in the past research studies focused primarily on the direct relationship between the predictor and the dispositional behavior, while a possibility of Mediation was never explored. Therefore the understanding of cause, effect and outcome could lead to better realization towards decision making in

the context of uncertainty as well as improve the returns from investment.

Keywords: *Disposition effect, past experience, overconfidence, mediation, Structural equation model.*

1. Introduction

Uncertainty is a possible constant that we experience in our day to day lives, it is possible that we bet our favorite cricket team to win, or in the case of our investments to have a higher value. However, to assess and communicate the choices that we make, it is essential to quantify the same. So, when we decide to quantify, there essentially comes the idea of rationalizing the principles used for quantification which is to consider subjective as well as objective probabilities.

While we consider objective probability, these are primarily based on factual observations and deductions based on the same so, as to arrive at a factually justifiable probability of an events occurrence. While subjective probabilities depend more on belief, intuition, confidence and so on. Therefore, objective probability-based decision making is more logical as well as rational than that of subjective, since subjective probabilities are not dependent on any factual information about a particular events occurrence and hence irrational without refuting the fact that this could or may not fetch the desired outcome.

The concept of reasoning is based on the principals of conduct, and conduct can be assessed and grouped together as rational or irrational. But an intellectual's difficulty would be to justify these guidelines objectively (Churchman, 1962). Decision making in the context of multiple choices is an operation of analytical processes (De Martino; Kumaran, et.al. 2006). But making a rational choice depends on the underlying emotions and neural machinery that operates in a social environment (Damasio; Grabowski, et.al. 1994).

According to efficient market hypothesis, investors are rational since they would make any decision according to the information available to them. And this rationality in decisions made would create a balance in the market. But how can a decision be made, when there is an informational shortage. A majority of the research literature proves that markets around the globe suffer from informational unavailability and transparency, thereby making the markets inefficient. So, in the context of an inefficient market, how would an investor make decisions?

Over the years this contextual question has been addressed through behavioral finance. It is a psychology-based stream that explains the decision making behavior of an individual investor in the context of uncertainty and the response of the market towards such actions or decisions. Lately, literature has uncovered a behavioral tendency of investors to hold on to a loss-making stock while realizing a profit making one too early. This behavior is referred to as Disposition effect. And this irrational decisional behavior in the context of uncertainty is the key subject of this research paper.

The variables that are identified as factors leading to dispositional behavior for this research are Past experience and Overconfidence. And the remaining section of literature review will address the relationship between Past experience, overconfidence and dispositional behavior.

2. Review of Literature

Psychology literature defines overconfidence under three possible classifications, namely a) over estimation in one's actual performance b) belief in themselves to be better than others c) certainty in the accuracy of one's belief (Moore, & Healy, 2008).

Individuals tend to have inadequate information about themselves and even more with that of others. This creates a regressive estimate about self and highly regressive estimate about others performance. Therefore, when the overall performance is high, individuals tend to underestimate self, while underestimating others even more, thereby considering themselves better than the others. But over estimation, over placement and over precision may not be a manifestation of overconfidence, since empirically as well as conceptually they are different (Moore, & Healy, 2008).

In the context of behavioral finance, Overconfidence could drive an individual to believe extensively on his private information than the once that are publically available. (Daniel, Hirshleifer, and Subrahmanyam (1998, 2005), Gervais and Odean (2001)). As a result an investor would buy when he believes it is undervalued and further reconfirm his belief if it gave a favorable outcome. So when the price decreases, the belief is that individuals in the market have not realized the real value. So it would

be better to hold on to the share. So, this tendency of selectively identifying outcomes to reconfirm existing beliefs is called confirmation bias and this would lead to overconfidence in a certain set of beliefs.

As earlier research confirms, over confidence is a significant factor of bias that has economic consequences, implying that there could be excess market entry (Camerer and Dan Lovallo, 1999), increased market volatility (Daniel, Hirshleifer and Subrahmanyam, 2001), choice towards risky portfolios (Odean 1998) and increase investments (Malmendier and Tate, 2005). Over confident investors can also potentially create greater stock return momentum and this momentum will be strongest in stocks, the valuation of which requires assessing ambiguous information (Daniel., & Titman, 1999).

Further over confidence depends on task difficulty and it is not universal, for example a task of managing people could be viewed as difficult for some and therefore they might rate themselves below average and for others it could be different, implying that after an easy task, individuals tend to exhibit underestimation and over placement and the reverse is true for difficult tasks. (Healy, & Moore, 2007). Therefore, overconfidence is context specific, so the context that produces over placement also produces underestimation (Moore and Kim, 2003). Hence, tasks that people believe to be better, are the same on which they believe to be worse than others (Chou, R. K., & Wang, Y. Y. 2011).

A demonstration of overconfidence is also through an unrealistic positive self- evaluation (Greenwald, 1980). Further it was found that experienced fund managers find economic new information less surprising that the less experienced fund managers (Menkhoff, Schmidt, & Brozynski, 2006). To prove this ideology further Svenson (1981) studied a sample of students on assessing their own driving safety skills. And 82% students categorized themselves to be among the top 30% in that group. A contradiction to the statistics above was a study on professional and lay people, which confirmed that both groups were over confident with a 40% success rate in professional predictions (Torngren., & Montgomery, 2004).

Another factor that influences over confidence is the illusion of knowledge, which implies excessive availability of information. But increased information does not necessarily mean that the individual has greater knowledge of the context that he is faced with, since this would require training, skill and experience to interpret the available information to establish a confirmation of prior beliefs (Baker, & Nofsinger, 2002). Further it was found that online investors tend to trade more while performing low due to the influence of illusion of knowledge, overconfidence and illusion of control

(Baber and Odean 2002). The concept of illusion of control implies that people tend to believe that they are in control of the outcomes in uncontrollable events (Budescu, & Bruderman, 1995). And the key factors such as choice, involvement, competition and familiarity of tasks when introduced into chance or probabilistic situations causes an individual to feel confident (Langer, 1975).

When considering a duopoly market model of informed speculation, over confidence tends to dominate rationality and an overconfident trader may end up generating a higher expected profit and utility than that of the rational counterpart (Kyle, & Wang, 1997). Further Overconfidence varies with gender, wherein men traded excessively than women when it came to areas such as finance (Barber, & Odean, 2001)

While assessing financial markets, there exists mixed results on the impact of experience on overconfidence. So, when we consider overconfidence as an unrealistic positive self-evaluation, it tends to increase with experience, while if over confidence is assessed as overestimation on one's own precision of knowledge then overconfidence decreases with experience (Chou, R. K., & Wang, Y. Y. 2011).

Further literature pertaining to experience observes that overconfidence as a behavioral irregularity tends to disappear or significantly weaken with enough experience, in the related field (Locke and Mann 2001), (Christoffersen and Sarkissian 2002) and this supported further by an increase in risk aversion as well (Menkhoff, Schmidt, & Brozynski, 2006). However, research also shows that experts tend to be more overconfident than that of the inexperienced one's (Heath and Tversky., 1991). To further confirm, a study on professional traders observed higher overconfidence compared to students on assessing trend and forecasting price movements of the stock (Glaser et al. 2007).

Stock market forecasters are overconfident in the sense that, it is persistent while exhibiting a degree of rational learning after failure by widening the confidence interval and narrowing it after success (Deaves, Lüders, & Schröder, 2010). It is also found that analysts who experience short lived successes tend to become overconfident about predicting future earnings (Hilary, & Menzly, 2006). In fact, investors who sold their stock earned 2.6% over the next four months while the stock that replaced them just earned 0.11% (Odean, 1999). This further implies that over confident investors have poor stock selection skills and they tend to be too certain about their opinions which are influenced by their belief on the absolute accuracy of the information as well as their ability to interpret the same. So, therefore they tend to trade more assuming, that they can identify winner stocks.

From the literature review it is clear, that over confidence influences disposition effect and further this over confidence is also dependent to a certain extent on the positive past experiences. And research pertaining to these variables have emphasized on the direct relationships of these individual variables like the over confidence and past experience with that of disposition effect, while not considering all these three variables together. The study conducted tries to understand if there could be a direct relationship between past experience and disposition, while a mediating relationship between overconfidence and disposition.

3. Research Framework

The model ideates on the direct role of past experience and mediating role of overconfidence, in explaining Disposition effect.

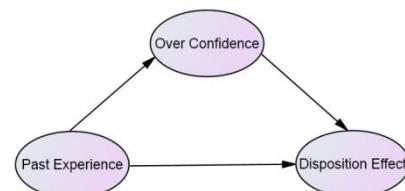


Fig 1: Conceptual Framework

Hypothesis

Based on the conceptual framework the following hypotheses are developed

- H1: Past Experience has significant positive influence on the Disposition Effect of the investors
- H2: Past Experience has significant positive influence on the Over Confidence of the investors
- H3: Over Confidence has significant positive influence on the Disposition Effect of the investors
- H4: Over Confidence has full mediation between Past Experience and the Disposition Effect of the investors

Participants

The study sample of individual investors were from Bengaluru, therefore a total of 405 investor's data was collected. Since the component of rationality appears under circumstances of uncertainty, especially when an investor must make a decision on whether to buy, sell or hold a stock. Therefore, investors who tend to invest in long term investment options such as the mutual fund or any other funds might not suit the requirement of the study. Therefore, a preliminary question was asked on whether they were investors who trade in the stock market. Despite this there were responses from non-investors or investors who invested in the long-term investment options and all such information

collected from non-traders or people who have no background in investing were not part of the study.

Instrument

In the context of this research study a questionnaire was used to measure overconfidence, past experience and disposition effect. The questionnaire consisted of 26 questions including demographics. The questions that were primarily concerned with variables of the study were a total of 18, i.e., six questions each for each variable. The questionnaire responses are measured using a Five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5).

The questionnaire is developed with the intention of capturing Investors decision outcomes. With reference to the questions corresponding the variables, reference was sought out for Overconfidence from a pre-existing scale on optimism (Glaesmer, H., et.al. 2012), while past experience and disposition effect were specifically developed for the study keeping in view with the conceptual understanding of disposition effect. And based on the suggestions from academic and industry experts, the questions for the study were developed.

Cronbach Alpha reliability test score for the internal consistency of the three variables were past experience 0.882, Over-confidence 0.847 and Disposition effect 0.902. The Crobach alpha score arrived at is above the threshold value of 0.7, (Nunnaly 1978) and therefore the questionnaire items are validated. All items of the questionnaire are clearly articulated in table I.

Sampling and Data collection

Sampling method: Data pertaining to the study had to be specifically collected from investors who trade in the stock market, not covering investors who merely trade in mutual funds or other similar types of Investment Avenue. Therefore from the context of this study, judgmental sampling method has been used.

Sample size: A total of 450 investors were contacted, out of which 405 responded to the questionnaire. In the context of gender majority were male and the investors were contacted through stock brokers, as well as personnel contacts.

Table I: Variables and Proposed items for measurement

Dimensions	Proposed items for measurement
Past Experience	<p>I trust my past experience based on which I make future investment choices for my portfolio I've had enough experience to know what kind of investment decisions to take most of the time without trying to figure it out from scratch every time. My approach towards solving confusion in investment choices for future relies heavily on my past experience. My expertise in investment choices for my portfolio is based on my past experience When making a quick investment decision in my area of expertise, I rely heavily on my past experience. I generally don't depend on my past experience to make investment decisions pertaining to my portfolio *</p>
Over Confidence	<p>I do not feel confident in making investment decisions for my portfolio, even when I have the knowledge to do so. * While I make investment choices in my portfolio, I am optimistic about making big returns on them. When I feel uncertain about the future outcome of my investment decisions, I usually expect the best outcomes. I am afraid of making Investment decisions in my portfolio, no matter how good I think my decisions are. * When I make investment decisions for my portfolio, I prefer consulting experts than doing it by myself. * When I make investment decisions in my portfolio, I feel that my skills and knowledge about the stock market helps me to outperform the market</p>
Disposition	<p>I believe that it is good to sell a stock which has made a gain above its purchase price rather than a loss I feel that it is better to realize an actual gain (Gain by sale of share) than a paper gain (Unrealized gain) I feel unsatisfied when I hold on to a loss making stock for a long time in my portfolio of Investments. When I make an unrealized loss (paper loss) on my investment, I consider it unacceptable and refrain from selling the stock at that price. I believe that it is important to at-least recoup the initial investment on each stock than to accept a loss on them. When I hold a stock for too long that has gained value. I feel that I have lost an opportunity on it.</p>

Note: * signifies reverse coded questions

4. Results and Discussion

To establish relationship between latent and observed variable, it is essential to run a Confirmatory factory analysis (Hoyle 2000). This method is also used to evaluate the unidimensionality as well as specific hypothesis (Fabrigar et al. (1999).

Therefore Confirmatory factory analysis is applied using AMOS 21 to check reliability, validity and the model fit indices. One of the primary objective that it serves is to check whether the correlation co-efficient (Loadings) between two items under each dimension is greater than 0.40, this would imply a moderate

correlation value. And if there exists a weak correlation between the items then they have to be discarded from being a criteria for the study. Accordingly PE_2 of Past experience, OC_4, OC_5 of Over confidence and DE_6 of Disposition have been removed. Thus the sample size was reduced to 391 from 405.

Since these criteria's were removed from each of the dimensions, CFA is run again. Modification indices are checked to improve the fitness of the model. Fig 2 depicts the model after taking into consideration the modification indices and covariance is drawn for the error terms to improve the model fit.

Validity tests

Validity tests are performed to ensure whether the purpose of research is achieved. Thus, construct validity tests have to be performed for the same. Construct validity assesses whether the variables that are measured will be able to establish an understanding to the latent variables in the study (Hair et al., 2006). Hence convergent and discriminant validity tests have to be conducted to establish construct validity.

Convergent validity measures the degree to which same constructs are correlated (Hair et al., 2006) and the criteria for evaluation and establishing convergent validity would be if $CR > 0.70$ and $CR > AVE$ (i.e., average variance explained) and AVE values greater than 0.50 are considered satisfactory (Fornell & Larcker, 1981), (Hair et al., 2006). While discriminant validity assesses the degree of difference among two conceptually similar concepts (Hair et al., 2006) and in order to establish discriminant validity the AVE of each construct has to be greater than its shared variance with other constructs. $ASV < AVE$ (Rebelo-Pinto, Pinto, Rebelo-Pinto, & Paiva, 2014) and $MSV < AVE$ (Hair, Black, Babin, and Anderson, 2010).

Especially in social science research, it is essential for a researcher to provide conceptual clarity as well as indicators that covers both its domain and dimension, since usually no consensus exists due to its domain and theoretical ambiguity (Bollen, 1989). Therefore content validity is an essential measure to represent all aspects of a given construct (Lawshe, 1975). Therefore content validity objective has been achieved through the literature review pertaining to Past experience, over confidence and disposition.

Table II describes the construct wise reliability, which was measured using cronbach (1951), which shows that all constructs have a cronbach alpha score that is above the threshold of 0.7,(Nunnally, 1978) Composite reliability and average variance extracted for all constructs is above the threshold of 0.7 and 0.50 as recommended by Hair et al. (1998) (Fornell and Larcker, 1981). Therefore convergent validity has been established.

The findings reveal that most of the constructs are higher than the required reliability. Hence we conclude that all the items grouped completely converge to its respective dimensions.

Table II: showing factor loading and their corresponding reliability scores

Factors	Items	Factor Loading	Mean	Cronbach h's Alpha	Average Variance Extracted (AVE)
Past Experience	P1	0.564	0.782	0.882	0.516
	P3	0.852			
	P4	0.874			
	P5	0.843			
	P6	0.777			
Over Confidence	O C1	0.731	0.774	0.847	0.566
	O C2	0.734			
	O C3	0.832			
	O C6	0.8			
	D E1	0.807			
Disposition Effect	D E2	0.731	0.802	0.902	0.648
	D E3	0.798			
	D E4	0.882			
	D E5	0.791			

Further Table III values show that AVE is greater than MSV and ASV , thereby establishing discriminant validity.

Table III: Showing discriminant validity values

Discriminant validity	AVE	MSV	ASV
Over Confidence	0.566	0.223	0.167
Past Experience	0.516	0.110	0.075
Disposition Effect	0.648	0.223	0.131

After establishing both convergent and discriminant validity, it was essential to assess fitness of measurement model. It was found that except for two, that is GFI (Goodness of Fit Index) ranged at 0.862 and NFI (Normed Fit Index), ranged at 0.872. While all measurement indices with reference to the model constructs had a value above the accepted value as prescribed in the table, which yielded a good model fit. Table IV depicts the model fit indices.

Table IV: Goodness-of-fit & Incremental Indices of CFA model

Fit Indices	Accepted Value	Model Value
Fit Indices		
Absolute Fit Measures		
χ^2 (Chi-square)	89.184	
df (Degrees of Freedom)		73
Chi-square/df (χ^2/df)	<5	1.222
GFI (Goodness of Fit Index)	> 0.9	0.862
RMSEA (Root Mean Square Error of Approximation)		
Incremental Fit Measures		
AGFI (Adjusted Goodness of Fit Index)	> 0.80	0.802
NFI (Normed Fit Index)	> 0.90	0.872
CFI (Comparative Fit Index)	> 0.90	0.973
IFI (Incremental Fit Index)	> 0.90	0.974
RFI (Relative Fit Index)		
Parsimony Fit Measures		
PCFI (Parsimony Comparative of Fit Index)	> 0.50	0.781

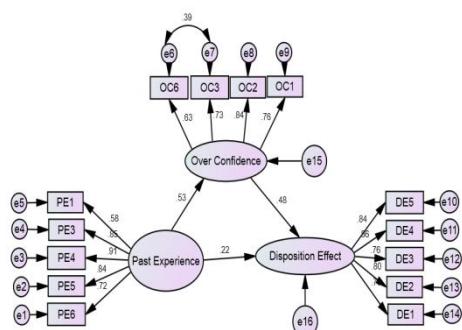


Figure 2: Showing the mediation effect of over confidence on the relationship between past experience and Disposition effect.

Mediation effect of Over Confidence

In order to establish mediation effect of over confidence on the relationship between past experience and disposition effect, it is essential that it satisfies three conditions as specified by Baron and Kenny (1986). "First, there must exist a significant relationship between independent and dependent variable. Second, a significant relationship between independent and mediator variable and third a concurrent relationship between independent,

mediator and dependent variable". To achieve full mediation, it is essential that the relationship between Independent and dependent ceases to be significant, while the relationship between the dependent and mediator becomes significant. whereas, if the relationship between independent and dependent variable decreases but still remains significant, then a partial mediation is obtained. Further results of the mediation effect is displayed in figure 2.

The first condition for a significant relationship between past experience and Disposition effect was established with a $b=0.22$, $p<0.099$ proving H1. The second condition for a significant relationship between past experience and over confidence was met with a $b=0.53$, $p<0.01$ proving H2. The third condition for a significant relationship between the over confidence and Disposition effect was met with a $b=0.48$, $p<0.01$ proving H3. Finally for a full mediation between over confidence with that of past experience and disposition effect, it is essential that the mediation effect is significant. The indirect effect is 0.2544 (0.53×0.48), the direct effect is 0.22. Both paths from past experience to disposition effect and overconfidence to disposition effect is significant. But the direct path between past experience and disposition effect is insignificant with p value 0.099, whereas the indirect path is significant. Also, the indirect effect is greater than the direct effect. Therefore, there is full mediation of over-confidence between past experience and disposition effect.

5. Discussions

With reference to the literature, that is available on disposition effect, it is found that most research works focused on establishing a relationship between predictors and the dependent variable that is disposition effect. Though this is not wrong, but the underlying relationship of what causes the predictors was not studied. So therefore this research study focused on understanding the entire cycle of what causes, what is the outcome and its effect on the dependent variable. So, what is being implied here is that, there have been studies that tried to establish direct relationship between overconfidence and disposition effect, but over-confidence needs a precedent, which is the past experience of that particular individual. To be specific, it is the positive past experiences that create over confidence. So Therefore there is a possibility of a mediation effect that exists between past experience, overconfidence and dispositional behavior.

6. Conclusion

The assessment of relationship between past experience, overconfidence and disposition effect was done using structural equation model and the

results state that there exists a direct relationship between past experience and disposition effect, there is a relationship between overconfidence and disposition effect, and there is also a relationship between past experience and over confidence, all of which is further in concurrence with that of the existing literature. Literature defines overconfidence as a behavioral irregularity that tends to disappear or significantly weaken with enough experience, in the related field (Locke and Mann 2001), (Christoffersen and Sarkissian 2002) implying that as the over confidence leads to negative outcomes, the investor would realize his mistake and therefore try not to repeat the same. Therefore establishing the relationship between past experience and over confidence. The last hypothesis is an attempt to understand whether over confidence becomes a mediator rather than a direct predictor of dispositional behavior, for which the study establishes that there exists a full mediation between these variables. Hence with an increase in positive past experiences, it would lead to over confidence and as over confidence increases, it would lead to more irrationality in the form of disposition effect.

Reference

- [1] Baker, H. K., & Nofsinger, J. R. (2002). Psychological biases of investors. *Financial services review*, 11(2), 97.
- [2] Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The quarterly journal of economics*, 116(1), 261-292.
- [3] Barber, B. M., & Odean, T. (2002). Online investors: do the slow die first?. *The Review of Financial Studies*, 15(2), 455-488.
- [4] Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173.
- [5] Bollen, K. A. (1989). A new incremental fit index for general structural equation models. *Sociological Methods & Research*, 17(3), 303-316.
- [6] Budescu, D. V., & Bruderman, M. (1995). The relationship between the illusion of control and the desirability bias. *Journal of Behavioral Decision Making*, 8(2), 109-125.
- [7] Camerer, C., & Lovallo, D. (1999). Overconfidence and excess entry: An experimental approach. *American economic review*, 89(1), 306-318.
- [8] Chou, R. K., & Wang, Y. Y. (2011). A test of the different implications of the overconfidence and disposition hypotheses. *Journal of Banking & finance*, 35(8), 2037-2046.
- [9] Chou, R. K., & Wang, Y. Y. (2011). A test of the different implications of the overconfidence and disposition hypotheses. *Journal of Banking & finance*, 35(8), 2037-2046.
- [10] Christoffersen, S., & Sarkissian, S. (2002). Location overconfidence. McGill University.
- [11] Churchman, C. W. (1962). On rational decision making. *Management Science*, (2), 71-76.
- [12] Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *psychometrika*, 16(3), 297-334.
- [13] Damasio, H., Grabowski, T., Frank, R., Galaburda, A. M., & Damasio, A. R. (1994). The return of Phineas Gage: clues about the brain from the skull of a famous patient. *Science*, 264(5162), 1102-1105.
- [14] Daniel, K. D., Hirshleifer, D., & Subrahmanyam, A. (2001). Overconfidence, arbitrage, and equilibrium asset pricing. *The Journal of Finance*, 56(3), 921-965.
- [15] Daniel, K., & Titman, S. (1999). Market efficiency in an irrational world. *Financial Analysts Journal*, 55(6), 28-40.
- [16] Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor overconfidence, covariance risk, and predictors of securities returns. *Journal of Finance*, 53, 1839-1886.
- [17] Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (2005). Investor psychology and tests of factor pricing models.
- [18] De Martino, B., Kumaran, D., Seymour, B., & Dolan, R. J. (2006). Frames, biases, and rational decision-making in the human brain. *Science*, 313(5787), 684-687
- [19] Deaves, R., Lüders, E., & Schröder, M. (2010). The dynamics of overconfidence: Evidence from stock market forecasters. *Journal of Economic Behavior & Organization*, 75(3), 402-412.
- [20] Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological methods*, 4(3), 272.
- [21] Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of marketing research*, 382-388.
- [22] Gervais, S., & Odean, T. (2001). Learning to be overconfident. *The Review of financial studies*, 14(1), 1-27.
- [23] Glaesmer, H., Rief, W., Martin, A., Mewes, R., Brähler, E., Zenger, M., & Hinz, A. (2012). Psychometric properties and population - based norms of the Life Orientation Test Revised (LOT - R). *British journal of health psychology*, 17(2), 432-445.
- [24] Glaser, M., Langer, T., & Weber, M. (2007). On the trend recognition and forecasting ability of professional traders. *Decision Analysis*, 4(4), 176-193.
- [25] Greenwald, A.G. (1980).The Totalitarian Ego. *American Psychologist*, 603
- [26] Hair Jr JF, Black WC, Babin BJ, Anderson R, Tatham R. Multivariate data analysis. 6th ed. Upper Saddle River: Prentice Hall; 2006.
- [27] Hair, J., Black, W., Babin, B., and Anderson, R. (2010). Multivariate data analysis (7th ed.): Prentice-Hall, Inc. Upper Saddle River, NJ, USA.
- [28] Healy, P., & Moore, D. (2007). Bayesian overconfidence.
- [29] Heath, C., & Tversky, A. (1991). Preference and belief: Ambiguity and competence in choice under uncertainty. *Journal of risk and uncertainty*, 4(1), 5-28.
- [30] Hilary, G., & Menzly, L. (2006). Does past success lead analysts to become overconfident?. *Management science*, 52(4), 489-500.

- [31] Hoyle, R. H. (2000). Confirmatory factor analysis. In Handbook of applied multivariate statistics and mathematical modeling (pp. 465-497).
- [32] Kyle, A. S., & Wang, F. A. (1997). Speculation duopoly with agreement to disagree: Can overconfidence survive the market test?. *The Journal of Finance*, 52(5), 2073-2090.
- [33] Langer, E. J. (1975). The illusion of control. *Journal of personality and social psychology*, 32(2), 311.
- [34] Lawshe, C. H. (1975). A quantitative approach to content validity 1. *Personnel psychology*, 28(4), 563-575.
- [35] Locke, P. R., & Mann, S. C. (2001, December). House money and overconfidence on the trading floor. In AFA 2002 Atlanta Meetings.
- [36] Malmendier, U., & Tate, G. (2005). Does overconfidence affect corporate investment? CEO overconfidence measures revisited. *European Financial Management*, 11(5), 649-659.
- [37] Menkhoff, L., Schmidt, U., & Brozynski, T. (2006). The impact of experience on risk taking, overconfidence, and herding of fund managers: Complementary survey evidence. *European Economic Review*, 50(7), 1753-1766.
- [38] Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological review*, 115(2), 502.
- [39] Moore, D. A., & Kim, T. G. (2003). Myopic social prediction and the solo comparison effect. *Journal of personality and social psychology*, 85(6), 1121.
- [40] Nunnally, J.C. (1978), *Psychometric Theory*, 2nd ed., McGraw-Hill, New York, NY.
- [41] Odean, T. (1998). Are investors reluctant to realize their losses?. *The Journal of finance*, 53(5), 1775-1798.
- [42] Odean, T. (1999). Do investors trade too much?. *American economic review*, 89(5), 1279-1298.
- [43] Rebelo-Pinto, T., Pinto, J. C., Rebelo-Pinto, H., & Paiva, T. (2014). Validation of a three-dimensional model about sleep: Habits, personal factors and environmental factors. *Sleep Science*, 7(4), 197-202.
- [44] Svenson, O. (1981). Are we all less risky and more skillful than our fellow drivers?. *Acta psychologica*, 47(2), 143-148.
- Torngren, G., & Montgomery, H. (2004). Worse than chance? Performance and confidence among professionals and laypeople in the stock market. *The Journal of Behavioral Finance*, 5(3), 148-153.