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The Effect of Self-attribution Bias on Investor's behavior: Mediating Role of Overconfidence Bias in the Capital Market of Iran

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Abstract

The rationality of individual investors in the financial markets has been challenged in the last few decades, and a paradigm shift can be witnessed among the investors who are influenced by both rational as well as psychological biases such as self-attribution and overconfidence. The purpose of this study is to investigate the effect of self-attribution bias on investor's behavior with mediating role of overconfidence bias. This research method is a descriptive survey. This study was conducted in investors of Tehran Stock Exchange. The sample comprises Investors, which were selected randomly. Data have been collected by the Mahina et al's (2018) self-attribution bias questionnaire, the ul Abdin et al's (2022) overconfidence questionnaire and the Parmitasari et al's (2018) investor's behavior questionnaire. The validity of the research questionnaires was assessed based on construct validity, diagnostic and convergent validity and its reliability was measured by Cronbach's alpha coefficient. The research model was tested with using Smart PLS software. The results showed that self-attribution bias has effect on overconfidence and investor's behavior. The effect of overconfidence on investor's behavior is significant. Overconfidence mediates the relationship between self-attribution bias and investor's behavior**.**

Keywords: Self-attribution bias, Overconfidence bias, Investor's behavior, Capital Market, Tehran Stock Exchange

1. Introduction

The paradigm shift among the investors in rational decision-making to psychological biases can be described by two prime factors: the fresh evidence depicting the impact of psychological bias on the economic actors' behavior and the deficiencies of the rational investment models in explaining the stock market trading volumes and returns (Daniel & Hirshleifer, 2015). Therefore, the emergence of behavioral finance literature and its dominance can be discerned. Behavioral finance can be used to explain the psychological principles of investment decision-making (Kapoor & Prosad, 2017), and the implications of psychology for financial markets (Paule-Vianez et al., 2020) can clarify the puzzles that prevail in a standard conventional paradigm where mismatches between the optimal choices exist. This aspect can be used to explain the actual choice of investment. In this paper, the effect of self-attribution bias on investor's behavior and the mediating role of overconfidence bias, is studied. Nowadays, many studies on investment behavior have been conducted using

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various approaches. In stock markets, investors may decide whether to buy or not to buy a certain stock because they are or are not interested in the name of its company - an instinctive but inefficient decision (Lucey and Dowling 2005). Consequently, investors' decision-making is not always based on rational factors but also influenced by the psychological ones (Murgea 2008, Sehgal and Singh 2012). Investor market behavior derives from psychological principles of decision makinlg to explain why people buy or sell stocks. These factors will focus upon how investors interpret and act on information to make investment decisions. Behavioral finance is defined by Shefrin, (1999) as "a rapidly growing area that deals with the influence of psychology on the behavior of financial practitioners". Individual investments behavior is concerned with choices about purchases of small amounts of securities for his or her own account (Nofsinger and Richard, 2002). Overconfidence bias relates to the unfounded valuations of stocks and believing in those confidently. Odean (1998) argued that overconfident investors can cause the market to underreact the information of rational investors. Investors believe that in the presence of anomalies, they can make an excess return (Entrop, McKenzie, Wilkens, & Winkler, 2016) using their cognitive behavior (Tekçe, Yılmaz, & Bildik, 2016). Daniel and Hirshleifer (2015) reported that overconfidence bias is a widespread and tragic bias in all cognitive biases. Overconfidence bias is one of the most examined biases with respect to presence (Kumar & Goyal, 2016; Tekçe et al., 2016), origination (Merkle, 2017), and outcomes (Sahi, 2017). The overconfident investors are more engaged in trading (Daniel & Hirshleifer, 2015) than any other investor to get higher returns (Barber & Odean, 2001). Nevertheless, findings show that overconfident investors most often fail to get a higher return from their investments (Baker & Ricciardi, 2014). Overconfident investors with neutral risk may make a higher expected return than rational ones (Benos, 1998). Overconfident investors may not only make a positive return from their rational opponent also higher return if they were also rational (Kyle & Wang, 1997). Daniel and Hirshleifer (2015) reported that overconfidence bias is a widespread and tragic bias in all cognitive biases. Overconfidence bias is one of the most examined biases with respect to presence (Kumar & Goyal, 2016; Tekçe et al., 2016), origination (Merkle, 2017), and outcomes (Sahi, 2017). The overconfident investors are more engaged in trading (Daniel & Hirshleifer, 2015) than any other investor to get higher returns (Barber & Odean, 2001). Nevertheless, findings show that overconfident investors most often fail to get a higher return from their investments (Baker & Ricciardi, 2014). Overconfident investors with neutral risk may make a higher expected return than rational ones (Benos, 1998). Overconfident investors may not only make a positive return from their rational opponent also higher return if they were also rational (Kyle & Wang, 1997). Overconfidence bias is not a unitary facet, but a series of overlapping ones (Hilton, Regner, Cabantous, Charalambides, & Vautier, 2011). Overconfidence bias can be described in three mainstreams (Akhtar & Das, 2020). These are miscalibration, better than average effect, and illusion of control. In addition, overconfidence bias can be described in the other three streams such as over placement, overprecision, and overestimation (Daniel & Hirshleifer, 2015). Previous studies (Williams & Gilovich, 2008; Kansal & Singh, 2018) on overconfidence bias mainly focused on the determinants of overconfidence bias. For instance, Kansal and Singh (2018) ascertained the four determinants of overconfidence bias: "better than average effect," "planning fallacy," "self-attribution," and "positive illusion." Williams and Gilovich (2008) examined the other determinants of overconfidence bias: availability, optimism, egocentric tendencies, or hindsight bias. However, very few studies so far have investigated the determinants of overconfidence bias. Moreover, limited research is conducted to identify the determinants of overconfidence bias in the perspective of individual investors. Therefore, the current research seeks to answer this question: Do have Overconfidence Bias a mediating role in the effect of the effect of self-attribution bias on Investor's behavior?

2. Literature Review

2-1. Investor's behavior

Investment behaviors are defined as how the investors judge, predict, analyze and review the procedures for decision making, which includes investment psychology, information gathering, defining and understanding, research and analysis. The whole process is "Investment Behavior" (Alfredo and Vicente, 2010). In this paper this definition is adopted. Investment behavior in the capital market as part of financial behavior is an individual way to develop the financial level in realizing the desired financial satisfaction. Each individual has a different level of financial satisfaction in accordance with the financial situation you want by looking at the needs and

financial desires of an individual. Individuals will make certain financial decisions that encourage the implementation of certain financial behaviors including investment decisions and behavior in the stock market. This assertion was also put forward by Woody Dorsey (2003) by saying that human behavior is key in the capital market (Parmitasari et al., 2018). In this study, investment behavior has been measured with the following three indicators:

Minimum risk policy: Risk minimization comprise formatting Investment portfolio in such a way that to minimize due to certain restrictions (Sharpe, 1991). Empirical risk minimization (ERM) is a principle in statistical learning theory which defines a family of learning algorithms and is used to give theoretical bounds on the performance of learning algorithms.

Maximum return policy: Expected stock returns studies the movements of asset prices based on investors behavior. The influence of mass psychology (Kumar & Lee, 2006), information uncertainty and transaction costs (Jiang et al., 2005) stand out in this line as motivators of the existence of anomalies in markets. These studies argue thatinvestor sentiment enables to predict asset prices, especially on stocks with small capitalization, low institutional property, low prices, high arbitrage costs, high bookto-market ratio and high idiosyncratic volatility (Fang & Peress, 2009).

Understanding of performance: Investment performance is the prime drive for investors to invest in stocks. According to previous findings, most investors get a reasonable return on their wealth invested in common stock (Campbell et al., 2019; Dai & Zhu, 2020). However, some individual investors consistently confront poor performance because of a lack of theoretical understanding of the stock market as well as the presence of behavioral biases (Chhapra et al., 2018). Investment performance signifies the attainment of the expected financial level and being satisfied with that desired level (Parmitasari et al., 2018).

2-2. Cognitive bias theories

Since Kahneman and Tversky pioneered the study of biases in cognitive processes [Table 1], the topic has been of great interest to psychologists and, more recently, behavioral ecologists. Table 1 supplies various definitions of the term ‘cognitive bias’. The common theme is of a bias (or distortion) to a cognitive process or mental representation. A cognitive bias could result in optimal behavior (i.e., behavior that maximizes expected payoff, often measured simply in terms of surviving offspring). (Trimmer, 2016). An influential paper by (Haselton et al.) identifies three classes of explanation for cognitive biases, which they term Heuristic, Error Management and Artefact biases (Haselton MG & et al,2005). They describe heuristic biases as being due to information processing constraints (possibly due to phy- logeny), resulting in mechanisms being used which fail to produce rational behavior in systematic ways. Error management biases are produced by natural selection taking account not only of the probabilities of errors when taking particular actions, but the expected payoffs associated with those actions. Artefact biases are due to individuals being tested in non-natural settings, leading to non-ratio- nal processing of a problem (Haselton MG & et al, 2015). The second of these, Error Management Biases, has received substantial attention. The mathematical basis of Error Management is signal detection theory (Green DM & et al, 1966), which shows how signal distributions can be combined with payoffs to set optimal thresholds for behavior. Unfortunately, in signal detection theory the optimal threshold setting referred to as the ‘bias’. This label refers to the setting in terms of the probabilities, rather than payoffs (or utilities). This kind of signal detection ‘bias’ produces optimal behavior, so it is not correct to infer a sub-optimal cognitive bias. This semantic confusion is exacerbated by it being easy to think in terms of local goals or probabilities, rather than overall utilities. For instance, Haselton et al. (2016) identify overconfidence in one's own abilities as a cognitive bias, which can be explained simply by signal detection theory, as they recognize. Although an interesting topic, and one that falls under a wide definition of cognitive bias (Takeshita F, et al,2016). In this study, among cognitive biases, self-attributions and overconfidence have been examined. In Table 1. different meanings of the term "cognitive bias" are presented.

Table 1. different meanings of the "cognitive bias"

Author	Definition	Semantics/issues
Haselton & et al. (2015)	Cases in which human cognition reliably produces representations that are systematically distorted compared to some aspect of objective reality	Any behavior that is not reward-maximizing could indicate a cognitive bias, even in non-natural lab settings. Thus, removing the term 'human' from the definition to study other animals, we find that an animal responding optimally (relative to its natural setting) may be regarded as cognitively biased.
Marshall & et al, (2013)	An inaccurate view of the world	Any behavior that is not reward-maximizing could indicate a cognitive bias, even in non-natural lab settings
Wikipedia (2016)	A systematic pattern of deviation from norm or rationality in judgement, whereby inferences about other people and situations may be drawn in an illogical fashion	Although this definition does not specify what 'rational' means, adaptive behavior may not be regarded as cognitively biased
Mendl M, & et al (2009)	Effects of emotional state or trait on cognitive processes	Any behavior can be inferred to show a cognitive bias if emotions are deemed to be a part of the decision-making process.
McKay R & et al (2010)	Interesting cognitive biases obtain when beliefs depart systematically from those of an agent with Bayesian beliefs	The authors point out that just about any decision-maker does not assign equal probability to every possibility — and that to do so would be a mistake.

Source: (Trimmer, 2016)

2-3. Self-attribution bias theories

Self-attribution bias is a long-standing concept in psychology research and refers to individuals' tendency to attribute successes to personal skills and failures to factors beyond their control. Recently, this bias is also being studied in household finance research and is considered to underlie and reinforce investor overconfidence. To date, however, the existence of self-attribution bias amongst individual investors is not directly empirically tested. That is, it remains unclear whether good (vs. bad) returns indeed make investors believe more (vs. less) strongly that skills drive their performance (Hoffmann and Post, 2014). self-attribution bias, i.e., the motivated tendency to attribute positive outcomes to oneself while negative outcomes are externalized (van Elk, 2017). Self-attribution is a cognitive and mental process bias in an individual personality. It explains the tendency of investors that give the credit of success to themselves and inversely blame others and external factors for their failure (Czaja & Roder, ¨ 2020). Individuals tend to give credit for their success to their skills such as natural talent, capabilities, and thinking abilities while condemning failure to uncontrollable factors such as luck. Self-attribution is gaining attention in the field of behavioral finance that can make individuals overconfident. The literature supports that successful individuals are sometimes overconfident in their decision-making; however, they may suffer unexpected loss and gain from their investment. If the investors succeed from their investment, it leads them to take more risks. Dawson (2020) argued that risk creation is motivated by the self-attribution bias of individuals. For instance, the investor who is a victim of self-attribution bias believes that he is always performing well in the market and willing to invest in the stock. Trehan and Sinha (2017) also delineated that self attribution bias is the major determinant of investors' risk trading behavior. Similarly, Koo and Yang (2018) stated that overconfidence bias is intensified by self-attribution bias. Therefore, the victim of self attributed investors is a risk-taker and willing to invest in the stock. Chou, Li, Yin, and Zhao (2021) showed that the self-attribution bias addresses the well-known phenomena of earning announcement anomaly in the stock market. Individual investors have unwarned belief in their attribution and ignore the error to be committed and take the higher risk in the market. Thus, the individual investors who are victims of biases are risk-takers. Risk propensity is the tendency of an individual toward risk-taking for the current period (Combrink & Lew, 2020). Risk-taker investors usually underperform in the market (Otuteye & Siddiquee, 2020). Unfortunately, a nonprofessional individual underperforms in the market because of his overconfidence bias related to self-

attribution bias (Trehan & Sinha, 2017; Czaja & Roder, ¨ 2020). Conversely, Hoffmann and Post (2014) argued that investors who get higher returns are associated with the self-attribution bias.

2-4. Overconfidence bias theories

The overconfidence bias is a firmly established feature of individual behavior in psychological research. In economics, it is put forth extensively to explain inefficient market outcomes connected to a biased sense of self-confidence. Recent studies on overconfidence cover, among others, the role of investor experience (Menkhoff et al., 2013). The majority of economic studies invoking the dismal effects of overconfidence either build on overconfidence as a stylized fact or reproduce the psychological experiments with no incentivized individual tasks and self-assessments. However, there is substantiated criticism concerning the applications of overconfidence within economics as being too far-reaching. (Proeger, T & et al. 2014). Overconfidence bias relates to the unfounded valuations of stocks and believing in those confidently. Odean (1998) argued that overconfident investors can cause the market to underreact the information of rational investors. Investors believe that in the presence of anomalies, they can make an excess return (Entrop et al., 2016) using their cognitive behavior (Tekçe et al., 2016). Daniel and Hirshleifer (2015) reported that overconfidence bias is a widespread and tragic bias in all cognitive biases. We measure overconfidence in two different ways: overestimation (or optimism) when subjects assess their ability, achievements, level of control, or probability of success to be higher than they actually are (Moore and Healy (2008)) and better-than-average (or over placement) when subjects believe that they are better than others. 2 Both overestimation and over placement refer to an inclination to overestimate performance (e.g. the number of correct answers a person gives in a quiz or future market index returns) either in comparison with the actual performance or in comparison with the performance of others. After we measure the participants' ability and overconfidence in the financial decision-making domain, they make investment choices in a set of different investment projects, where their personal income depends on their financial knowledge and investment level as well as risk. We run our experiment with students who pursue majors in business and economics as well as with financial professionals (comprising financial managers, financial consultants, and bankers) who have a degree in financial economics as well as experience in the financial domain. We find that our participants' confidence in their financial knowledge is higher than their actual knowledge and that most participants also believe that they are better than average. While professional managers actually have higher financial knowledge/skill than students in business and economics, a majority of these financial managers is still overconfident. We find that overconfidence and under confidence are associated with investment choices that are not value-maximizing: the participants in the highest overconfidence quartile choose inappropriately high investment levels and, likewise, the under confident individuals choose inappropriately low investments. In our experiment, only moderately overconfident subjects are well calibrated in that they tend to choose accurate investment levels. (Pikulina, E, et al, 2017).

2-5. Previous researches

ul Abdin et al's (2022) study examines the determinants of overconfidence bias that, in turn, influence investment performance via risk propensity. This study also investigates the three cognitive biases that lead to overconfidence bias, influence investment performance, and establish the indirect relationship through risk propensity. The mixed methodology is applied to examine the proposed research model. The results depict that all the cognitive biases influence the risk propensity and investment performance via risk propensity. The illusion of control is the strongest predictor of risk propensity and investment performance. Furthermore, findings imply that all the cognitive biases have a positive relation with investment performance. This study provides policy implications to practitioners and individual investors. Chou et al. (2021) indicated that investors lead to poor returns because of self-attribution. Unfortunately, a nonprofessional individual underperforms in the market because of his overconfidence bias related to self-attribution bias (Trehan & Sinha, 2017). Cava & Röder (2020) investigate consequences of the self-attribution bias for nonprofessional traders. By applying a textual analysis of more than 44,000 public comments on a large social trading platform, they contribute to empirical literature on investment and trading behavior in three ways: First, they show that one component of the self-attribution bias, the self-enhancement bias, leads to subsequent underperformance. Second, results support the

theory that traders become overconfident due to biased self-enhancement. Third, they find that traders' social trading portfolios attract higher investment flows from investors when showing self-enhancement biased behavior. The Mahina et al's (2018) used cross-sectional descriptive survey research design to ascertain and establish the effect of behavioral biases on investment in the Rwanda stock exchange. The target population comprised of 13,543 individuals, group investors at the Rwanda Stock Exchange. Random sampling was used where the targeted population was individual investors to finally yield a sample size of 374 respondents. The results confirmed that there was a significant positive linear relationship between selfattribution biasand Investment in Rwanda stock market. The study also concluded that most investors suffered from self-attribution bias in investment in stock markets. The study recommends that investors should be keen to identify such bias to increase their rationality in stock trading. Conversely, Hoffmann and Post (2014) with using a unique combination of survey data and matching trading records of a sample of clients from a large discount brokerage firm, find that (1) the higher the returns in a previous period are, the more investors agree with a statement claiming that their recent performance accurately reflects their investment skills (and vice versa); and (2) while individual returns relate to more agreement, market returns have no such effect. Furthermore, the results of the study by Muthumeenakshi (2017) have shown that risk-taker investors get a reasonable return on their investment. Hence, the risk-taker individual believes in getting a higher return on their stock. The overconfident investors are more engaged in trading than any other investor to get higher returns (Daniel & Hirshleifer, 2015). Nevertheless, findings of Baker & Ricciardi (2014) study show that overconfident investors most often fail to get a higher return from their investments. There are inconclusive results on self-attribution. Thus, there is a need to fill the gap to assess investment performance with respect to risk-return and satisfaction (Parmitasari et al., 2018) while previous studies consider risk and return as a component of investment performance. Investment performance is the measure of return, risk, and level of satisfaction toward investment decisions. There is a need to investigate the investment performance with respect to satisfaction as well as risk and return. Self-attribution bias causes an investor to become more overconfident as his past better performance is confirmed. This, in turn, makes the investors take a high risk in the decision-making and affect their investment performance, and makes them active participants in the market. After the attainment of multiple successes from the investments, the investors become more confident that ultimately can affect their risk-taking behavior and investment decision.

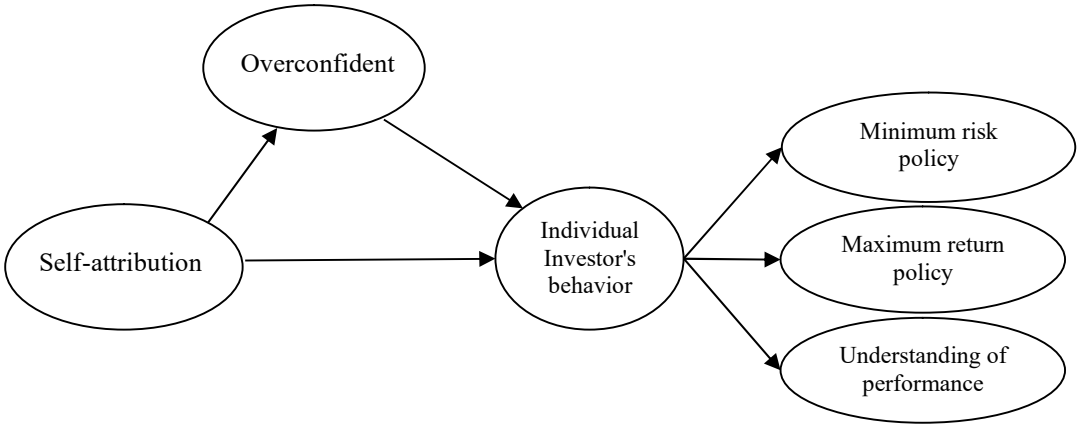

Figure 1. Research Model

Hypotheses:

H_1: self-attribution bias has effect on investor's behavior.
H_2: self-attribution bias has effect on overconfidence bias.
H_3: overconfidence bias has effect on investor's behavior.
H_4: overconfidence bias mediates the relationship between self-attribution bias and investor's behavior.

3. Methodology

Objectives of this research are found out the effect of self-attribution and overconfidence on investor's behavior in Tehran Stock Exchange. The current research has a descriptive-correlative method. 170 Investors of Tehran Stock Exchange were selected randomly as the subjects of the study. In this research, the Mahina et al's (2018) self-attribution bias questionnaire, the ul Abdin et al's (2022) overconfidence bias questionnaire and the Parmitasari et al's (2018) investor's behavior questionnaire was used as a data collection tool. In order to analyze the data, partial least squares method with using SmartPLS software was used to test the research model. In this study, factor analysis technique has been used for construct validity, diagnostic validity and convergent validity to check the validity of the questionnaire. Cronbach's alpha coefficient technique was also used for reliability of the questionnaires.

4. Findings

4.1. Structural, Diagnostic and Convergent Validity and Reliability

Before testing the conceptual model of research, it is first necessary to ensure the validity and reliability of the questionnaire. The construct validity has been tested by confirmatory factor analysis. Table 2 shows the results of this method, including factor loadings.

Table 2. Structural validity results (confirmatory factor analysis)

Latent variable		Observed variable	Factor loadings	t-statistics	Significance level
self-attribution		Q_1	0.777	31.33	0.000
		Q_2	0.801	42.30	0.000
		Q_3	0.696	21.32	0.000
		Q_4	0.684	21.27	0.000
		Q_5	0.791	35.68	0.000
		Q_6	0.698	17.63	0.000
		Q_7	0.840	41.08	0.000
		Q_8	0.824	46.85	0.000
		Q_9	0.756	27.22	0.000
overconfidence		Q_{10}	0.886	84.07	0.000
		Q_{11}	0.673	19.31	0.000
		Q_{12}	0.893	83.25	0.000
		Q_{13}	0.874	76.00	0.000
		Q_{14}	0.829	45.75	0.000
		Q_{15}	0.760	33.18	0.000
		Q_{16}	0.747	30.44	0.000
		Q_{17}	0.555	11.80	0.000
		Q_{18}	0.801	42.91	0.000
		Q_{19}	0.617	14.08	0.000
investor's behavior	Minimum risk policy	Q_{20}	0.869	53.73	0.000
		Q_{21}	0.871	67.29	0.000
		Q_{22}	0.886	74.68	0.000
		Q_{23}	0.761	27.08	0.000
	Maximum return policy	Q_{24}	0.859	56.85	0.000
		Q_{25}	0.887	56.56	0.000
		Q_{26}	0.898	93.56	0.000
		Q_{27}	0.814	32.91	0.000
	Understanding of performance	Q_{28}	0.867	53.06	0.000
		Q_{29}	0.848	54.50	0.000
		Q_{30}	0.880	75.36	0.000
		Q_{31}	0.905	95.14	0.000
		Q_{32}	0.897	81.33	0.000

The results in Table 2 show that for all items, the values of factor loadings are greater than the standard level of 0.5. Therefore, according to the reported values, it can be claimed that the questions in the questionnaire are of construct validity. In addition to construct validity, diagnostic validity, convergent validity and reliability are also addressed in Table 3

Table 3. Structural, diagnostic and convergent validity and reliability

Variable (Structure)	mean of the extracted variance (AVE)	Composite Reliability (CR)	Cronbach's Alpha Coefficient
self-attribution	0.585	0.927	0.910
overconfidence	0.595	0.935	0.921
minimum risk policy	0.719	0.911	0.869
maximum return policy	0.748	0.922	0.888
understanding of performance	0.774	0.945	0.927

Diagnostic validity will be established if the mean of the extracted variance is greater than the critical value of 0.5. The Dillon-Goldstein coefficient is used to evaluate the composite reliability of each construct. In the structural equation modeling methodology, the composite reliability coefficient higher than 0.7 for each structure indicates appropriate reliability (Seyed Abbaszadeh et al., 2012). Values of this coefficient that are more than 0.7 are given in Table 4. Therefore, the structures have good composite reliability. In this study, Cronbach's alpha coefficient was used to determine the internal consistency (reliability) of the research concepts, whose coefficients were generally higher than 0.7, indicating a high degree of internal consistency.

In order to measure divergent validity, the HTMT index (single-double validity) was used. The results of divergent validity are reported in Table 4.

Table 4. Divergent validity (HTMT index)

Variable	1	2	3	4	5
1. self-attribution	-				
2. overconfidence	0.622	-			
3. minimum risk policy	0.615	0.629	-		
4. maximum return policy	0.728	0.732	0.713	-	
5. understanding of performance	0.72	0.743	0.724	0.719	-

As can be seen in Table 4, the values related to the HTMT criterion are less than 0.9 and are acceptable.

4.2. Research Model Testing

Figures 2 and 3 illustrate the research model with the latent and observed variables in the form of reflective measurement models with path coefficients between the variables as well as the values of the coefficient of determination and t-student statistic

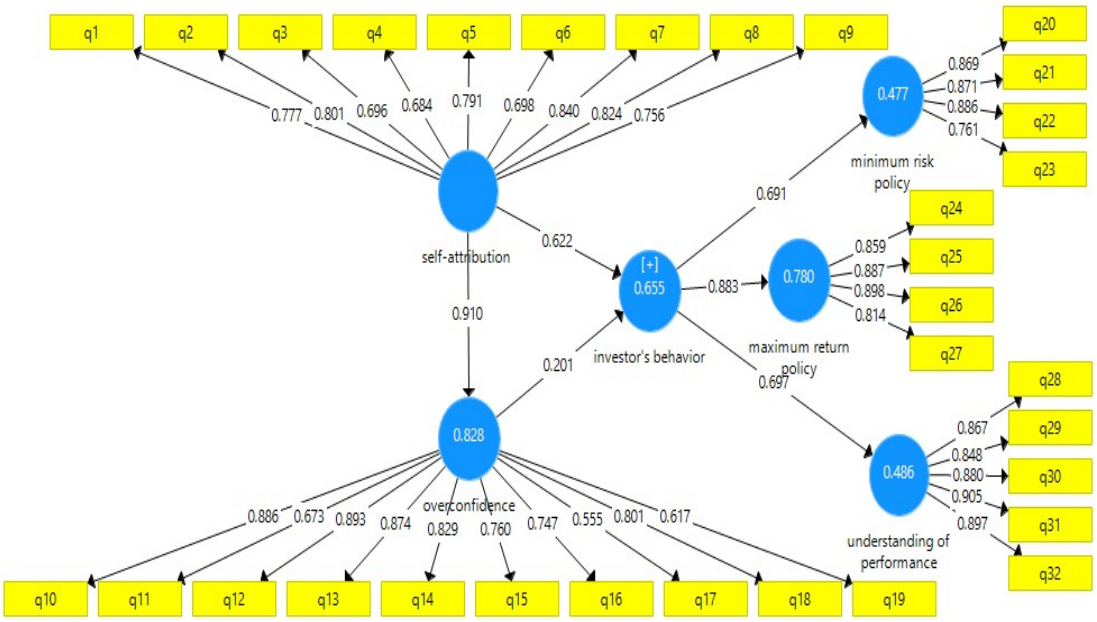

Figure 2. Path coefficients and values of the coefficient of determination

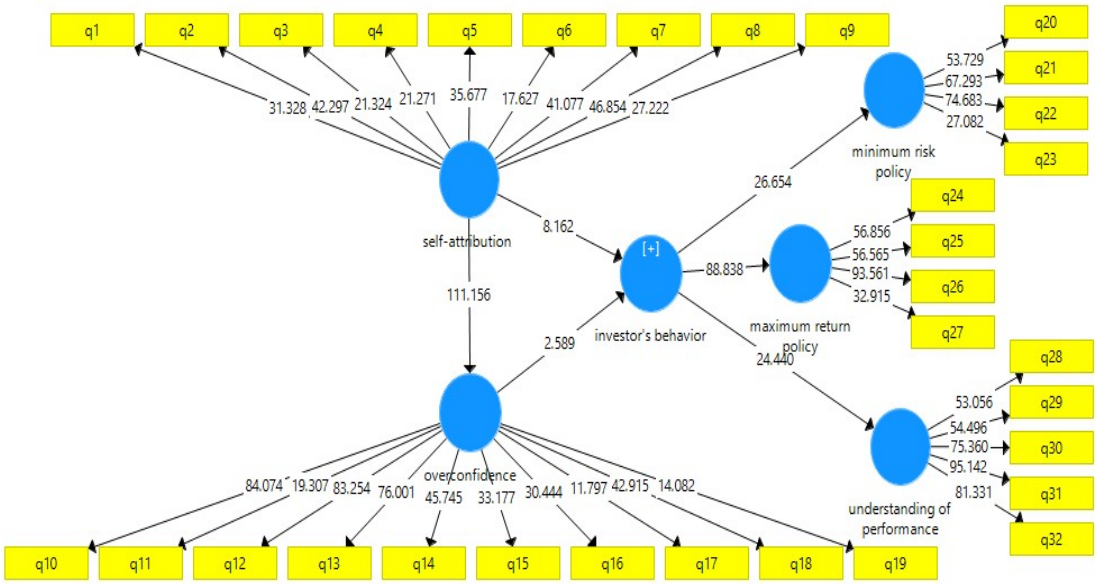

Figure3. T-student statistic values

One of the most important criteria for checking the fit of the structural model is the coefficient of determination (R^2). Three values of 0.19, 0.33, and 0.67 are considered as the criterion values for weak, medium, and strong R^2 values (Bayoll et al., 2000). According to Figure 2 for model endogenous variables, i.e. overconfidence and investor's behavior, R^2 were 0.828, and 0.655 respectively. Herefore, with respect to the criterion values, the model generally has a good structural fit. The results of path coefficients along with t-student values and significance level are shown in Table 5.

Table 5. Hypothesis test results

Hypotheses	Path coefficient	t-statistics	Results
H_1: overconfidence → investor's behavior	0.201**	2.589	Confirmed
H_2: self-attribution → investor's behavior	0.622**	8.162	Confirmed
H_3: self-attribution → overconfidence	0.910**	111.156	Confirmed

* and ** are significant at 5% and 1%, respectively.

The results in Table 4 showed that overconfidence has a significant effect on investor's behavior with a standard coefficient of 0.201. Therefore, the first hypothesis was confirmed. Also self-attribution has a significant effect on investor's behavior with a standard coefficient of 0.622. Therefore, the second hypothesis was confirmed. Self-attribution has a significant effect on overconfidence with a standard coefficient of 0.910. Therefore, the third hypothesis was confirmed.

In order to test the mediating role of variables, in addition to the direct effects, it is necessary to examine the effects of mediating variables on the relationship between variables. The Sobel test was used to test hypotheses based on mediating variables and indirect paths. The results of the path coefficients and the Sobel test along with the significance levels for the indirect effects are shown in Table 6.

Table 6. Hypothesis test results

Hypothes	Path coefficient	Sobel test	Results
H_4: self-attribution * overconfidence → investor's behavior	(0.910*0.201=0.183)*	2.576	Confirmed

* And ** are significant at 5% and 1%, respectively

Based on the results presented in Table 5, the value obtained from the Sobel test for explaining the mediating role of overconfidence in the relationship between self-attribution and investor's behavior is greater than 1.96 (2.576), thus indirect effects of self-attribution on investor's behavior through mediating variable of overconfidence was significant and the fourth hypothes was confirmed.

5. Discussion and Conclusion

This research, investigate behavioral finance theories and models of consumer behavior. The aim of this article is, determine the effect of self-attribution bias on investor's behavior with mediating role of overconfidence biasin in Tehran Stock Exchange. According to the results overconfidence has a significant effect on investor's behavior and a person who has a high overconfidence bias does not have a rational decision-making behavior. This result is consistent with previous research such as ul Abdin et al's (2022). This study examines the determinants of overconfidence bias that, in turn, influence investment performance via risk propensity. This study also investigates the three cognitive biases that lead to overconfidence bias, influence investment performance, and establish the indirect relationship through risk propensity. The results depict that all the cognitive biases influence the risk propensity and investment performance via risk propensity. The illusion of control is the strongest predictor of risk propensity and investment performance. Furthermore, findings imply that all the cognitive biases have a positive relation with investment performance. This study provides policy implications to practitioners and individual investor. Also according to the results self-attribution has a significant effect on investor's behavior and a person who has a high self-attribution bias does not have a rational decision-making behavior. This result is consistent with previous research such as Chou et al. (2021). They indicated that investors lead to poor returns because of self-attribution. unfortunately, a nonprofessional individual underperforms in the market because of his overconfidence bias related to self-attribution bias Also These results are consistent with previous research The Mahina et al's (2018) they used cross-sectional descriptive survey research design to ascertain and establish the effect of behavioral biases on investment in the Rwanda stock exchange. The results confirmed that there was a significant positive linear relationship between self-attribution bias and Investment in Rwanda stock market. The study also concluded that most investors suffered from self-attribution bias in investment in stock markets. The study recommends that investors should

be keen to identify such bias to increase their rationality in stock trading. This research examines theories of cognitive bias and investor behavior theory. According to the results a person who has a high self-attribution bias also has a high overconfidence bias and a person who has both high self-attribution bias and high overconfidence bias does not have rational decision-making behavior. In accordance with the results of this study, the results of Trehan & Sinha (2017) research showed that investors lead to poor returns because of self-attribution. A nonprofessional individual underperforms in the market because of his overconfidence bias related to self-attribution bias.Cava & Röder (2020) show that one component of the self-attribution bias, the self-enhancement bias, leads to subsequent underperformance. Second, results support the theory that traders become overconfident due to biased self-enhancement.

Future studies could be conducted on other biases such as emotional or preferences biases from the perspective of individual investors using the prospect theory. In addition, the coefficients of the cognitive biases are weak toward risk propensity and investment performance due to the minimum number of items to measure cognitive biases. The rationale to use the minimum items is to avoid respondent bias. The study could be extended by adding more variables to investigate the proposed model. Moreover, the other socioeconomic segments could be considered that will help to understand whether the results from this research are stable across the other segments. Further future studies may use longitudinal data to confirm that cognitive biases and investment performance remain constant at a different period. In addition, introducing financial literacy as a moderator could be an interesting avenue for future research.

References

Alexander. G.A., Sharp.W. F & Bailey.G.V.(1993). Fundamentals of Investment. Prentice-*Hall International.*

Alfredo Martin Oliver, Vicente Salas-Fumas, (2010). I.T. Investment and Intangible*, Evidence from Banks SSRN Working Paper Series*.

Akhtar, F., & Das, N. (2020). Investor personality and investment performance: from the perspective of psychological traits. *Qualitative Research in financial markets*.

Baker, H. K., & Ricciardi, V. (2014). How biases affect investor behavior. *The European Financial Review*, 7-10.

Bayol1 M.P., Foye A., TellierC. & TenenhausM.,(2000). Use of PLS Path Modelling to estimate the European Consumer Satisfaction Index (ECSI) model. Published in Statistica Applicata, 12(3), 361-375.

Bennett, P.D. (1995). Dictionary of Marketing Terms. Chicago IL: *American Marketing Association*.

Benos, A. V. (1998). Aggressiveness and survival of overconfident traders. *Journal of Financial Markets*, *1*(3-4), 353-383.

Blackwell, R.D., Miniard, P.W. and Engel, J.F. (2001) Consumer Behavior*, 9th edition. Mason, OH: Southwestern.*

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.

Campbell, J. Y., Ramadorai, T., & Ranish, B. (2019). Do the rich get richer in the stock market? Evidence from India. *American Economic Review: Insights*, *1*(2), 225-240.

Chalvin, V. G, Kalichman, S. C (2000). Work related stress and occupational burnout in aids caregivers, test of a coping model aids care*, Aids Care*, Vol. 12 No.2 pp. 149-167.

Chang, c.& Yan Luo, (2009), Investor Psychology and misevaluation Comovement*, school of business, faculty and economics, university of Hong Kong*.

Chen, H. (2003). Attributional Style and Self Esteem as Predictors of Psychological Well Being, *Counselling Psychology Quarterly*, Vol. 16, No.2, pp.121-130.

Chhapra, I. U., Kashif, M., Rehan, R., & Bai, A. (2018). An empirical investigation of investor's behavioral biases on financial decision making. *Asian Journal of Empirical Research*, 8(3), 99-109.

Cromwell, R. L., Rosenthal, D., Shakow, D., & Zahn, T. P. (1961). Reaction time, locus of control, choice behavior, and descriptions of parental behavior in schizophrenic and normal subjects. *Journal of Personality*, 29, 363-380.

Czaja, D., & Röder, F. (2020). Self-attribution bias and overconfidence among nonprofessional traders. *The Quarterly Review of Economics and Finance*, 78, 186-198.

Combrink, S., & Lew, C. (2020). Potential underdog bias, overconfidence and risk propensity in investor decision-making behavior. *The Journal of Behavioral Finance*, 21(4), 337–351.

Chou, H. I., Li, M., Yin, X., & Zhao, J. (2021). Overconfident institutions and their self-attribution bias: Evidence from earnings announcements. *Journal of Financial and Quantitative Analysis*, *56*(5), 1738-1770

Dai, Z., & Zhu, H. (2020). Stock return predictability from a mixed model perspective. *Pacific-Basin Finance Journal*, *60*, 101267.

Daniel, K., & Hirshleifer, D. (2015). Overconfident investors, predictable returns, and excessive trading. *Journal of Economic Perspectives*, *29*(4), 61-88.

Daniel, K., Hirshleifer, D. & Subrahmanyam, A. (1998). Investor Psychology and Security Market under and Overreactions, *The Journal of Finance*, 53: 1839-1885

Doherthy, W. (1981). Impact of Divorce on Locus of Control Orientation in Adult Women: A Longitudinal Study. *Journal of Personality and Social Psychology*, No 44, pp. 834-840.

Dorman, J. (2003). Testing a model for teacher burnout. Australian Journal of Educational & Developmental Psychology. Vol. 3 No.1 pp. 35-47.

Dawson, I. G. (2020). Taking responsibility: self-attribution for risk creation and its influence on the motivation to engage in risk management behaviors. *Journal of Risk Research*, 23(11), 1440-1451.

Entrop, O., McKenzie, M., Wilkens, M., & Winkler, C. (2016). The performance of individual investors in structured financial products. *Review of Quantitative Finance and Accounting*, *46*, 569-604.

Fang, L., & Peress, J. (2009). Media coverage and the cross-section of stock returns. *The Journal of Finance*, 64(5), 2023–2052.

Filbeck, G., Hatfield, P. and Horvath, P. (2005). Risk aversion and personality type. *Journal of Behavioral Finance,* 6 (4), 170–180.

Flores, F., & Solomon, R. C. (1998). Creating trust. *Business Ethics Quarterly*, 8, 205–232.

Green DM, Swets JA. (1966). Signal Detection Theory and Psychophysics. *Wiley and Sons.*

Hoffmann, A. O., & Post, T. (2014). Self-attribution bias in consumer financial decision-making: How investment returns affect individuals' belief in skill. *Journal of Behavioral and Experimental Economics*, *52*, 23-28.

Haselton MG, Nettle D, Murray DR (2015). The evolution of cognitive bias. *In The Handbook of Evolutionary Psychology, edn 2. Edited by Buss DM. Wiley*.

Hilton, D., Regner, I., Cabantous, L., Charalambides, L., & Vautier, S. (2011). Do positive illusions predict overconfidence in judgment? A test using interval production and probability evaluation measures of miscalibration. *Journal of Behavioral Decision Making*, *24*(2), 117-139.

Haselton MG, Nettle D, Andrews PW (2005). The evolution of cognitive bias. *In The Handbook of Evolutionary Psychology. Edited by Buss DM. Wiley.*

Investor Words, the biggest, best investing glossary on the web (2009). *Individual Investor Definition*, Accessed at www.investor words.com/2437.

Jiang, G., Lee, C. M., & Zhang, Y. (2005). Information uncertainty and expected returns. *Review of Accounting Studies*, 10(2-3), 185–221.

Kahneman, D. and Tversky, A. (1974). Judgment under Uncertainty*: Heuristics and Biases, Scien*ce, 85 (4157), 1124-1131.

Kahneman, D. and Tversky, A. (1979). Prospect theory: an analysis of decision-making under risk', *Econometrical*, 47 (2), 263–291.

Kansal, P., & Singh, S. (2018). Determinants of overconfidence bias in Indian stock market. *Qualitative Research in Financial Markets.*

Kumar, S., & Goyal, N. (2016). Evidence on rationality and behavioral biases in investment decision making. *Qualitative Research in Financial Markets*, *8*(4), 270-287.

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.

Kapoor, S., & Prosad, J. M. (2017). Behavioral finance: A review. *Procedia computer science*, *122*, 50-54.

Kotler, Philip. (1999). Gary Armstrong "Principles of Marketing", translates Ali Parsaeian, Tehran, *Press Adabestan*

Kumar, A., & Lee, C. (2006). Retail investor sentiment and return co-movements. *The Journal of Finance*, 61(5), 2451–2486.

Koo, J. H., & Yang, D. (2018). Managerial overconfidence, self-attribution bias, and downwardly sticky investment: Evidence from Korea. *Emerging Markets Finance and Trade*, *54*(1), 144-161.

Lucey, B., M. Dowling, (2005). The role of feelings in investor decision-macking, *joutnal of economic su*rveys, 19: 211-237.

Mahina, J. N., Willy, M., & Florence, M. (2018). Effect of self-attribution bias on investment in the Rwandan stock market. *Global Journal of Management and Business Research*, *18*(C2), 55-63.

Murgea, A. (2008). Investor's psychology cycle on the romanian capital market. *Analele Universităţii Alexandru Ioan Cuza" Iaşi Ştiinţe Economice* 55: 111-119.

Merkle, C. (2017). Financial overconfidence over time: Foresight, hindsight, and insight of investors. *Journal of Banking & Finance*, 84, 68-87.

Mendl M, Burman OHP, Parker RMA, Paul ES (2009). Cognitive bias as an indicator of animal emotion and welfare: emerging evidence and underlying mechanisms. *Appl Anim Behav*, 118:161-181. 57.

McKay R, Efferson C. (2010). The subtleties of error management. *Evol Hum Behav*, 31:309-319.

Marshall JAR, Trimmer PC, Houston AI, McNamara JM. (2013). On evolutionary explanations of cognitive biases, 28:469-473

Muthumeenakshi, M. (2017). Perception of investors towards the investment pattern on different investment avenues-A review. *The Journal of Internet Banking and Commerce*, 1-15.

Menkhoff, L., Schmeling, M., Schmidt, U., 2013. Overconfidence, experience, and professionalism: an experimental study. J. Econ. *Behav. Organ*. 86, 92–101.

Nofsinger and Richard, (2002). Individual investments behavior, *New York, McGraw-Hill*

Olsen R.A. (1998). Behavioral Finance and Its Applications for Price Volatility, *Financial Analysts Journal*, Vol. 54, Issue 2: 10-18

Odean, T. (1998). Volume, volatility, price, and profit when all traders are above average. *The journal of finance*, 53(6), 1887-1934.

Otuteye, E., & Siddiquee, M. (2020). Underperformance of actively managed portfolios: some behavioral insights. *Journal of Behavioral Finance*, *21*(3), 284-300.

Parmitasari, R. D. A., Hamzah, D., Alan, S., & Laba, A. R. (2018). Analysis of Ethics and Investor Behavior and Its Impact on Financial Satisfaction of Capital Market Investors. *Scienctific Research Journal (SCIRJ)*, *4*.

Paule-Vianez, J., Gómez-Martínez, R., & Prado-Román, C. (2020). A bibliometric analysis of behavioral finance with mapping analysis tools. *European Research on Management and Business Economics*, 26(2), 71-77.

Proeger, T., & Meub, L. (2014). Overconfidence as a social bias: *Experimental evidence. Economics Letters, 122*(2), 203-207.

Peterson, C. (2002). Causal Explanation as a Risk Factor for Depression: Theory and Evidence. *Psychological Review*, 91, 347-374.

Pikulina, E., Renneboog, L., & Tobler, P. N. (2017). Overconfidence and investment: An experimental approach. *Journal of Corporate Finance*, *43*, 175-192.

Peterson RL. (2016). The Only Thing to Fear. *Chapter in Trading on Sentiment. online by W*iley; http://dx.doi.org/10.1002/ 9781119219149.ch9

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

Ritter, R. J. (2003). Behavioral finance: *pacific- basin finance joutnal*. 11, 429-437.

Robin, T. and Bierlaire, M. (2011). Modeling the behavior of investors, Technical report, Transport and Mobility Laboratory, *Ecole Polytechnique Federale de Lausanne.*

Rutter, J.B., (1966). "Generalized Expectancies for Internal Versus External control of Reinforcement", *Psychological monographs***,** Vol.80, No.1, pp.609.

Sahi, S. K. (2017). Psychological biases of individual investors and financial satisfaction. Journal of Consumer Behavior, 16(6), 511-535.

Sharpe, William, (1991). The Arithmetic of Active Management. Financial Analysis Journal.

Shefrin, H. (1999), Beyond Greed and Fear, Harvard Business School Press, Boston, MA.

Sehgal, M. and D. Singh (2012). Psychology of investors based on value and life style survey. *International Journal of Transformations in Business Managemen*t 2 (2).

Seyyedabbaszadeh, M.M., Amani, J., Khezri Azar, H. & Pashoy, G. (2012). Introduction to Modeling of Structural Equations with PLS and its Application to Behavioral Sciences by Introduction PLS-Graph, Visual PLS, Smart PLS Software, Urmia: Urmia University Press

Smith, B. P. (2000). The Effects of Gender on Explanatory Style of Secondary Vocational Teachers. *Journal of Vocational Education Research*, 25 (1): 19-23.

Tekçe, B., Yılmaz, N., & Bildik, R. (2016). What factors affect behavioral biases? Evidence from Turkish individual stock investors. *Research in International Business and Finance*, *37*, 515-526.

Takeshita F, Sato N. (2016). Adaptive sex-specific cognitive bias in predation behaviors of Japanese pygmy squid. Ethology, 122:236-244.

Trimmer, P. C. (2016). Optimistic and realistic perspectives on cognitive biases. *Current opinion in behavioral sciences*, *12*, 37-43.

Trehan, M. B., & Sinha, A. K. (2017). An empirical study of impact of trading experience on self-attribution and optimism bias among investors leading to overconfidence. *Emerging Issues in Finance*, 1, 2017.

ul Abdin, S. Z., Qureshi, F., Iqbal, J., & Sultana, S. (2022). Overconfidence bias and investment performance: A mediating effect of risk propensity. *Borsa Istanbul Review*, *22*(4), 780-793.

van Elk, M. (2017). The self-attribution bias and paranormal beliefs. *Consciousness and cognition*, *49*, 313-321.

Waweru, N., M., Munyoki, E., & Uliana, E. (2008). The effects of beha vioral 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), 24-41.

Wikipedia (2016) https://en.wikipedia.org/wiki/Cognitive_bias Downloaded 21 Jan 2016. 56

Williams, E. F., & Gilovich, T. (2008). Do people really believe they are above average? *Journal of Experimental Social Psychology*, *44*(4), 1121-1128.