Journal of Organisational Studies and Innovation
Vol. 9, no1, Spring 2022

Investigating the Moderating Roles of Basic and Advanced Financial Literacy between Behavioural Biases and Stock Buying Decisions

Rajnesh Shahani*[1] and Kazi Afaq Ahmed**
*Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST), Hyderabad, Pakistan**
*Institute of Business Management, Karachi, Pakistan***

Received: March 1, 2021; Revised: Nov 11, 2021; Accepted: Dec 16, 2021

Abstract: This empirical research investigates whether investors in Pakistan Stock Exchange are influenced by a set of behavioural biases while making stock buying decisions. Subsequently, this study evaluates as to what extent active stock investors are financially literate at basic and advanced level and test whether basic and advanced financial literacy moderate the effects of behavioural biases on stock buying decisions. Five-point Likert scale has been used to measure the reflective constructs of behavioural biases and stock buying decisions. Sample size of 326 respondents from Karachi and Hyderabad cities in Pakistan has been used, employing convenience sampling, to analyze the data using descriptive statistics and Partial Least Square Structural Equation Modeling. Out of seven biases tested, Anchoring and Adjustment bias is found to have negative significant effect on stock buying decisions while Herd Mentality bias and Availability bias are found to have significant positive effect on stock buying decisions. Active stock investors were found to have high level of basic financial literacy whereas advanced financial literacy was present at a moderate level. Basic financial literacy moderates the association between herd mentality bias and stock buying decisions while advanced financial literacy moderates the relationship between mental accounting bias and stock buying decisions.
Keywords: *Behavioural biases, stock buying decisions, basic and advanced financial literacy.*

Introduction

Stock investors who base their investment decisions on the solid fundamental analysis of the securities under consideration and optimizing their risk-return are likely to drive maximum utility from their investments and are therefore referred to as rationalists in investment decisions (Markowitz, 1952). On the other hand, behavioural finance propagates the idea that investors rarely act rationally and are carried away by biases, resulting in irrational behaviour, in order to make quick decisions devoid of a thorough analysis (Shefrin and Statman, 2011). Behavioural biases are one of the main factors leading to inefficient capital markets. Analysing stocks prudently requires a set of skills and knowledge which a novice in the stock market is often lacking and as a result investors fall prey to mental shortcuts influenced by their behavioural biases. Therefore, investors inevitably end up making irrational decisions due to their psychological, emotional and social biases (Rubinstein, 2001). Popular theories in the field of conventional Finance, such as, Capital Asset Pricing Model, Modern Portfolio Theory, and Efficient Market Hypothesis inherently assume the idea that investors act rationally and in

[1] DOI: https://doi.org/10.51659/josi.21-141

a risk-averse manner, taking into account all pertinent factors and the due analysis of risk and return; however, the unsound behaviour manifested by stock investors in practice and as corroborated by the literature is well in conflict with the classical theories taught in the academia. By means of theory of behavioural finance, one can understand as to how and why behavioural biases affect stock buying decisions and the underlying motivations therein (Subrahmanyam, 2008). Various studies, mainly in the developed countries, have been conducted to assess as to which particular biases affect investment decisions and the results have been of varying nature for each type of bias. For example, Ariely et al., (2006) contends that determining intrinsic value of securities is a daunting job and therefore investors use some mental accounting techniques to relatively value assets.

Unlike other similar studies where a limited number of biases were taken into consideration, this study aims at examining the effect of a comprehensive range of behavioural biases, including, Anchoring and Adjustment, Availability, Representativeness, Herd Mentality, Overconfidence, Mental Accounting and Disposition effect on the stock buying decisions of investors in Pakistan Stock Exchange with an emphasis on the moderating effects of basic and advanced financial literacy so as to fill a dearth in the existing literature on this topic, particularly in Pakistan Stock Exchange, and thereby further validate the assertions of the theory of behavioural finance. Pompian & Wood (2006) prescribes that Education and literacy are indeed significant means to subdue the effects of behavioural biases on investment decisions. There have been very few studies, specifically in Pakistan, that have assessed the role of financial literacy with regard to the effects of behavioural biases on stock buying decisions. Unlike other studies, this study categorically discriminates between basic and advanced level of financial literacy in investors and attempts to investigate their moderating roles on the effects of behavioural biases. Hence, the research questions raised in this study are: (i) What is the effect of behavioural biases on stock buying decisions of investors in Pakistan Stock Exchange? (ii) Do investors in Pakistan Stock Exchange possess adequate financial literacy at basic and advanced levels? (iii) What is the moderating role of basic and advanced financial literacy on the effects of behavioural biases on stock buying decisions? The specific research objectives, therefore, sought in this study are: (i) To examine whether investors in Pakistan Stock Exchange are affected by behavioural biases while buying stocks. (ii) To determine as to what extent investors in Pakistan Stock Exchange are financially literate at a basic and an advanced level. (iii) To determine whether basic and advanced financial literacy modify the association between behavioural biases and stock buying decisions of investors in Pakistan Stock Exchange.

This study adds to the existing literature in three different ways: (i) Financial literacy is an important aspect with regard to financial decision making as it determines the extent to which sound and rational financial decision making can be executed without falling prey to behavioral and cognitive biases and can, therefore, potentially lead to enhanced market efficiency (Pompian & Wood, 2006). Very few studies in the existing literature have catered to the hypothesis of the role of financial literacy in validating the postulations of behavioral finance that investors become victim to biases in making stock investments decisions. Previous studies have focused on financial literacy in this context only at basic level. Role of advanced financial literacy, however, has not been explored as yet. Advanced financial literacy can potentially affect the way investors make decisions (Van Rooij, Lusardi and Alessie, 2011). The present research, therefore, has operationalized both basic and advanced financial literacy separately as moderators in examining the effect of behavioral biases on stock buying decision. (ii) Present study contributes to the existing literature by studying the wide range of behavioral biases onto which empirical evidences are either inconsistent or lacking. (iii) Finally, present research offers empirical evidence from an emerging market for which existing literature is not adequate. Thus, insights into the effect of behavioral biases on stock buying decision with a

special focus on basic and advanced financial literacy should be valuable for researchers and investment analysts studying similar phenomenon in future.

Literature Review

Fromlet (2001) has defined behavioural finance as: "Behavior of investor is a part of behaviour finance, which seeks to understand and predict systematic financial market implications of psychological decision processes. Behavior finance closely combines individual behavior and market phenomena and uses knowledge taken from both the psychological field and financial theory."

Behavioural finance has had a significant role to play in shaping the decision making of investors in the capital markets. Behavioural biases, as defined by the theory of behavioural finance, can be held responsible to a great extent for the irrational behaviours that caused the financial crisis of 2007-2008 which started in the US and subsequently caused a worldwide recession (Szyszka, 2010). Previous studies have found that investors incur heavy losses in the stock market when their psycholgical, social and emotional biases come into play while making investment decisions (Gervais, S. and Odean, 2001; Odean et al., 1998).

Theoretical Underpinning and Hypotheses Development

Heuristics theory in behavioral finance is defined as the tendency of investors to resort to mental shortcuts or rules of thumb in making investment decisions. Heuristics can help in making quick decisions when the time is limited but nevertheless it results in biased decisions, lacking in thorough analysis. The most common heuristics include representativeness bias, availability bias and anchoring and adjustment bias (Tversky & Kahneman, 1974; Ritter, 2003)

The prospect theory in behavioural finance proposes that humans have natural dispositions to gamble with profits rather than losses. According to the theory, losses and gains are perceived different ways, because investors make choices based on perceived gains rather than perceived losses. The general principle underlying the theory is that if an investor is faced with two equivalent choices, one with potential benefits and the other with potential losses, the former alternative will be chosen. People are more emotionally affected by losses than gains, thus if given 2 alternatives with the same outcome, they will choose the one that gives perceived rewards. According to the theory, the certainty effect occurs when people prefer certain outcomes over ones that are only plausible. The certainty effect causes people to avoid taking risks when there is a chance of a certain payoff. It also pushes people to seek out danger when the alternative is a guaranteed loss. The isolation effect occurs when people are given two options with the same result but distinct approaches to that result. In this case, investors will likely filter out similar knowledge to minimize cognitive burden, and their decisions may vary depending on how the options are worded. (Kahneman and Tversky, 1979).

The efficient market hypothesis (EMH) asserts that stock prices reflect all available and pertinent information and that earning abnormally higher return consistently is unlikely. Securities trade at their intrinsic value on exchanges, according to the hypothesis, making it hard for investors to spot underpriced stocks. Hence, outperforming the market with expert stock selection or market timing should be challenging, and the only way to beat the market is by means of investing into riskier stocks (Sharpe, 1970).

Basic and Advanced Financial Literacy

Financial literacy can be classified as either of basic level or advanced level. Basic level of financial literacy is characterized by the knowledge of time value of money, how interest rates function, effects of compounding and compound interest, impact of inflation, discounting and nominal versus real values. Basic financial transactions, financial planning, and day-to-day financial decision-making are all based on these principles whereas the advanced level of financial literacy is characterized by the knowledge of financial assets, such as stock and bonds, mutual funds, return and riskiness of various assets, functioning of capital markets, risk

diversification and relationship between bonds prices and interest rates (van Rooij, Lusardi and Alessie, 2011)

Behavioural Biases

Seven behavioural biases have been considered in this study, taken from the theoretical underpinnings and the existing literature, to examine their effects on stock buying decisions in the investors of Pakistan Stock Exchange with special emphasis on basic and advanced financial literacy:

Anchoring and Adjustment Bias

Anchoring and adjustment is a cognitive heuristic that results from people's propensity to estimate by beginning with a guess and then making changes to that guess to arrive at the final estimate. The "anchor" for the first guess may come from a number of places, including the computation, a given value, the current value, or historical averages. The changes up or down to meet the final figures, regardless of the anchor's source, are inadequate. As a result of using such estimates in financial decision-making, investors deviate from the rational behavior as suggested by the classical theories in finance (Khan *et al.*, 2017). Investors often use the previous stock price as an anchor for today's stock price, causing them to underreact to fundamental news and price changes (Montier, J., 2002).

H1*: Anchoring and adjustment bias has a significant effect on stock buying decisions.*

H2*: Basic financial literacy moderates the association between anchoring and adjustment bias and stock buying decisions.*

H3*: Advanced financial literacy moderates the association between anchoring and adjustment bias and stock buying decisions.*

Representativeness Bias

Representativeness is a cognitive bias that emphasizes that investors have a tendency to perceive a feature of an event as representative of the event as a whole, irrespective of whether or not the feature is relevant. Individual investors are particularly affected by two key interpretations of representativeness bias: first, base rate neglect, and second, sample size neglect. Investors have a tendency to frame an event in a way that is easy to grasp when evaluating its soundness for investment objectives. However, when making their selection, they are prone to miss other crucial aspects that may influence the value of the investment. The explanation for this is that investors see stereotypes as a cheaper alternative to doing the necessary research to assess an investment. Investors' propensity to base their decisions on an insufficient sample of data when evaluating a specific investment is known as sample size neglect (Khan *et al.*, 2017; Tversky & Kahneman, 1974; Waweru et al., 2008).

H4*: Representativeness bias has a significant effect on stock buying decisions.*

H5*: Basic financial literacy moderates the association between representativeness bias and stock buying decisions*

H6*: Advanced financial literacy moderates the association between representativeness bias and stock buying decisions*

Availability Bias

Availability is a cognitive bias that concerns the propensity to rely on the knowledge that is easily available and accessible. People base their decision keeping in mind the ease with which past experiences or knowledge can be recalled to assess the likelihood of a case according to Tversky & Kahneman (1974) and Pompian (2011). The stock market is prone to be affected by availability bias that affects investors. It may cause under-reaction or over-reaction in expectations, resulting in asset price fluctuations (Chiodo *et al.*, 2003).

H7*: Availability bias has a significant effect on stock buying decisions*.

H8: *Basic financial literacy moderates the association between availability bias and stock buying decisions.*

H9: *Advanced financial literacy moderates the association between availability bias and stock buying decisions.*

Herd Mentality Bias

The propensity of investors' activities to imitate the behaviour of others is known as the herding effect in the stock market. Since investors depend on collective information rather than private information, practitioners generally consider the nature of herding. This may result in a price divergence of securities from their fundamental value. Academicians are interested in herding because its effects on stock price fluctuations can affect the attributes of risk and return models, which has an impact on the assertions of the asset pricing theories (Tan, L. et al., 2008).

H10: *Herd mentality bias has a significant effect on stock buying decisions.*

H11**:** *Basic financial literacy moderates the association between herd mentality bias and stock buying decisions.*

H12**:** Advanced *financial literacy moderates the association between herd mentality bias and stock buying decisions.*

Mental Accounting Bias

Mental accounting refers to the various values that an individual assign to the same sum of money based on arbitrary standards, which can have negative consequences. Individuals interpret funds differently and are thus vulnerable to unreasonable spending and investment decisions**.** The principle of fungibility of money underpins the theory. To say money is fungible is to say that all money is the same, regardless of its source or intended use. Individuals should perceive money as perfectly fungible when allocating between various accounts, whether it's a budget account or a wealth account, to avoid the mental accounting bias. People are prone to mental accounting bias when it comes to investing. Therefore, mental accounting often causes investors to resort to irrational decisions (Barberis, N., 2005).

H13: *Mental accounting bias has a significant effect on stock buying decisions*.

H14**:** *Basic financial literacy moderates the association between mental accounting bias and stock buying decisions.*

H15**:** *Advanced financial literacy moderates the association between mental accounting bias and stock buying decisions.*

Overconfidence Bias

Overconfidence bias is the tendency to give a mistaken and dishonest assessment of our abilities. In a nutshell, it's the arrogant assumption that we're wiser than what we in fact are. It's a potentially risky bias that's common in behavioural finance (Pompian and Wood, 2006). Montier (2006) surveyed 300 experienced fund managers to see if they thought they were above average in their abilities. According to the survey, almost no one felt they were below average. The results represent a statistically unrealistic possibility.

H16: *Overconfidence bias has a significant effect on stock buying decisions.*

H17**:** *Basic financial literacy moderates the association between overconfidence bias and stock buying decisions*.

H18**:** *Advanced financial literacy moderates the association between overconfidence bias and stock buying decisions*.

Disposition Effect Bias

Festinger (1962) suggested a self-justification theory to explain the disposition effect. Ordinary people, it is argued, are more likely to justify their conduct based on incorrect judgement, and a person sometimes spends more money in a series of acts to overcome adversity, resulting in an even higher number of commitments for such items, and thus may end up financially disturbed by their decisions. Investors' aversion to selling assets that have dropped in value and preference for selling assets that have gained in value is known as the disposition effect. (Shefrin & Statman, 1985). Empirical findings suggest that due to disposition effect investors

are more likely to sell risky assets with capital gains than risky assets with capital losses, and it's been linked to poor trading results (Frydman, C. and Rangel, 2014).

***H19**: Disposition effect bias has a significant effect on stock buying decisions.*

***H20:** Basic financial literacy moderates the association between disposition effect bias and stock buying decisions.*

***H21:** Advanced financial literacy moderates the association between disposition effect bias and stock buying decisions*.

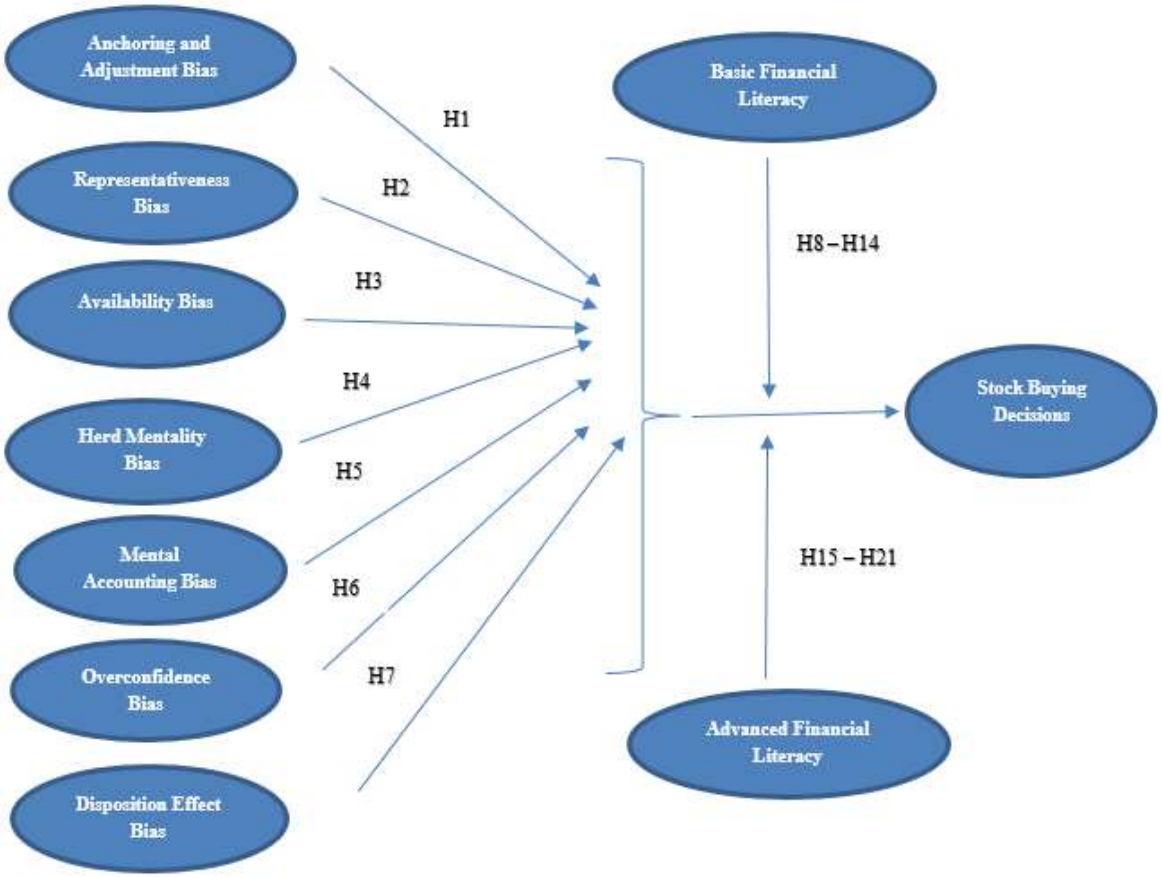

Figure 1: Conceptual Framework

Methodology

The underlying research philosophy and the ontological stance that derive this research is positivism since a scientific method has been applied using quantitative data to test hypotheses and asses results without any personal value judgements and researcher bias. Deductive approach has been used and the research design is entirely quantitative because theories under the ambit of behavioural finance have been tested, such as, prospect and heuristics theories, using quantitative data analysis techniques. The study can be termed explanatory and to some extent exploratory as well because of the aspect of exploring the effects of financial literacy at basic and advanced level.

Population and Sampling

The population of the current study includes people who are active stock investors, traders and stock analysts at Pakistan Stock Exchange. Convenience sampling has been used due to the diverse and scattered nature of the population wherein a total of 500 questionnaires were administered to investors, traders and employees of brokerage firms investing in Pakistan Stock

Exchange. Out of 500 questionnaires served, the response rate was 69%, i.e. 345. Missing values were handled with mean imputation method, however, respondents with missing values of more than 10 percent were deleted so as to ensure that the statistical analysis is without any bias (Bennett, 2001). After deleting such responses, cleaning the data and handling missing values, 326 responses were spared for data analysis. There are differing opinions of various scholars as to the selection of a sample size for a quantitative study. Sample of 250 has been prescribed to be appropriate for a quantitative study by some scholars and on the other hand, confidence interval can be the basis to select the sample size (Hair et al., 2006). Sekaran (2000) recommends that for multivariate data analysis, a minimum of 30 respondents per variable should be selected, therefore, this study having 10 variables, a sample size of 326 is justified.

Data Collection and Instrument

Data was collected through a structured questionnaire and the items/indicators to measure all the constructs were adopted from various studies as follows: Items for Anchoring and Adjustment Bias (6 questions), Representativeness Bias (6 questions), Availability Bias (6 questions) and Stock Buying Decisions (7 questions) have been adopted from Khan et al., (2017); Items for Herd Mentality Bias (3 questions), Mental Accounting Bias (3 questions) and Overconfidence Bias (4 questions) have been adopted from Kimani (2018); Items for Disposition Effect Bias (7 questions) have been adopted from Goo et al., (2010) whereas items for Basic Financial Literacy (5 questions) and Advanced Financial Literacy (5 questions) have been adopted from Van Rooij, Lusardi and Alessie (2011). Five point Likert scale was used to measure the reflective constructs of seven behavioural biases (independent variables) and the dependent variable (stock buying decisions) used in the study, ranging from 1 (strongly disagree) to 5 (strongly agree). However, the questions for assessing basic and advanced financial literacy were in the form of multiple choice questions in which out of 5 options 1 was correct and 4 were incorrect. In order to have a consistent five-point scale for all constructs, financial literacy responses were coded as follows for data analysis: Responses were coded as "1" if a respondent answered the question correctly and "0" if the chosen answer was incorrect. Scores for each respondent were then summed to create variables for basic and advanced level financial literacy in an ordinal scale; Score of "1" will indicate lowest level of literacy while a score of "5" will indicate highest level of literacy. As a result, basic and advanced financial literacy were measured through a single item variable in order to assess the extent of financial literacy in participants and examine its moderating effect in the model.

Data Analysis

The present study has employed partial least square structural equation modelling (PLS-SEM) with the help of SmartPLS 3.2 as the tool of data analysis. PLS-SEM is a multi-level regression technique designed to improve predictive accuracy of estimates and to account for explained variance in the endogenous constructs (Hair, Ringle and Sarstedt, 2011). Therefore, PLS-SEM was deemed to be an appropriate option for this study to analyse data.

Results and Discussion

Table 1 given below depicts the demographic profile of the respondents. Out of 326 respondents in the final sample, 71.8% were males whereas 28.2% were females which is understandable considering the reduced tendencies of females to invest in stocks in Pakistan Stock Exchange. However, 28.2% for females is still a significant number because the study mainly focused on big cities, such as, Karachi where the ratio of educated females is higher. 46.6% of respondents fall in the age bracket of 26-35 years which is an indication that a considerable portion of youth is investing in stocks in Pakistan and moreover people of this age bracket are financially independent as well. 33.1% of respondents are 25 years or below because the questionnaire was also sent to university students who invest in stocks because of the accessibility convenience. Respondents of various education levels are part of this study. The highest number is from master degree holders or above (51.5%) followed by bachelor

degree holders (38.7%). 63.2% of respondents were investing their own money in the stock market whereas 27.6% were investing in stocks on behalf of their clients.

Table 1: Sample Demographics

S. No.	Demographic	Sub-Groups	Frequency	% Frequency	Cumulative % Frequency
1	**Gender**	Female	92	28.2	28.2
		Male	234	71.8	100.0
		Total	326	100.0	
2	**Age**	25 years or below	108	33.1	33.1
		26 - 35 years	152	46.6	79.8
		36 - 45 years	48	14.7	94.5
		46 - 55 years	12	3.7	98.2
		More than 55 years	6	1.8	100.0
		Total	326	100	
3	**Level of Education**	Bachelors	126	38.7	38.7
		Diploma	3	0.9	39.6
		Intermediate / A Level	29	8.9	48.5
		Masters or above	168	51.5	100.0
		Total	326	100.0	
4	**Your decision to invest in stocks applies to:**	Both	30	9.2	9.2
		Your clients (Other people's money)	90	27.6	36.8
		Yourself (Your own money)	206	63.2	100.0
		Total	326	100.0	

Descriptive Analysis for Basic and Advanced Financial Literacy

Questions asked to assess the extent of financial literacy (basic and advanced) in the participants and the aspect of financial literacy covered are mentioned in table 2 whereas table 3 states the percentage of respondents who answered correctly.

Table 2: Questions on Basic and Advanced Financial Literacy

Basic		Advanced	
Questions for Basic Financial Literacy	**Aspect of Financial Literacy Assessed**	**Questions for Advanced Financial Literacy**	**Aspect of Financial Literacy Assessed**
1. "Suppose you had Rs. 100 in a savings account and the interest rate was 2 % per year. After 5 years, how much do you think you would have in the account if you left the money to grow?"	Ability to perform basic financial calculations	1. "Which of the following statements describes the main function of the stock market?"	Workings of the stock market
2. "Suppose you had Rs. 100 in a savings account and the interest rate is 20 % per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?"	Understanding of working of compound interest	2. "Which of the following statements is correct? If somebody buys the stock of firm B in the stock market:"	Knowledge of financial securities, e.g. stocks and bonds
3. "Imagine that the interest rate on your savings account was 1 % per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?"	Effect of inflation	3. "Which of the following statements is correct? If somebody buys a bond of firm B:"	Knowledge of financial securities, e.g. stocks and bonds
4. "Assume a friend inherits Rs. 10,000 today and his sibling inherits Rs. 10,000 3 years from now. Who is richer because of the inheritance?"	Time discounting	4. "When an investor spreads his money among different assets, does the risk of losing money:"	Risk diversification
5. "Suppose that in the year 2020, your income has doubled and prices of all goods have doubled too. In 2020, how much will you be able to buy with your income?"	Money illusion	5. "If the interest rate falls, what should happen to bond prices?"	Relationship between bond prices and interest rates.

Table 3: Response on Basic and Advanced Financial Literacy

Number of questions answered correctly	Extent of financial literacy as per the correct responses	Percentage of participants with correct responses on Basic Financial literacy	Percentage of participants with correct responses on Advanced Financial literacy
1	Lowest	3.7%	11%
2	Below average	6.4%	23.9%
3	Moderate	6.4%	19.3%
4	Above average	22.1%	17.2%
5	Highest	61.3%	28.5%

As seen in the table, 61.3 % of participants answered all questions correctly (indicating highest basic financial literacy) whereas only 3.7% participants answered one question correctly (indicating lowest basic financial literacy). Looking at all percentage responses, it can be inferred that basic financial literacy is prevalent in the investors at a high magnitude. However, percentage responses of advanced financial literacy questions reveal that only 28.5% respondents have highest advanced financial literacy and 11% participants have lowest level

of advanced financial literacy. Therefore, overall percentage responses indicate that financial literacy at an advanced level is not as prevalent as the basic level of financial literacy.

Measurement Reliability and Validity of Data

In order to ascertain internal consistency of the items, composite reliability and Cronbach's alpha tests were applied whereas average variance extracted was employed to gauge the validity of the instrument, i.e. whether it measure the constructs it intends to measure (Carmines and Zeller, 1979; Valentini and Damasio, 2016). As depicted in table 4 given below, the measures for reliability and validity of the constructs satisfy the minimum acceptable cut-off values, i.e. 0.7 for Cronbach's alpha and composite reliability and 0.5 for average variance extracted (Hair et al., 2014; Peterson & Kim, 2013). Therefore, it can be inferred that the measurement reliability and validity has been sustained in the data as per the requirement for further analysis in the structural model.

Table 4: Measurement Reliability and Validity of Data

Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Anchoring and Adjustment Bias	0.868	0.901	0.605
Representativeness Bias	0.852	0.890	0.575
Availability Bias	0.870	0.899	0.599
Herd Mentality Bias	0.874	0.923	0.800
Mental Accounting Bias	0.817	0.892	0.733
Overconfidence Bias	0.866	0.908	0.713
Disposition Effect Bias	0.884	0.907	0.586
Stock Buying Decisions	0.869	0.901	0.568

Discriminant Validity

In order to assess whether the constructs used in the study possess uniqueness, i.e. each construct is distinct from all other constructs, discriminant validity has been tested using Fornell-Locker criterion. The square root of total variance explained, which must be greater than the value of each pair of correlations, is calculated in the discriminant validity test (Fornell & Larcker, 1981; Ab Hamid et al., 2017; Hair et al., 2011; Henseler, J., Ringle, C.M. and Sarstedt, 2015). Tables 5 indicates that the discriminant validity for all constructs used in this study is achieved.

Table 5: Fornell-Locker Criterion

	Anchoring and Adjustment	Availability	Disposition Effect	Herd Mentality	Mental Accounting	Overconfidence	Representativeness	Stock Buying Decisions
Anchoring and Adjustment	0.778							
Availability	0.682	0.774						
Disposition Effect	0.570	0.590	0.765					
Herd Mentality	-0.445	-0.549	-0.474	0.894				
Mental Accounting	0.546	0.716	0.528	-0.498	0.856			
Overconfidence	-0.446	-0.589	-0.392	0.671	-0.587	0.844		
Representative-ness	-0.658	-0.595	-0.537	0.635	-0.499	0.536	0.758	
Stock Buying Decisions	-0.470	-0.342	-0.366	0.493	-0.266	0.369	0.478	0.754

Indicator Reliability-Factor Loading

The outer loading measures are computed to evaluate the number of items that can be kept or removed from the scale that are not causing any additional variance and to test the validity of the outer model. The minimum acceptable loading value for an item to be retained is 0.5 (Hair *et al.*, 2014). As depicted in the table 6 below, the outer loadings of all items used to measure the independent and dependent variables are more than 0.5, therefore all these items have been retained in the model.

Table 6: Outer Loadings

Items	Outer Loadings
Anch_Adj_1	0.857
Anch_Adj_2	0.864
Anch_Adj_3	0.742
Anch_Adj_4	0.702
Anch_Adj_5	0.751
Anch_Adj_6	0.737
Avail_1	0.839
Avail_2	0.787
Avail_3	0.748
Avail_4	0.663
Avail_5	0.775
Avail_6	0.820
Disp_Effect_1	0.742
Disp_Effect_2	0.832
Disp_Effect_3	0.769
Disp_Effect_4	0.784
Disp_Effect_5	0.806
Disp_Effect_6	0.808

Disp_Effect_7	0.592
Herd_Ment_1	0.867
Herd_Ment_2	0.937
Herd_Ment_3	0.877
Ment_Acc_1	0.865
Ment_Acc_2	0.891
Ment_Acc_3	0.811
OverConf_1	0.819
OverConf_2	0.868
OverConf_3	0.865
OverConf_4	0.823
Repre_1	0.809
Repre_2	0.728
Repre_3	0.798
Repre_4	0.769
Repre_5	0.654
Repre_6	0.781
Stock_Buy_Dec_1	0.862
Stock_Buy_Dec_2	0.831
Stock_Buy_Dec_3	0.756
Stock_Buy_Dec_4	0.829
Stock_Buy_Dec_5	0.682
Stock_Buy_Dec_6	0.723
Stock_Buy_Dec_7	0.548

Common Method Bias

Common method bias (CMB) occurs when the nature of the questionnaire produces variability in responses rather than the true tendency of the respondents that the instrument is seeking to detect. In other words, the instrument introduces a bias, which is then analysed through variances. As a result, the noise from the biased instruments pollutes the results obtained. CMB can be tested using Harman's single factor score; the total variance for a single factor should be less than 50% in order to deny the existence of CMB in the data (Podsakoff, P.M., et al., 2003). In this study, the same questionnaire was used to collect data within the same time frame; Moreover, research design was purely cross-sectional. Therefore, the possibility of common method bias (CMB) existed. We used Harman's single factor technique to check for the presence of CMB in the data by loading all items, measuring the latent variables, on to the one common factor. The first factor in the output showed 33.171% of variance which is below 50%, therefore, the data is free from CMB.

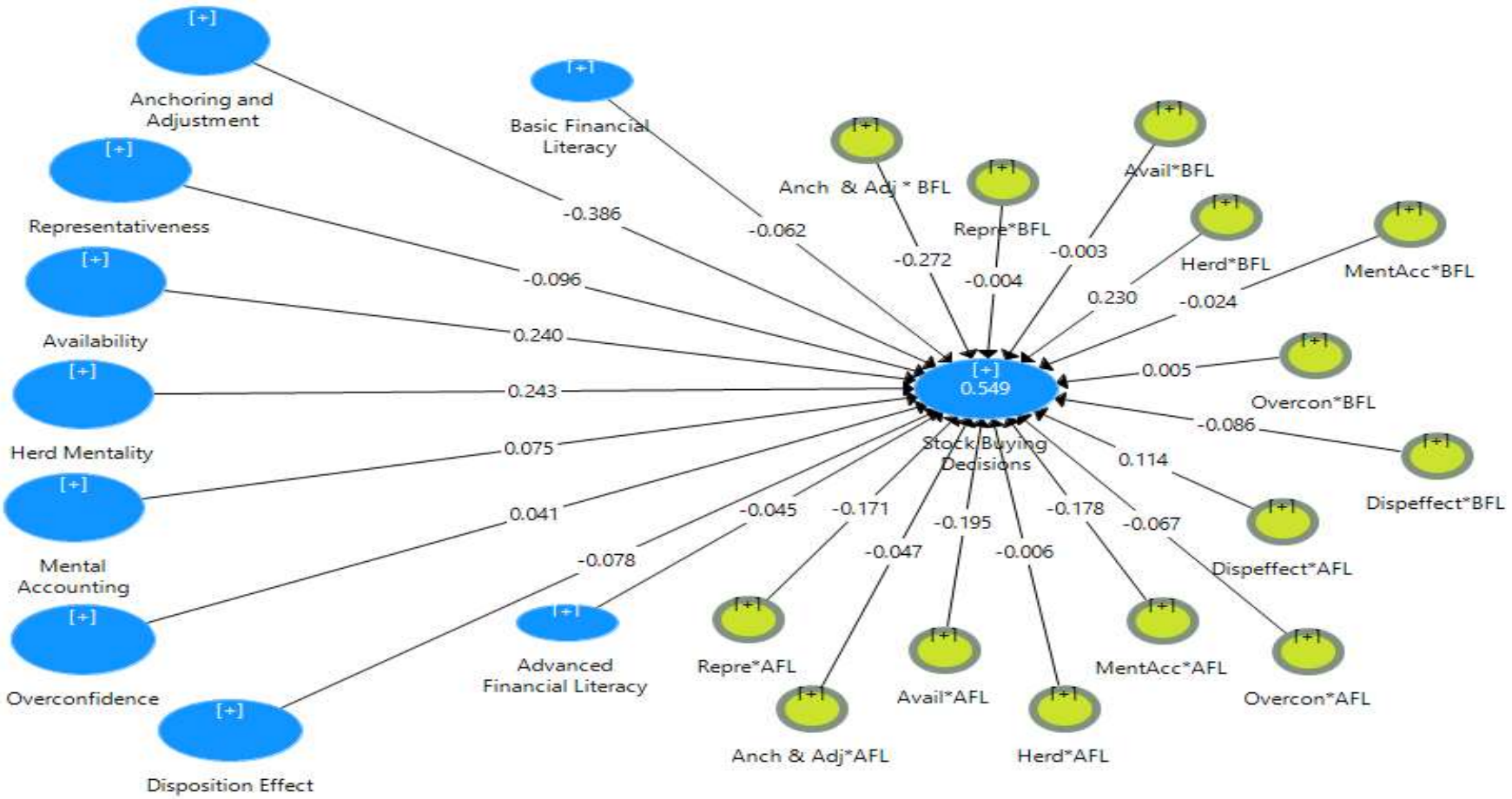

Figure 2: Conceptual Model in the Structural Equation Modelling showing the relationship amongst the constructs used in the study

Hypotheses Testing: PLS-Structural Equation Model and Moderation Analysis Results
Smart-PLS bootstrapping was used to measure the structural model. 5000 sub-samples were generated to derive the results and test the hypotheses. Table 7 given below presents the results of bootstrapping.

Table 7: Structural Equational Model / Hypothesis Testing Results

Hypotheses	B-Value	T-Value	P-Value	Decision
H1: Anchoring and Adjustment -> Stock Buying Decisions	-0.386	4.176	0.000	Supported
H2: Representativeness -> Stock Buying Decisions	-0.096	1.022	0.307	Not Supported
H3: Availability -> Stock Buying Decisions	0.240	2.523	0.012	Supported
H4: Herd Mentality -> Stock Buying Decisions	0.243	2.704	0.007	Supported
H5: Overconfidence -> Stock Buying Decisions	0.041	0.548	0.584	Not Supported
H6: Mental Accounting -> Stock Buying Decisions	0.075	1.116	0.265	Not Supported
H7: Disposition Effect -> Stock Buying Decisions	-0.078	1.079	0.281	Not Supported
Moderation Analysis				
H8: Anch & Adj * BFL -> Stock Buying Decisions	-0.272	1.920	0.055	Not Supported
H9: Repre*BFL -> Stock Buying Decisions	-0.004	0.037	0.970	Not Supported
H10: Avail*BFL -> Stock Buying Decisions	-0.003	0.027	0.979	Not Supported
H11: Herd*BFL -> Stock Buying Decisions	0.230	2.896	0.004	Supported
H12: Overcon*BFL -> Stock Buying Decisions	0.005	0.088	0.930	Not Supported
H13: MentAcc*BFL -> Stock Buying Decisions	-0.024	0.349	0.727	Not Supported
H14: Dispeffect*BFL -> Stock Buying Decisions	-0.086	0.786	0.432	Not Supported
H15: Anch & Adj*AFL -> Stock Buying Decisions	-0.047	0.342	0.733	Not Supported
H16: Repre*AFL -> Stock Buying Decisions	-0.171	1.065	0.287	Not Supported
H17: Avail*AFL -> Stock Buying Decisions	-0.195	1.798	0.072	Not Supported
H18: Herd*AFL -> Stock Buying Decisions	-0.006	0.057	0.955	Not Supported
H19: Overcon*AFL -> Stock Buying Decisions	-0.067	0.659	0.510	Not Supported
H20: MentAcc*AFL -> Stock Buying Decisions	-0.178	2.359	0.018	Supported
H21: Dispeffect*AFL -> Stock Buying Decisions	0.114	1.204	0.229	Not Supported

Model Fit Index and R Square

Model Fit Index	Saturated Model	Estimated Model
SRMR	0.089	0.089

Dependent Variable	R Square	R Square Adjusted
Stock Buying Decisions	0.549	0.515

Discussion, Conclusion and Recommendations

The results of the bootstrapping analysis, as depicted in the table 7, indicate that Anchoring and Adjustment bias has a significant negative effect on stock buying decisions ($\beta = -0.386$, $t = 4.176$) and therefore support H1. Moreover, H3 and H4 are also supported, since Availability bias ($\beta = 0.24$, $t = 2.523$) and Herd Mentality bias ($\beta = 0.243$ and $t = 2.704$) have positive significant effect on stock buying decisions. The remaining four behavioural biases do not appear to have a significant effect on Stock Buying Decisions, i.e. Representativeness bias, Overconfidence bias, Mental Accounting bias and Disposition Effect bias. The results of the moderating effects reveal that Basic Financial Literacy moderates the association between Herd Mentality and Stock Buying Decisions ($\beta = 0.230$, $t = 2.896$) and therefore support H11. In addition to this, H20 is also supported which indicates that Advanced Financial Literacy moderates the association between Mental Accounting bias and Stock Buying Decisions ($\beta = -0.178$, $t = 2.359$).

Model fit indices are computed to assess whether the observed data complies with the particular probability distribution (Hooper, D., Coughlan, J., & Mullen, 2008). Model fit index extracted from Smart-PLS3 is presented in the table 7 given above. The difference between the observed correlation and the model implied correlation matrix is known as the Standardized Root Mean Square Residual (SRMR). As a result, it can be used to evaluate the average magnitude of the differences between observed and expected correlations as an absolute measure of model fit. For SRMR, a value of zero means ideal fit since the SRMR is an absolute measure of fit; However, there is no penalty for model complexity in SRMR. A value of less than 0.10 can be regarded as a good fit (Hu and Bentler, 1999). SRMR value of 0.089 in this model is within the acceptable limit, therefore, the model can be deemed a good fit as per SRMR. Adjusted R square value is 0.515 which indicates that a 51.5% of variance in the dependent variable (stock buying decisions) is explained by the independent variables selected in the model which represents a considerable goodness-of-fit.

This study aimed at investigating the effect of behavioural biases on stock buying decisions and determining whether financial literacy at basic and advanced level strengthens or weakens the said effect. The results, as stated in the previous sections, are not quite aligned with the results corroborated by the existing literature on similar studies since out of the seven major behavioural biases, selected in this study, only three biases are found to have a significant effect on stock buying decisions (Anchoring and Adjustment, Availability and Herd Mentality) whereas the remaining four biases (Representativeness, Overconfidence, Mental Accounting and Disposition effect) are found to have no significant effect on stock buying decisions. Previous studies conclude that behavioural biases, by and large, have a significant effect on investment decisions as propagated by the theories of behavioural finance (Khan et al., 2017; Shefrin & Statman, 1985; Shefrin & Statman, 2011; Anderson et al., 2012). However, Goo et al., (2010) concludes that investors having college or advanced degree manifest a lower disposition effect which is to some extent aligned with the results of this study as 51.5% of respondents in this study were master degree holders or above and they exhibited lower disposition effect through their responses and disposition effect bias has no significant effect on stock buying decisions either. Acceptance of H3 and H4 (Significant effect of Herding

Mentality and Availability on Stock Buying Decisions) is in agreement with the results of previous studies (Khan et al., 2017, Hirshleifer & Hong Teoh, 2003; Krugman, 2009; Baker & Wurgler, 2007). The results of the effects of behavioral biases on stock buying decisions can, therefore, be summarized as follows: Investors having higher tendencies to get carried away by anchoring and adjustment bias are less inclined to invest in stocks as indicated by beta coefficient value of -0.386 whereas investors, while buying stocks, possess tendencies to be affected by herd mentality and availability biases. These results are, nevertheless, an indication that behavioral biases do not have a substantive effect on stock buying decisions in the investors of Pakistan Stock Exchange which, in turn, implies that the stock market in Pakistan is likely to have strong or semi-strong form of efficiency because investors do not fall prey to behavioral biases in a manner suggested by theories in behavioral finance, such as, heuristics and prospect theories. Unlike other similar studies, this study differentiated between basic and advanced level of financial literacy and examined their moderating role on the effect of behavioral biases on stock buying decisions. The results reveal that investors in Pakistan Stock Exchange possess a higher level of basic financial literacy whereas the investors displayed a moderate level of advanced financial literacy. Investors were well aware of the basic computations in Finance, concept of time value of money, compounding effect and the effects of inflation on their savings and investment, however, when it comes to concepts relating to relationship between bond prices and interest rates, knowledge of financial assets, functioning of capital markets and diversification benefits, investors were not as up to the mark in answering the questions as they were in the case of basic literacy questions. The results of moderation effects reveal that basic financial literacy marginally weakens the effect of herd mentality on stock buying decision; Moreover, advanced financial literacy moderates the relationship between mental accounting bias and stock buying decisions. All other moderation effects of basic and advanced financial literacy are insignificant, therefore, it can be concluded that financial literacy, both at basic and advanced level, by and large, do not alter the effects of behavioral biases in the investors of Pakistan Stock Exchange.

The results derived from this study have potential implications including theoretical as well as practical. Regulators of capital markets at the government and institutional level should initiate educational programs to impart financial knowledge among potential investors, specifically at an advanced level, since financial literacy at basic level is pretty common among investors as per the results of this study. Advanced financial literacy is very scarce in the stock investors of Pakistan stock exchange. Investors should increase their financial literacy so that they do not fall prey to herd mentality and mental accounting biases as corroborated by this study. Moreover, investors should be wary of three behavioral biases while making stock buying decisions (Anchoring and adjustment bias, availability bias and herd mentality bias) since these three biases have significant effects on stock buying decisions. The more the investors can get rid of these biases while making investment decision, the more rational decisions they will be able to take which will save them from losses. At the market level, regulators like the Securities & Exchange Commission of Pakistan (SECP), which regulates capital markets in Pakistan, should initiate awareness programs for the investors to help them control the behavioral and cognitive biases so that the investors, by and large, make informed and rational decisions and as a result capital markets will become more efficient which will preclude creation of financial bubbles in the economy and eventually make stock markets and the economy more stable.

Research Limitations and Future Work

This study collected data mainly from the cities of Karachi and Hyderabad in Pakistan due to resource and time constraints, therefore, the results cannot be generalized to the entire country. Future similar studies, however, can be conducted in smaller cities where the level of general education is overall low and the results might be different there as financial literacy may have a stronger moderating effects. Although the sample size was statistically justified, it can be

further increased in future researches as that might make the results more generalizable. Random sampling could not have been used in this study because of the scattered nature and inexact quantity of the population of this study. Risk aversion tendencies can also be taken as a moderator along with financial literacy in future researches and the effects could be examined on investment decisions in derivatives in Pakistan Mercantile Exchange.

References:

Ariely, D., Loewenstein, G. and Prelec, D., 2006. Tom Sawyer and the construction of value. *Journal of Economic Behavior & Organization*, *60*(1), pp.1-10.

Baker, M. and Wurgler, J., 2007. Investor sentiment in the stock market. *Journal of economic perspectives*, *21*(2), pp.129-152.

Barberis, N., Shleifer, A. and Vishny, R.W., 2005. *A model of investor sentiment* (pp. 423-459). Princeton University Press.

Bennett, D.A., 2001. How can I deal with missing data in my /study? *Australian and New Zealand journal of public health*, *25*(5), pp.464-469.

Brewer, N.T., Chapman, G.B., Schwartz, J.A. and Bergus, G.R., 2007. The influence of irrelevant anchors on the judgments and choices of doctors and patients. *Medical Decision Making*, *27*(2), pp.203-211.

Carmines, E.G. and Zeller, R.A., 1979. *Reliability and validity assessment*. Sage publications.

Darrell Fox, B.S.W., 2018. Name: Devinder Singh Dhaliwal.

Everett, J.A., 2013. The 12 item social and economic conservatism scale (SECS). *PloS one*, *8*(12), p.e82131.

Festinger, L., 1957. *A theory of cognitive dissonance* (Vol. 2). Stanford university press.

Fornell, C. and Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, *18*(1), pp.39-50.

Fromlet, H., 2001. Behavioral finance-theory and practical application: Systematic analysis of departures from the homo oeconomicus paradigm are essential for realistic financial research and analysis. *Business economics*, pp.63-69.

Frydman, C. and Rangel, A., 2014. Debiasing the disposition effect by reducing the saliency of information about a stock's purchase price. *Journal of economic behavior & organization*, *107*, pp.541-552.

Gervais, S. and Odean, T., 2001. Learning to be overconfident. *the Review of financial studies*, *14*(1), pp.1-27.

Goo, Y.J., Chen, D.H., Chang, S.H.S. and Yeh, C.F., 2010. A study of the disposition effect for individual investors in the Taiwan stock market. *Emerging Markets Finance and Trade*, *46*(1), pp.108-119.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L., 2006. Multivariate data analysis 6th Edition.

Hair, J.F., Ringle, C.M. and Sarstedt, M., 2011. Journal of Marketing Theory and Practice PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(2), pp.139-152.

Henseler, J., Ringle, C.M. and Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, *43*(1), pp.115-135.

Hirshleifer, D. and Hong Teoh, S., 2003. Herd behaviour and cascading in capital markets: A review and synthesis. *European Financial Management*, *9*(1), pp.25-66.

Hooper, D., Coughlan, J. and Mullen, M., 2008, September. Evaluating model fit: a synthesis of the structural equation modelling literature. In *7th European Conference on research methodology for business and management studies* (pp. 195-200).

Jordan, P.J. and Troth, A.C., 2020. Common method bias in applied settings: The dilemma of researching in organizations. *Australian Journal of Management*, *45*(1), pp.3-14.

Kahneman, D. and Tversky, A., 1979. On the interpretation of intuitive probability: A reply to Jonathan Cohen.
Khan, H.H., Naz, I., Qureshi, F. and Ghafoor, A., 2017. Heuristics and stock buying decision: Evidence from Malaysian and Pakistani stock markets. *Borsa Istanbul Review*, *17*(2), pp.97-110.
Kimani, S.M., 2018. *The Effect of Behavioural Biases on Individual Investment Decisions at the Nairobi Securities Exchange* (Doctoral dissertation, university of nairobi).
Krugman, P., 2009. How did economists get it so wrong? *New York Times*, *2*(9), p.2009.
Mallery, P., 2003. SPSS for windows step by step. *Canadà: La Sierra University*.
Markowitz, H.M., 1952. Portfolio Selection/Harry Markowitz. *The Journal of Finance*, *7*.
Montier, J. and Strategy, G.E., 2002. Applied Behavioural Finance: Insights into irrational minds and market. *Unpublished manuscript*.
Montier, J., 2006. Behaving badly. *Available at SSRN 890563*.
Odean, T., 1998. Are investors reluctant to realize their losses? *The Journal of finance*, *53*(5), pp.1775-1798.
Peterson, R.A. and Kim, Y., 2013. On the relationship between coefficient alpha and composite reliability. *Journal of applied psychology*, *98*(1), p.194.
Pompian, M.M. and Wood, A.S., 2006. Behavioral finance and wealth management: How to build optimal portfolios for private clients.
Pompian, M.M., 2011. *Behavioral finance and wealth management: how to build investment strategies that account for investor biases* (Vol. 667). John Wiley & Sons.
Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology*, *88*(5), p.879.
Prahastuti, S., Hidayat, M., Hasianna, S.T., Widowati, W., Amalia, A., Yusepany, D.T., Rizal, R. and Kusuma, H.S.W., 2019, November. Antioxidant potential ethanolic extract of Glycine max (l.) Merr. Var. Detam and daidzein. In *Journal of Physics: Conference Series* (Vol. 1374, No. 1, p. 012020). IOP Publishing.
Prayag, G., 2009. Tourists 'evaluations of destination image, satisfaction, and future behavioral intentions—the case of Mauritius. *Journal of Travel & Tourism Marketing*, *26*(8), pp.836-853.
Ritter, J.R., 2003. Behavioral finance. *Pacific-Basin finance journal*, *11*(4), pp.429-437.
Rubinstein, M., 2001. Rational markets: yes or no? The affirmative case. *Financial Analysts Journal*, *57*(3), pp.15-29.
Sekaran, U., 2000. Research methods of business: A skill-building approach, 3dn, Johan Wiley & Sons.
Sharpe, W.F., 1970. Efficient capital markets: a review of theory and empirical work: discussion. *The Journal of Finance*, *25*(2), pp.418-420.
Shefrin, H. and Statman, M., 1985. The disposition to sell winners too early and ride losers too long: Theory and evidence. *The Journal of finance*, *40*(3), pp.777-790.
Shefrin, H. and Statman, M., 2011. Behavioural finance in the financial crisis: market efficiency, Minsky, and Keynes. *Santa Clara University, November*.
Sigel, B.A., Benton, A.H., Lynch, C.E. and Kramer, T.L., 2013. Characteristics of 17 statewide initiatives to disseminate trauma-focused cognitive-behavioural therapy (TF-CBT). *Psychological Trauma: Theory, Research, Practice, and Policy*, *5*(4), p.323.
Subrahmanyam, A., 2008. Behavioural finance: A review and synthesis. *European Financial Management*, *14*(1), pp.12-29.
Szyszka, A., 2010. Behavioural anatomy of the financial crisis. *Journal of Centrum Cathedra*, *3*(2), pp.121-135.
Tan, L., Chiang, T.C., Mason, J.R. and Nelling, E., 2008. Herding behavior in Chinese stock markets: An examination of A and B shares. *Pacific-Basin finance journal*, *16*(1-2), pp.61-77.

Valentini, F. and Damasio, B.F., 2016. Average variance extracted and composite reliability: reliability coefficients/variancia media extraida e confiabilidade composta: indicadores de Precisao. *Psicologia: Teoria e Pesquisa*, *32*(2).
Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial economics*, *101*(2), 449-472.
Waweru, N.M., Munyoki, E. and Uliana, E., 2008. The effects of behavioural factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, *1*(1), pp.24-41.