ROLE OF REGRET AVERSION AND LOSS AVERSION EMOTIONAL BIASES IN DETERMINING INDIVIDUAL INVESTORS' TRADING FREQUENCY: MODERATING EFFECTS OF RISK PERCEPTION

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Abstract

Purpose: This study aims to investigate the moderating effect of risk perception on the relationship among emotional biases (i.e., regret aversion and loss aversion) and the trading frequency of individual investors in the context of the Pakistan Stock Exchange (PSX).

Approach / Methodology: This study is conducted under the philosophical assumptions of the positivist paradigm and the approach is deductive. The convenience sampling technique is used for sample selection of registered individual investors on the database of PSX. This led the study towards designing a cross-sectional study. Furthermore, 384 questionnaires are used for the collection of primary data from a population of 0.22 million registered PSX individual investors. The direction and degree of relationship among variables of concern are analyzed by the multiple linear regression techniques. The structural Equation Modelling (SEM) technique is used for authentication of moderation results.

Findings: The results depict that regret aversion and loss aversion have statistically significant and negative impacts on individual investors' trading frequency. Whereas, risk perception has an insignificant & positive impact on individual investors' trading frequency. Moreover, risk perception is found to moderate the relationship between these two emotional behavioral biases.

Originality/Value: This current study is a pioneer in developing links between individual investors' trading frequency, loss aversion, regret aversion, and risk perception. The article also contributes to the literature of behavioral finance, specifically while understanding the role of emotional biases in investment strategies. So, this article engenders the reader's thoughtfulness to find plausible explanations in minimizing the impact of emotional biases in trading frequency and decision-making of individual investors.

Implications: This study implies that emotional biases and risk perception cause and moderate the magnitude of the trading frequency of individual investors. The regulatory bodies such as the Securities and Exchange Commission of Pakistan (SECP) and PSX can launch training programs for individual investors to train them in coping up with such emotional biases and risk perception. This might result in the enhancement of the market capitalization of the stock market.

Keywords: Behavioral Finance, Regret Aversion, Loss Aversion, Risk Perception, Trading Frequency.

INTRODUCTION

For decades, the lifeline of an economic system has been relying on the sculpture of wealth management. Saying so, wealth maximization is the vision of almost every corporation in the capitalistic environment. This enhances the value of investments and entrepreneurship. Defining features of investments and entrepreneurship rely upon choosing the right opportunities for persuasion and exploitation (Shane and Venkataraman 2000). In doing so, conventional and behavioral finance guides the individual and institutional investors in making the right choices for them. Past studies show that investors use different theories and models of conventional finance for appraisal of risk and linked expected returns while trading in stocks (Arora and Kumari 2015). Several assumptions and theories of conventional finance have been used by renowned scholars to elucidate the finance models. Classical or traditional economics/finance theories reflect that investors make rational decisions to enhance their returns (Çilingiroğlu, Rahman, et al. 2011). Whereas, in reality, irrational behaviors are displayed by investors while trading in financial markets i.e., investors trade unreasonably like they buy certain stocks without knowing their fundamental value just because their good friends are buying those stock (Benjamin, Virani, et al. 2018). Experts suggest that this irrational part has a deep linkage with cognitive and emotional behavioral biases of investors which can only be studied under behavioral finance theories. In consonance with (Alrabadi, Al-Abdallah, et al. 2018) behavioral finance is different from conventional finance as in this investors are considered to depict irrational and psychologically biased behavior which ultimately creates an impact on individual investors trading frequency.

The basic concept of behavioral finance was transpired in the famous book of Adam Smith "Moral Thought System" in 1759 where he says that irrational behavior is displayed when some investor attains some breakthrough in investments. Behavioral finance defines bias as the propensity of taking investment decisions when some fastidious investor is already persuaded by any underlying belief (Shefrin 2016). (Özen and Ersoy 2019) documented and defined individual

investor as an investor who likes to trade on his behalf and same trade at small levels comparatively.

Investors' decision-making criterion remains the main focus of attention in the literature of conventional and behavioral finance. Thorough research work in recent times has reconnoitered many psychological biases and also analyzed their influence on individual investors' investment decisions. According to behavioral finance specialists, every investor has different behavioral biases due to his unique personality. These behavioral biases can prevent investors from making investments rationally, which may have unpleasant repercussions on investors' trading frequency due to the irrational decision-making process ([Acciarini, Brunetta, et al. 2020](#)). The pioneering and famous prospect theory of behavioral finance states that investors rely on limited information by using heuristics, or biases, which simplify their decisions at cost of factual information use ([Kahneman 2007](#)). On the other side, traditional financial theories disregard such biases and heuristics; it assumes investors are rational, and they make investments rationally ([Pompian 2012](#)). Market efficiency theory holds the value of bedrock in traditional finance. It reflects that markets are efficient i.e., even if investors do make errors or mistakes; due to certain behavioral biases, the price of securities or stocks still represent fair value ([Cassidy 2010](#)). Efficient markets interpret investors as rational, consistent, and unbiased actors in making optimal investment decisions, with no involvement of their emotions or psyche ([Delcey 2019](#)). The behavioral finance concept has continually cropped up from 1990 onwards, along with intensifying evidence that the efficient markets hypothesis theory is not sufficient to explain irrational behavior of investors and anomalies in the market ([Cornicello 2004](#)). ([Nikiforow 2010](#)) documented in a study related to performance and trading of fund managers that most proficient training is even insufficient in altering the irrational behavior of humans in making investments.

Adam Smith in his book "*Moral Thought System*" laid the foundation of regret aversion and loss aversion biases by documenting that individuals feel regret and pain while moving from a good situation to a bad condition ([Özen and Ersoy 2019](#)). Individual investor's trading frequency is influenced by many factors like bounded rationality, income level, cognitive and emotional weakness, financial knowledge, limited information, intuitive reasoning, demographics, fundamental heuristics, and qualification of investors. The relationship between trading frequency and psychological biases has been explained in many theories. Key theories in this regard include prospect theory, cognitive theory, and bounded rationality theory. The prospect theory which laid the foundation of behavioral finance was presented by ([Kahneman and Tversky 1979](#)). This theory states that trading frequency relies on investment decisions that are made based on losses and gains by investors. Investors value losses and gains differently, and both are calculated by certain benchmarks or reference points.

Numerous studies like ([Awais and Estes 2019](#)), ([Khan 2016, Khan 2017](#)), ([Shah, Ahmad, et al. 2018](#)), ([Rasool and Ullah 2020](#)), and ([Shah and Malik 2021](#)) have reported that, in reality, markets are inefficient due to individual biases along with persisting anomalies in Pakistan. ([Rasool and Ullah 2020](#)) highlighted in his research that to explain and understand individual investors' choices and trading frequency, it is mandatory to examine certain emotional behavioral biases that influence investor's performance in the emerging market like PSX.

The meta-analysis of behavioral finance studies conducted in Pakistan like ([Shah, Ahmad, et al. 2018](#)), ([Awais and Estes 2019](#)), and ([Shah and Malik 2021](#)) reflect that majority of researchers in Pakistan has explored the combined impact of both types of behavioral biases i.e., cognitive and emotional biases on investors performance and decision-making process. However, the study on exploration of emotional biases only and their impact on the trading frequency which is an important proxy of individual investor's decision making is still a muddled area in Pakistan. The entire debate on various aspects of trading frequency has not produced objective rules or theories to date. The direct relationship between emotional behavioral biases and trading frequency has already been examined in few studies in past but they paid less concern to those underlying means by the help of which such relationships are induced more in real (Baker and Puttonen 2017). Furthermore, ([Rosenberg 1968](#)) highlighted in contingency theory that bivariate relationships rely on the involvement of a third variable. Therefore, it is very pertinent to introduce new moderators in the understanding of psychological factors which affect investors' trading frequency. ([Shah, Ahmad, et al. 2018](#)) propose that it is imperative to explore those variables which moderate the relationship between behavioral biases and individual investors' trading frequency of PSX. Risk perception varies among individual or institutional investors. This study theorizes that risk perception moderates the relationship between biases and the trading frequency of individual investors. Risk perception is an important moderator of this research, which is not tested and explored before in such an underlying mechanism.

This research relies on the theoretical fields of emotional and cognitive psychology and emotional-driven behavioral biases which are combined with some investment management literature. So, a theoretical contribution is being made by this study by apprising on insights in individual investors' trading frequency of PSX and further exploring how individual investors' trading frequency is affected by these two selected emotional biases along with the moderation impact of risk perception. This study has both theoretical and vital practical implications, as individual investors trade in such environments which are normally characterized by a great level of insecurity and uncertainty ([Jain, Jain, et al. 2015](#)). Emerging markets such as Pakistan and India are bound to possess such irrational behavior depiction of investors. The majority of earlier studies conducted in the developed markets have been concentrating on exploring individualistic cultures in developed financial markets. Empirical research is essential to develop an understanding of the individual investors' behaviors in collectivist-dominated cultures for increasing financial stability in developing countries' stock markets. Due to differences in such contextual paradigms (collectivist vs individualist) research conducted in any

developed country may not be generalized to any Asian country like Pakistan or India. This leaves room to fill the gap in the current literature by contributing contextually and by using data collected from individual investors of PSX. In Pakistan, investors are not completely aware of existing behavioral biases while trading, so this article will contribute to understanding selected emotional biases which may guide in future for effective decisions in the case of public policy by the Securities and Exchange Commission of Pakistan (SECP). It may also be useful in bringing awareness to individual investors by understanding these emotional biases and in gauging the influence of their emotional factors on their performance and trading frequency.

After the introduction in the 1st section of the paper, the appended 2nd section discusses the relevant literature on the main variables of the study i.e., regret aversion, loss aversion biases, and risk perception. Section 3 presents the data and outlines the methodology employed in this study to achieve the stated objective. Section 4 reports results, analysis, and develops discussion on the reported results of the study. Section 5 concludes the study while presenting recommendations and directions for future research.

LITERATURE REVIEW

Voluminous literature is available on the behavioral biases, irrational behavior of investors, and trading frequency of individual investors. Many researchers have put their best in investigating the impact of emotional and cognitive biases on the performance, decision-making, and trading frequency of individual investors in different environments and cultures. This leads us to the next section of the study, which presents a theoretical and empirical review of prior studies; mainly considering the linkage of regret aversion and loss aversion emotional biases along with the vital role of risk perception on individual investors' trading frequency.

Individual Investors' Trading Frequency

The Individual investors and their trading frequency and linkages among these two remain the topic of discussion in this section. For instance, (Hu* and Chan 2005) explained trading frequency as the number of investments performed in a particular time interval. (Özen and Ersoy 2019) documented and defined individual investor as an investor who likes to trade on his behalf. From earlier studies, (Sharpe 1964) found out that individual investors like to take optimum decisions while trading and doing investments. On the other hand, these topics are linked with the presence of emotional biases as well. (Jain, Jain, et al. 2015) highlighted that investment decisions of individual investors' trading frequency have a deep linkage with existing behavioral biases in individual investor personality. On similar lines, (Barber and Odean 2013) in their study on individual investors mentioned that trading frequency is an important proxy for analyzing individual investors' decision-making processes and patterns.

The study of behavioral finance literature reflects that individual investors do not behave rationally and the same has been proven through empirical evidence in many studies. (Barberis and Thaler 2003) postulated few models to explain excess volatility in stocks and excessive trading of investor's stock return predictability with the help of prospect theory. It is highlighted in many studies that high-frequency traders dominate in the financial markets. (Li, Cooper et al. 2018) stated that systematic instabilities and anomalies in stock markets dominated by the high trading frequency of investors are now becoming a principal concern for regulatory authorities after the 2010 Flash Crash. Furthermore, (Bollerslev and Todorov 2011) and (Jung, Lee, et al. 2009) stated in their research that the emergence of emotional behavioral finance biases has introduced individual investor behavior (investor psychology) as a factor affecting the trading frequency and asset returns. It is obvious from the studies cited above that it is pertinent to identify the causes of investors' trading frequency in emerging as well as developed markets.

Emotional Biases

Behavioral biases of all market participants discriminate them from rational actors as explained in classical economic theory. All these behavioral biases explaining individual investor's behavior are covered under Behavioral Finance Micro (Ricciardi 2008). The extant research work on behaviors of individual investors categorizes these biases by relating them to some meaningful framework. Few studies define these biases as heuristics (rules of thumb), while few call them judgments, beliefs, or preferences; still, the majority of scholars segregate them on cognitive and emotional lines. (Pompian 2011) segregated biases on cognitive and emotional bases and defined emotional biases as "*Biases which occur spontaneously when an individual behaves, while relying on personal feelings at the time of decisions or making an investment*". He further adds that "*If commitment and certain facts specify any emotional affiliation while trading or making decisions challenge, then those facts and commitments pose emotional threats*". Numerous researchers in past have analyzed the impact of emotional biases and their outcome on individual investors' behavior, trading frequency, and decision making while doing investments in the stock exchange (Fenton-O'Creevy, Lins, et al. 2012), (Duxbury 2015), and (Sutha 2016).

According to (Kahneman and Riepe 1998) "*individual investors may always be directed by reflecting an accurate picture of their emotional personality that influences their investment decisions: their occasionally imperfect assessment of their interests due to emotions, and the perimeters of their capacity to seek advice from others related to their emotional affiliation's*". (Shefrin 2010) explored that the root cause of the 2008 financial crisis was psychological. In all the events which caused these crisis, heuristics, framing effects and emotional behavioral biases were glaring reasons

that strongly influenced the judgments and decisions of financial firms, government regulators, rating agencies, elected officials and lastly individual investors.

Regret Aversion and Individual Investor Trading Frequency

Regret aversion is an emotional bias that is comparatively developed late in any investor. Individual investors occasionally posit that a negative outcome may have been avoided if a different course of action has been selected while trading (Ady 2019). Regret theory (Loomes and Sugden 1982) is a vital theory of emotional biases in behavioral finance which reflects that investors mostly care about what they could have realized in the past if a different option would have been chosen (Ady 2019). This theory has been tested in several studies. For instance, (Deuskar, Pan, et al. 2020) investigated the impact of regret aversion emotional bias on investors' trading frequency in China and confirmed that this impact effect is stronger in case of any taken action rather than inaction. Neuroscience also backs the importance of regret in the decisions of human beings and the psychological area of regret in all types of decision-making is extensively investigated with empirical evidence in past studies (Camille, Coricelli, et al. 2004, Bourgeois-Gironde 2010). Similarly, in neuroticism relationship of regret with individual investors' trading behavior is studied in past studies .e.g., (Fung and Durand 2014) report that if individual investors with high neuroticism invest in portfolios with certain outcomes that strengthen the negative emotions linked with trait; the actions they take in response to mitigate these disturbing incitements are mostly self-defeating and ineffective. As per (Pompian 2011) individual investors become victims of regret aversion bias and avoid investments either due to errors of commission or errors of omission. In general, such behavior is displayed by some individual investors in the shape of reference-dependent utility as investors mostly do compare their investments with other investments in their state of mind (Diecidue and Somasundaram 2017). (Engelbrecht-Wiggans, Haruvy et al. 2007) determined in their study that individual investors do regret in both scenarios i.e., either in stable or even non-stable environments. (Awais and Estes 2019) conducted a detailed study on the antecedents of regret aversion bias in PSX and they documented after thorough analysis that lack of analyzing ability, errors of commission, regret aversion, inappropriate information & conservatism are key contributing factors in the development of emotional biases in Pakistan. Similarly, a recent study by (Shah and Malik 2021) documented that regret aversion harms the trading frequency of PSX registered individual investors.

After doing above mentioned review of relevant literature, the following is hypothesized for its empirical testing.

H1: Regret Aversion has a significant negative impact on individual investors' trading frequency in PSX.

Loss Aversion and Individual Investor Trading Frequency

loss aversion emotional bias is a part of the theory of prospects (Kahneman and Tversky 1979). These two renowned scholars of behavioral finance thoroughly explained the loss aversion phenomenon in prospect theory and also laid the foundation of emotional biases. Loss aversion was described as an S-shaped kind of value function in this theory where investors weigh all possible profits and losses in connection to a set benchmark and investors show the propensity of being extra conscious to losses contrary to possible profits.

Many scholars have explained individual investor's loss-averse behavior and trading preferences (Ben-Rephael, Kandel, et al. 2012) and (Gao, Li et al. 2017). These scholars trusted on normative models where individual investors maximized the utility function in relevance to some predetermined criteria. In a classic scenario of loss aversion bias, an individual investor will always dread to sell those securities in his portfolio, which have not performed well (Elhussein and Abdelgadir 2020). Similarly, (Lee and Veld-Merkoulova 2016) documented that an individual investor with loss-averse emotional behavioral bias in his personality will always prefer investment options with low expected losses as compared to gains. (Yao and Li 2013) highlighted the endogenous loss aversion emotional bias in an individual investor in a situation where the degree of incomplete information touches a certain threshold. He states that this bias appears more prominently in a scenario where information turns out to be sparser.

The asset allocation pattern and trading of a linear loss-averse investor were studied by (Fortin and Hlouskova 2011) and the same was compared with traditional and conditional value-at-risk investors. They found that under asymmetric dependency, loss-averse investors mostly outperform mean-variance portfolio investors, provided these investors are amply loss-averse. (Leung and Tsang 2013) used a data set that contained transactions in Hong Kong of transactions of investors in the real estate sector from 1992 to 2006. They found that loss aversion bias has an impact on the investors' trading behavior. Their results indicated that loss aversion and anchoring bias contribute to the trading choices and cyclicity of the housing market. (Durand, Fung, et al. 2019) reported that as neuroticism increases, investor's propensity to unveil myopic loss aversion increases, and the variance among the competition among the infrequent and frequent treatments of investors become greater. Similarly, (Bouteska and Regaieg 2018) found that loss aversion harms investors' trading frequency in the US market and that the market responds negatively to this emotional bias. In the scenario of Pakistan, a study conducted by (KHAN, Azeem, et al. 2017) documented after thorough analysis that loss aversion has a negative and significant impact on the investment decisions of individual investors. A recent study by (Shah and Malik 2021) also explored that loss aversion harms the trading frequency of PSX registered individual investors.

After doing above mentioned review of relevant literature, the following is hypothesized for its empirical testing.

H2: Loss Aversion has a significant negative impact on individual investors' trading frequency in PSX.

Risk Perception

Traditional and behavioral finance defines risk differently. According to the behavioral finance perspective, risk perception is a subjective judgment of investors, which they make regarding the characteristics and gravity of a risk ([Ricciardi 2008](#)). The study of all renowned theories of risk perception like situational rationality theory habituated action theory, and protection motivated theory reflects that people rely on certain experiences, values, and beliefs while assessing risk. As per ([Schmidt 2004](#)) habituated action theory reflects that rapid trading in increased risk behavior without facing a negative outcome mostly decreases the risk perceptions connected with this behavior. Similarly, ([Lam and Ozorio 2015](#)) reported that risk perception can be used to differentiate an overall decision in Chinese students that it is risky as compared to other available alternatives. Similarly, ([Jandail 2014](#)) stated that the risk perception of investors is an important factor that influences their respective investment decisions.

Risk Perception and Trading Frequency

([Hoffmann, Post, et al. 2015](#)) investigated the impact of risk perception on individual investors' trading frequency and behavior and confirmed that perceptions of individual investors are important drivers of actual trading and risk-taking behavior. Some researchers explored that investors with more return expectations are likely to trade more to have higher turnover and profits. Similarly, (Ainia and Lutfi 2019) documented that decisions of investors and trading frequency of investments are impressively influenced by risk perception and previously earned profit. The case of research studies conducted on investors of Pakistan ([Shafi, Hussain, et al. 2011](#)) and ([Farooq and Sajid 2015](#)) documented that the trading behavior of investors in the equity market is negatively influenced by their risk perceptions.

After doing above mentioned review of relevant literature, the following is hypothesized for its empirical testing.

H3: Risk perceptions of individual investors have a significant negative influence on trading frequency in PSX.

Moderation role of Risk Perception

The moderating role of risk perception between behavioral biases and investors' trading behavior is reflected in the previous studies. ([Khan 2016, Khan 2017](#)) have analyzed the moderating role of risk perception along with selected emotional biases and found that risk perception strengthens this relationship of emotional behavioral biases and investment decisions of registered investors. Similarly, a recent study by ([Shehata, Abdeljawad, et al. 2021](#)) used risk perception as a moderator while finding its moderating impact on the Saudi Arabian stock market investors' and documented that risk perception has a negative impact on investors intentions. Whereas, the findings of ([Trang and Tho 2017](#)) were in contrast to the above-mentioned study and reflected that the greater the perceived risk, the more the investors are satisfied in their investment decisions. ([Ferreira 2018](#)) reports that investors' risk perceptions and attitudes are relying on selected financial models. These models are used in describing perceived risks and investment behaviors and are explained by subjective and objective risk propensity. Another important study by ([Ademola, Musa, et al. 2019](#)) explored that risk perception plays a role of significant moderator in individual investor's trading experiences and decisions.

After doing above mentioned review of relevant literature, the following is hypothesized for its empirical testing.

H4: Risk perception moderates the association between regret aversion and trading frequency of individual investors in PSX.

H5: Risk perception moderates the association between loss aversion and trading frequency of individual investors in PSX.

Theoretical Framework

The literature review reflects that regret aversion and loss aversion emotional behavioral biases unquestionably have an impact on the trading frequency of individual investors while investing in the stock markets. Keeping in view the gap analysis, theories, and evidence from past researches, the conceptual framework (Figure 1) is derived for empirically examining the impact of regret aversion and loss aversion emotional behavioral biases on individual investors' trading frequency along with moderating role of risk perception.

DATA AND METHODOLOGY

This section presents the data description and the econometric technique for analyzing the proposed hypothesis. The following subsections present the same in detail:

The population of the Study

The study population comprises 0.22 million individual investors registered in PSX ([2020](#)). Although this study is carried out in Pakistan and focuses on the trading frequency of individual investors of PSX, it may also have applicability to developing countries' investor trading frequency in their respective stock exchanges.

Figure 1: Conceptual framework

Sampling and Data Collection

This study is conducted in the positivistic paradigm and the results of this study are reliable with assumptions of the stated paradigm. The sample size of 384 was calculated by using the formula $SS = \frac{Z^2 * (p) * (1-p)}{c}$ (Smith 2013). 384 questionnaires were distributed for collecting the data from the respondents. 242 questionnaires were returned from the respondents and out of these 62 questionnaires were rejected as being wrongly filled by the respondents. 180 questionnaires with a response rate of 65% were used for data analysis. It is highlighted by (Hair 2009) that, in the case of quantitative research, data obtained from a minimum number of 100 respondents is good enough for statistical data analysis and produces reliable results. It was confirmed by reviewing the methodology of previous studies like (Shah, Ahmad, et al. 2018), (Shah and Malik 2021), and (Khan 2016, Khan 2017) that in all these studies the sample size varied from 140 to 265. Convenience sampling was used for collecting data from all the respondents instead of random sampling as access to a complete population frame was not possible. Furthermore, for ease and comfort of respondents and keeping in view the time and cost element in mind, the self-reported questionnaire method was used for data collection. Similarly, tenure for filling out all questionnaires was from March 2020 to November 2020.

Econometric Technique

The statistical expression of the model is as appended below: -

$$TF = \alpha + \beta_1 RA + \beta_2 LA + \beta_3 RP + \beta_4 RARP + \beta_5 LARP + \epsilon$$

In the above linear equation, the trading frequency (dependent variable) of registered individual investors is represented by TF whereas, RA and LA represent regret aversion and loss aversion biases which are used as independent variables in our study. Risk perception is a moderating variable and is reflected as RP. Similarly, ϵ represents the error term of our equation.

Research Approach & Design

This study is conducted in the positivistic paradigm and the results of this study are reliable with assumptions of the stated paradigm. A deductive and correlational study approach was preferred on inductive approach because as per (Sekaran and Bougie 2016) in the deductive approach researchers rely on existing theory and then after logical generalization and discussion they move to some conclusion. Furthermore, research proceeding focuses on testing of hypothesis while relying on underlying behavioral finance and psychology theories, and as per (Sekaran and Bougie 2016) testing of hypothesis suggests a better understanding of the existing relationship between variables.

Instrumentation for Data Collection

Closed-ended questions were used in our study to note down responses from the target population as specified in the questionnaire. Similarly, a Likert scale, starting from one to five reflecting strongly disagree responses to strongly agree responses of respondents was used in this study. The questionnaire of this study comprises of four sections: A to E. Section A is on regret aversion questions where six items were used for measuring the regret aversion bias and questions were adopted from the study of (Kisaka 2015). Sample item of section A is "Is this fear of regretting your investment decisions will likely to continue informing your future decisions or not?" and Cronbach's alpha value of regret aversion was noted as 0.712. Similarly, section B reflects questions on loss aversion bias where five items were used for measuring regret aversion bias, and questions were adopted from the study of (Kisaka 2015). The sample item of section B is "If I have Rs. 500,000 excess, I would prefer to invest in a risky alternative" and Cronbach's alpha value of loss aversion was noted as 0.812. Section C is on risk perception questions where seven items were used for measuring risk perception of individual investors and questions were adopted from (Hoffmann, Post, et al. 2015) study. Sample item of section C is "Next month I prefer certainty over uncertainty when investing" and Cronbach's alpha value of risk perception was noted as 0.799. Section D is related to the trading frequency of individual investors. The trading frequency of individual investors was measured by adopting an instrument from (Graham, Harvey, et al. 2009) study.

Furthermore, responses for measuring the trading frequency of individual investors were segregated into 5 categories showing investments of individual investors. Sample item of section D is “*In general, how often do you trade in the financial markets?*” and the value of Cronbach’s alpha for trading frequency was 0.874.

Methods

After data collection from respondents, their responses were analyzed with help of SPSS and Gretl software. First of all pilot testing including reliability and validity testing like Cronbach’s alpha test and convergent validity of research instrument was carried out, then statistical software was used to attain the results for discussion which includes, descriptive statistics, regression analysis, and correlation analysis. To identify gaps for future research (Kumar and Goyal 2015) reviewed all quantitative studies conducted on the investment decision in behavioral finance and revealed that 66% of studies on investor's decisions have used regression analysis. Consequently, this study also used a regression model to test hypotheses. To test the moderation effect of risk perception method of (Baron and Kenny 1986) was used. The structural Equation Modelling (SEM) technique was also utilized for authenticating the results of moderation. The methods are consistent with previous studies conducted on similar topics like (Shah, Ahmad, et al. 2018), (Khan 2016, Khan 2017), and (Bouteska and Regaieg 2018).

RESULTS & ANALYSIS

Pilot and Reliability Testing

Firstly, 78 questionnaires were delivered for pilot testing by the researcher to respondents i.e., individual investors who are operating in PSX. Out of these 78 questionnaires, 60 questionnaires were returned reflecting a response rate of 76.25%. Among these 60 questionnaires, only 51 were useable, representing a usage rate of 65.25%. Reliability testing was carried out by considering Cronbach’s alpha value / F test of all variables and further validating the results through composite reliability and the end validity of the instrument was done by convergent validity test. The pilot testing results indicated that the dependent variable i.e., investors trading frequency has a Cronbach’s alpha value equal to 0.62, which showed improvement and reached 0.745 after deleting two categories for measurement of individual investors trading frequency. The results (Table 1) for Cronbach’s alpha value of all variables were found to be greater than 0.7. Similarly, table 1 also reflects that convergent validity also names as AVE (Average Variance Extracted) values are ranged from 0.51 to 0.75. It was suggested by (Hair, Anderson, et al. 2010) that composite reliability values of any construct more than 0.50 reflect that selected items show greater variance than error term. Furthermore, reliability results of composite reliability in table 1 are ranging from 0.71 to 0.82 which reflects that reliability for all the constructs is well within a satisfactory range.

Table 1: Results for reliability analysis

Variables	No of items	Cronbach’s alpha value	F(sig)	CR	AVE
Loss aversion	4	0.812	9.673(0.000)	0.785	0.513
Regret aversion	5	0.712	11.673(0.000)	0.713	0.612
Risk perception	7	0.799	16.673(0.011)	0.816	0.633
Trading Frequency	3	0.874	12.673(0.001)	0.886	0.521

Note(s): CR = composite reliability and AVE = average variance extracted

Descriptive Statistics

Table 2 reflects descriptive statistics related to the demographics i.e., the frequency distribution of age, gender, and experience:

Table 2: Demographic statistics

	Frequency	Percent
Gender		
Female	20	11.1
Male	160	88.9
Age		
Less than 25	14	7.7
20-30 years	24	13.6
31-40 years	49	27.9
41-50 years	21	12.7
51-60 years	40	22.5
Experience		
Less than 1 year	31	17.1
1-10 years	29	16.2
11-15 years	40	22.7
16-20 years	35	19.4

21 years and above	45	24.4
Note(s): N =180		

Table 2 reflects that most respondents were males as among 180 individual investors 160 respondents which makes 88.9 % of respondents are males and only 20 respondents (11.1 %) are females in the entire study. Similarly, results of demographics statistics reflect that most registered individual investors are between 31-40 (28%) years of age and 51-60 (20.5%) years of age. Similarly, the lowest percentage of registered individual investors are the ones having age less than 25 years (7.7%). Likewise, 24 registered individual investors out of 180 are of age 20-39 years and 21 investors out of 180 registered individual investors are of age 41 – 50 years which are making 12.7 % of total respondents. Furthermore, table 2 of the article also indicates that the majority of registered individual investors are having experience of 21 years and above (24%). The lowest percentage of registered individual investors are the ones who have experience of 1-10 years (16.2%). Moreover, 35 individual investors out of 180 are having experience of 16-20 years which is making 19.4 % of the total respondents.

Correlation Analysis

The correlations among selected variables and results for mean and standard deviations of variables are reflected in Table 3. Analysis of this table depicts that loss aversion is negatively linked with the trading frequency of individual investors, with a Pearson's correlation coefficient of r is -0.202 and it is significant at $p < 0.01$; regret aversion with a Pearson's correlation coefficient value of r is -0.221 and it's significant at $p < 0.05$. Similarly, the correlation coefficient value of risk perception is - 0.191 and it is significant as $p < 0.05$. As a whole, this all depicts that, like loss aversion, regret aversion, and risk perception increases then the trading frequency of individual investors of these investors decreases. Findings of correlation analysis are consistent with studies of (Shehata, Abdeljawad, et al. 2021), (Awais and Estes 2019), and (Shah and Malik 2021).

Table 3: Results for Pearson's correlation

Variables	Mean	SD	1	2	3	4	Sig
Trading Frequency	3.01	1.12	1				
Loss aversion	3.32	0.912	-0.202*	1	0.612		0.00
Risk perception	3.49	0.89	-0.191**	0.216	1	0.326	0.02
Regret aversion	3.61	1.17	-0.221*	0.886	0.521	1	0.00
Note(s): N=180; *$p < 0.01$, **$p < 0.05$							

Inferential Statistics

A hierarchical regression analysis test was performed in two steps for hypothesis testing. At first, selected demographic variables were added as control variables for reporting R^2 value only. Later, in the second step loss aversion, regret aversion and risk perception, and trading frequency were regressed and tested. Similarly, changes in R^2 and beta (β) values were reported. Variation in R^2 denotes that, after controlling demographic variables, R^2 values were significantly affected. Moreover, more than 40% of the variation was not explored in each case.

Firstly, control variables were regressed with investor's trading frequency; the value R^2 reflects 11% of the study dependent variable (trading frequency) is explained with the help of control variables i.e., demographics. Similarly, in the next step, loss aversion, regret aversion, and risk perception were regressed on the trading frequency of individual investors, and the R^2 value i.e., 0.59 shows that about 59 % of the variation in trading frequency is caused by loss aversion, regret aversion, and risk perception.

Individual Investors' Trading Frequency

It was hypothesized in the first three hypotheses of the literature review that loss aversion, regret aversion, and risk perception would be negatively linked with individual investor's trading frequency. To test the same, researchers regressed individual investor's trading frequency with loss aversion, regret aversion, and risk perception as depicted in Table 4. Analysis of results reflects that regret aversion ($\beta = -0.29$ & $p < 0.001$) is a significant predictor of individual investor's trading frequency which supports article H1. Similarly, analysis of results also reflects that loss aversion ($\beta = -0.39$ & $p < 0.05$) is a significant predictor of individual investor's trading frequency which also supports article H2. Furthermore, risk perception ($\beta = 0.04$ & $p > 0.001$) is not a significant predictor of individual investor's trading frequency and it also has a positive impact on individual investor's trading frequency i.e., opposite direction as predicted in H3 of the article.

Table 4: Result of regression analysis

Predictors	β	Trading Frequency R^2	ΔR^2	Sig
Step 1				
Control variables	0.011	0.11		
Step 2				
Regret aversion	-0.29***			.000

Loss aversion	-0.39**			.000
Risk perception	0.04	0.59	.035	.138
Note(s): ***p < 0.001, **p < 0.05; control variables are age, qualification, gender				

Moderation Analysis

The study used moderation analysis to observe risk perception as a moderator between regret aversion, loss aversion, and trading frequency of individual investors in PSX. The study used (Baron and Kenny 1986) method for doing moderation analysis in our study. Initially, demographics i.e., qualification, gender, experience, and age were added as control variables in the first step. Later, for the second step, we entered regret aversion and loss aversion along with risk perception to predict the impact on the trading frequency of individual investors. Finally, in the last and third steps, the interaction terms among regret aversion, loss aversion trading frequency of individual investors were added.

The results of table 5 depict that regret aversion and loss aversion emotional bias ($\beta = -0.46$, $p < 0.001$ for regret aversion) & ($\beta = 0.41$, $p < 0.001$ loss aversion) are influencing negatively the trading frequency of individual investors. Likewise, both are significant predictors of trading frequency also. Whereas, risk perception ($\beta = 0.05$, $p > 0.05$) was an insignificant predictor of individual investor's trading frequency. However, the interaction term of these variables had a significant and negative impact on individual investor's trading frequency i.e., $\beta = 0.31$ & $p < 0.001$ for regret aversion and risk perception. Similarly, the relationship between loss aversion and risk perception as a moderator was found to have a significant and negative impact on individual investor's trading frequency ($\beta = -0.31$ & $p < 0.001$). These results support the stated hypothesis i.e., H4 & H5, which forecasted that risk perception will moderate the association between regret aversion, loss aversion biases, and trading frequency of individual investors.

Table 5: Result of moderation analysis

Predictors	B	Trading Frequency R^2	ΔR^2	Sig
Step 1				
Control variables	0.011	0.11		
Step 2				
Regret aversion	-0.46***	0.49	0.41	.000
Loss aversion	-0.41**			.000
Risk Perception	0.05			.244
Step 3				
RA× RP	-0.51***	0.59	0.35	.000
LA× RP	-0.59***	0.55	0.39	.000
Note(s): ***p < 0.001, **p < 0.05; control variables are age, qualification, gender				

Robustness tests

SEM technique was used for validating the results for the moderation of this study (Table 6 & Fig 4.1). Results of SEM technique indicated that that regret aversion emotional bias ($\beta = -1.387$, $p = 0.002$) & loss aversion emotional bias ($\beta = -1.287$, $p = 0.003$) are significant predictors and are having negative impact on trading frequency of individual investors. Whereas, risk perception ($\beta = 0.0402$, $p = 0.299$) was found to be an insignificant predictor of the trading frequency of individual investors. Furthermore, the interaction term of same variables had a significant negative effect on trading frequency of individual investors ($\beta = -0.4895$, $p = 0.0282$ for regret aversion and risk perception moderation effect & $\beta = -0.4195$, $p = 0.0282$ for loss aversion and risk perception moderation effect). These findings show similarity with regression analysis. So, the SEM technique validates the regression analysis findings of this research.

Table 6: Results for reliability analysis

	β	SE	CR	P value
TF ← RA	-1.37	0.414	-3.17	0.002
TF ← LA	-1.27	0.317	-0.299	0.003
TF ← RP	0.042	0.497	0.347	0.319
TF ← RA×RP	0.4895	0.387	-0.327	0.002
TF ← LA×RP	0.4195	0.417	-0.41	0.003
Note(s): TF= trading frequency, RA = regret aversion, LA= loss aversion RA×RP & LA×RP= interaction terms				

DISCUSSION

This study expands the prospect theory of behavioral finance theory and habituated action theory of risk perception while analyzing their moderating impact on the trading frequency of individual investors in PSX. The idea of this study was developed from past literature and then we tested responses by hierarchical regression analyses by using statistical software i.e., SPSS and Gretl. Except for results for the risk perception variable in this study, all other results of our

study provide empirical support to past literature. So, other than the risk perception variable this research does not uncover any surprising results which may be considered dissimilar from past studies conducted on the same topic elsewhere in the world. Furthermore, study findings verify that individual investors of PSX behave irrationally. Loss aversion and regret aversion are significantly negatively associated with individual investor's trading frequency, meaning that loss aversion and regret aversion emotional biases blights the frequency of individual investors' trading. Furthermore, a significant negative relationship between loss aversion and regret aversion emotional biases and individual investors' trading frequency means that individual investors' trading frequency also decreases due to loss aversion and regret aversion emotional biases increment in their personality of individual investors.

Figure 2: Structural Model

Results for loss aversion and regret aversion emotional biases had similarities with past researches like (Hoffmann, Post, et al. 2015), (Bouteska and Regaieg 2018), (Shah and Malik 2021), (Awais and Estes 2019), and (Lee and Veld-Merkoulova 2016). Whereas, risk perception results were contrary to past literature available both in the case of PSX and other developing stock markets e.g., results of (Khan 2016, Khan 2017), (Shehata, Abdeljawad, et al. 2021), and (Shafi, Hussain, et al. 2011) showed that risk perception harms investment trading but this study reflects it has an insignificant and positive impact on the trading frequency of individual investors while investing in PSX. The results and findings of our study on risk perception are contradicted to the prospect theory of behavioral finance (Tversky and Kahneman 1992) which reflects that If a risk is included in individual investors decisions related to the investment performance or trading frequency, then these investors tend to avoid such investment opportunities. So, the positive linkage between risk perception and investment trading frequency shows linkage with the portfolio theory of Markowitz related to risk and return. These results for risk perception show familiarization with a study by (Yuliani, Isnurhadi et al. 2017) who also found a positive linkage of risk perception with investment decisions. Similarly, it shows dissimilarity with the vital (Malmendier and Nagel 2011) study who proposed that bad experiences induce emotional biases and risk perception which make individual investor regret and ultimately they become loss averse which ultimately can decrease investors' willingness to take risks by lessening their risk tolerance.

It is evident from the above discussion that, risk perception variable while interacting with loss aversion and regret aversion emotional biases has no substantial influence on the trading frequency of individual investors. Furthermore, explicitly loss aversion and regret aversion emotional biases have a significant negative impact on the trading frequency of individual investors. The study may also suggest from these findings that when individual investors in Pakistan have emotional behavioral biases of loss aversion and regret aversion in their personalities their trading frequency while investing in PSX is insignificantly affected by risk perception which was used moderator here even being influenced significantly when same variables were used without risk perception.

CONCLUSION & RECOMMENDATIONS

Conclusion / Contribution of study

This paper explores the impact of regret aversion and loss aversion emotional biases on the trading frequency of individual investors while investing in) PSX, along with moderating the impact of risk perception. Researchers provide evidence that supports that the trading frequency of individual investors while investing in PSX is significantly influenced by these two-selected emotional behavioral biases. Individual investors' pessimism induces the presence of regret aversion and loss aversion emotional biases in the personality of a registered investor of PSX as both biases negatively influence the trading frequency of individual investors, whereas individual investors' optimism induces the presence of risk perception as it positively influences individual investors trading frequency. Investor's risk perception has a positive impact on trading frequency, implying that risk perception of PSX may benefit them through greater profitability, higher stock returns, and lower risk performance.

Trading frequency is an important proxy for the measurement of investment decisions. Extreme variations in individual

investor's trading frequency and performance in developing economies like Pakistan has been observed in past by researchers like (Shah, Ahmad, et al. 2018), (Shah and Malik 2021), (Quddoos, Rafique, et al. 2020), and (Akhtar and Das 2020). Traditional finance has not been able to completely justify such variations to date. More specifically, our article under behavioral finance theories suggests that it is for the better interest of individual investors of PSX and other developing countries' stock markets that individual investors must be less pessimistic and they should protect themselves against loss aversion and regret aversion behavioral biases.

This research is the first of its kind as an impact on trading frequency in developing countries like Pakistan was never explored earlier in such mechanism. Furthermore, the majority of earlier studies conducted in western countries have been concentrating on exploring individualistic cultures in developed financial markets as (Zahera and Bansal 2018) and (Shah, Ahmad, et al. 2018) highlighted in their relevant research work that due to differences in such contextual paradigm (collectivist vs individualist) research conducted in any west country may not be generalized to any Asian country like Pakistan. So, this research will fill the gap in the current literature by contributing contextually. Similarly, It highlights important practical significances for practitioners of finance like for any investor who likes to invest in PSX and other developing countries stock exchanges, for any advisor in an investment firm or even a portfolio manager, for any investment banker and any broker at a stock exchange. Nevertheless, the study is also relevant to academia and all those stakeholders who manage corporate entities and play any role in financial decisions.

POLICY IMPLICATION & RECOMMENDATIONS

After the global financial crisis strong regulations of stock and capital markets, understanding of behavioral norms / assumptions and guidance of individual/institutional investors is a serious concern for all policy-makers both in developed and emerging economies (Spindler 2011). This article serves as an acumen to stock market policy-makers like SECP in better understanding the role of emotional behavioral biases in individual investor's trading frequency and other decision-making processes. This research can assist SECP in the segregation of individual investors as per their personality and psychological biases and develop policies that can counter such behavioral factors for smooth market movement. Similarly, it was highlighted and documented in (Montier and Strategy 2002) research related to the irrationality of minds and markets that individual investors can face serious consequences if behavioral biases are ignored in their trading decisions and investment analysis. Accordingly, this study stipulates awareness of emotional biases in investment management, which may be very helpful for policymakers and finance practitioners.

Based on the findings, we suggest that investors should conduct a proper analysis of market opportunities for rational trading frequency instead of relying on emotional behavioral biases as it is inducing them to get involved in irrational trading frequency while investing in PSX. Individual investors' trading frequency may be provoked by regret aversion and loss aversion emotional biases when they observe the decline in some stock of their existing portfolio even they have been holding it for so long. An effective guideline for such investors is that they must ignore all emotions and conduct a proper technical and fundamental analysis of investment opportunities for rational trading frequency. Furthermore, after doing these analyses once they feel convinced about the trading of certain stocks, they should feel confident on their choice and selection of stock, they must stick to their decisions particularly while trading to avoid such significant impact of loss aversion and other emotional biases.

DIRECTIONS FOR FUTURE RESEARCH

As discussed in previous sections, this study investigated two emotional behavioral biases in the perspective of Pakistan with a small sample size. So, it is recommended research extension for confirming findings of our study may be carried out in the future with a greater sample size along with diverse respondents. Similarly, research extension can also be made by directing research efforts on the appended question:- How do investor's loss aversion and regret aversion biases influence PSX individual investor's performance and trading frequency? Furthermore, it is suggested that more behavioral finance theories should be applied in the exploration of other emotional behavioral biases, which can influence the trading frequency of individual investors as moderated by risk perception.

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AUTHORS CONTRIBUTION

All research proceedings of this article are compiled and completed by the first / corresponding author i.e. **Sayed Ibtasam Shafqat**. Whereas, the second author has been in a supervisory role during all courses of action.

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