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# The Impact of Heuristic Biases on Investors' Investment Decision Making; Evidence from Colombo Stock Exchange

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## ABSTRACT

This paper aims to investigate the impact of heuristic biases on the decision making of individual investors' who are actively trading on Colombo Stock Exchange (CSE). Most studies focus on well-developed financial markets and very little is known about investors' behaviour in less developed financial markets or emerging markets. The present study contributes to filling this gap in the literature. Investors' heuristic biases have been measured using a five-point Likert scale questionnaire which contained numerous items including indicators of investment decisions. The sample consists of 140 individual investors trading on the CSE. The systematic random sampling technique was used for data collection. To examine the impact of heuristic biases on investment decision making, hypotheses were tested by using multiple regression analysis. The results suggest that, there is a significant impact from the heuristic bias create from the initial piece of information (Anchoring and adjustment bias) over the investment decision making. But other biases such as the overconfidence bias, representativeness bias and availability bias are not much significantly impact on investment decision making by the individual investors in CSE. The paper inspires the investors to avoid relying on heuristic biases when making investments. It provides awareness and understanding of heuristic biases in investment management which could be really worth for decision makers and professionals in financial institutions, such as portfolio managers and traders in commercial banks, investment banks and mutual funds. This paper helps investors to select better investment tools and to avoid repeating expensive errors, which occur because of heuristic biases. So, it is necessary to focus on a specific investment strategy to control mental mistakes by investors due to heuristic biases.

**Keywords:** Availability, Anchoring & Adjustment, Investment Decision, Overconfidence, Representativeness.

## INTRODUCTION

At present, most individuals have to make distinctive choices in their lives, some choices are substantial, and others are of little consequence. That means, some decisions are very simple whereas others are very complicated and therefore it generates the requirement of a multi-step decision-making process. Recent studies in the field of standard finance demonstrate that individual investors want to make their investment decisions rationally (Kubilay & Bayrakdaroglu, 2016). Many theories of standard finance have been developed with the assumption that investors in the financial markets are rational and always make rational decisions. According to Arora and Kumari (2015) most investors use different models and theories which are coming under standard finance to estimate the risk and expected returns when making investment decisions. Therefore, traditional financial theories assume that individual investors are rational beings.

But there are some cases that the investors display an irrational behaviour within the marketplace. Trading excessivel, purchasing stocks without looking at the fundamental

values, buying stocks which their friends are buying, taking decisions based on their past performance and retaining loss-making stocks while selling winning stocks are some of them. As a result of theorisation of these irrational behaviours, a new discipline called behavioural finance has begun to develop after gathering enough information that confirms human behaviour, which contradicts with the traditional finance theory. So, when focusing about behavioural finance, it says there are some situations that human beings do not behave rationally, and their decisions are influenced by the psychological feelings. That means, behavioural finance scholars, advocate that each individual has unavoidable psychological biases that prevent them from making rational decisions and those psychological biases may lead to having bad consequences on the investment decisions. And also, Bakar and Yi (2016) found that psychological factors have a significant impact on the decision-making of individual investors who are in the stock markets. Some other researchers have found that cognitive errors, fundamental heuristics and psychological biases are the various factors that affect the investment decision-making process (Baker & Nofsinger, 2010). According to that, there are some behavioural factors affecting the investment decisions of individual investors which are Herding factors, Heuristics factors, Prospect factors and Market factors.

According to Shefrin, H (2007) behavioural biases are the main reason for irrationality in decision-making and poor investment performance. The focus of this study is on those behavioural biases and out of those behavioural biases, the researchers focuses on Heuristic biases. That means, here the researchers focused on four main heuristic biases called overconfidence bias, representativeness bias, anchoring & adjustment bias, and availability bias. Therefore, in this study, the heuristics theory can be identified as one of the most important theories in behavioural finance. According to the heuristic theory, decision-makers use these heuristics to avoid the risk of losses in uncertain situations. Heuristics are rules of thumb, which decision-makers use in complex and uncertain situations to make decisions easily (Brabazon, 2000; Ritter, 2003) by reducing the complexity of measuring probabilities and forecasting values to simpler judgments (Tversky & Kahneman, 1974). By using these heuristics, human beings can speed up their decision-making process relative to rationally processing the available information. Generally, when the time is limited, these heuristics are beneficial as well as useful (Waweru et al., 2008). Whatever it may be, according to the Kahneman and Tversky (1974) ; Ritter (2003) these heuristics may lead to biases. And also, all heuristics are a form of effort reduction, using one or more of the following: analysing only a few clues, integrating less information or analysing only a few alternatives (Shah & Oppenheimer, 2008). So, to reduce the risk of loss in uncertain situations most investors have used these heuristic biases like overconfidence bias, representativeness bias, availability bias, anchoring & adjustment bias. Here, even though the individual investors can reduce the mental effort in the decision-making process by using these heuristics, they may be led to some errors in judgement. As a result, investors make inaccurate decisions and it will further affect to the performance of the investment.

When determining the market trend, the decisions taken by the individual investors in the stock market play a significant role. Therefore, to understand and provide an appropriate explanation for the investors' decisions, it's needed to investigate which heuristic biases are influencing on the decisions of the individual investors in CSE and how these heuristic biases are further affecting to the performance of the investment decisions.

And, since the field of behavioural finance is an emerging area for research relative to other financial theories, this study is going to be unique. When considering the financial markets in developing countries, behavioural finance has a limited number of applications

(Ahmad et al., 2018). So as a developing country when focusing on the Sri Lankan context, there is a lack of empirical research to explain the impact of these heuristic biases on the individual investors' decision-making in CSE. According to Kengatharan & Kengatharan (2014) as there are limited studies about behavioural finance in Sri Lanka, this study provides a greater contribution to the development of this field within Sri Lanka. Hence, this research is conducted with the hope of ensuring the suitability of using behavioural finance for such kind of financial markets.

On the other hand, when considering the global context, as per the previous studies much research on heuristic biases have so far focused on Western countries. The studies which are conducted in Western contexts cannot be generalized to the Asian countries (Ahmad et al., 2018). It may not necessarily have any relevancy to Sri Lankan context, because of the differences in contextual paradigm (i.e., individualist vs collectivist). That means, most studies have concentrated on individualistic cultures and well-developed financial markets whereas very little is known about the profiles, inspirations and conduct of individual investors in collectivist cultures and less developed markets. So, there is a significant gap and this study helps to fill that gap in the literature by considering how the investors' behavioural biases affects the performance of the investment decisions in collectivist societies, particularly in Sri Lanka. Moreover, since the Sri Lanka is a different country with regard to culture, political and legal settings compared to developed nations as well as some developing countries, the findings from other countries cannot be applied directly to the Sri Lankan setting (Rajeshwaran, 2020). Another thing is, thinking level of Sri Lankan investors also vary from investors in developed countries and hence this study is going to contribute contextually. Therefore, the overall objective of the study is to identify the impact of heuristic biases on the investment decisions of individual investors trading in CSE.

Nowadays, since the investment decisions play a significant role than ever before, this study is more important as well as very useful not only for individual investors but also for other decision-makers and professionals in financial institutions such as portfolio managers & traders in commercial banks, investment banks and mutual funds. Out of

those beneficiary parties, here it is mainly focused on individual investors. Therefore, this analysis can avoid the individual investors from relying on the heuristic biases or feelings, when making their investment decisions and it would be led to the overall performance of such investment decisions. Another thing is through this study, individual investors will be able to acquire an appropriate awareness and understanding relating to these heuristic biases in investment management. And, when making the investment decisions by individual investors, repeating expensive errors can be occurred due to these heuristic biases. So, to avoid such repeating expensive errors, investors have to choose the better investment tools and this study would be more helpful in such situations as well. According to that, this research encourages individual investors to improve the performance of their investments by recognizing these biases and errors in judgement. Therefore, to control "mental mistakes" done by the individual investors due to these heuristic biases, it is necessary to focus on a specific investment strategy.

## LITERATURE REVIEW

Number of researchers have investigated the impact of psychological biases on individual investors' decision making from various aspects in various cultures or environments, some of which obtained most relevant and valuable results for this study. However, a limited review of prior studies relating to the heuristic biases, such as overconfidence bias, representative bias, availability bias, anchoring and adjustment bias and its impact on individual investors' decision-making are cited hereafter.

Traditional finance theory indicates investment decisions are based on the assumption that investors behave in a rational

way (Sherif, 2016). That means they always try to earn returns for the money they invest in the stock markets. Therefore, to become successful within the stock market it is required for the investors to have rational behaviour patterns (Sherif, 2016).

At present, behavioural finance has become an integral part of the decision making, since it significantly influences the performance of investors (Kengatharan & Kengatharan, 2014). Behavioural finance theory suggests that when making the investment decisions investors do not behave in a rational way at every time (Sherif, 2016). That means there are some situations that the investors deal with some cognitive and psychological errors. These errors are known as behavioural biases and they may exist in many ways. Therefore, the behavioural finance theory mainly focuses on psychology and it leads to understand how emotions and cognitive errors influence on behaviours of individual investors (Kengatharan & Kengatharan, 2014). Moreover, Gunathilaka (2014) has found that individual investors can be influenced by investors' psychological factors. According to Ritter (2003) behavioural finance is purely based on psychology and it argues that individual investors' decision-making process is subject to different cognitive illusions. Moreover, behavioural finance concept describes individual behaviour and collective behaviour through the integration of sociology, psychology, and other behavioural sciences (Kawshala et al., 2020).

According to Gitman and Joehnk (2008) scholars in behavioural finance advocate that investment decisions of individual investors are influenced by a number of beliefs and biases. Due to such beliefs and biases, investors overreact to various types of financial information and underreact to others. So that, they make not only irrational decisions but also, they affect to their risk-taking behaviours as well (Bakar & Yi, 2016). This behavioural finance theory leads to form the heuristics theory, which is known as "rules of thumb" (Bakar & Yi, 2016).

When focusing on the heuristic theory, many experiments and theoretical evidences propose that there are different types of heuristics, which affect to the decision-making process of the investors. Heuristics are referred to as simple efficient rules of thumb. Such heuristics have been proposed to provide an explanation about how people make decisions, how they come to judgments and how they solve problems when they are facing complex situations or when they have incomplete information (Gitau et al., 2019). Moreover, some researchers advocate that many people try to make decisions by using mental shortcuts and when making decisions, they do not consider all available information and therefore, they do not engage in a complex analytical process. According to Ritter (2003) these heuristics make the decision-making process easier, specially within a complex and uncertain environment. Generally, these heuristics are more useful when the available time is limited (Waweru et al., 2008). According to Daniel Kahneman (2011) and Parikh (2009) even though these rules perform well under many circumstances, there may be certain situations, which lead to systematic cognitive biases. In year 1974, Kahneman & Tversky were the first writers of biases relating to heuristic theory by introducing three main heuristic biases named representativeness bias, availability bias, and anchoring bias (Tversky & Kahneman, 1974). Then Waweru et al. (2008) introduced the Overconfidence bias into heuristic theory. According to Weerawansa and Morage (2018) heuristics have a strong negative relationship with investment decision making.

**Overconfidence Bias and Investment Decision Making**

According to Pompain (2006) overconfidence is one of the main heuristic biases, which can be explained as unwarranted faith in one's intuitive reasoning, judgments and cognitive abilities. When individuals overestimate their knowledge and skills, it is a demonstration of overconfidence (De Bondt & Thaler, 1995; Hvide, 2002). According to Pompain (2006) "too many people overvalue what they are not and undervalue what they are and such people

suffer from overconfidence bias". Therefore, as per the previous scholars there are three attributes, which reflect the individuals who are suffering from overconfidence bias. They are overestimation, over-placement and over-precision. If the individuals focus only on their own skills and the beliefs of decision makers about their quality of performance rather than their actual performance it can be defined as the overestimation (Statman et al., 2006). Duttle Kai (2015) found that "Overestimation can be measured through over-performance, the level of control, chance of success and overestimation of one's actual abilities". If the people consider that, they are better than others that is the over-placement (Larrick et al., 2007). If the investors are ignoring the risk factors, which are associated with investment decisions and if they are too or excessively certain of their judgments that is the over-precision (Odean, 1999). Sometimes after receiving new information, individual investors do not revise their initial assessment appropriately and so that they do not consider to what extent their assessment may be inaccurate. That is also a main reason for overconfidence bias.

When focusing about the investment decision-making, the overconfidence bias has very bad consequences for decision-making process and the performance of the investors. According to Bakar and Yi (2016) "overconfidence bias has a significant impact on investors' decision-making". If some investor is suffering from overconfidence bias there is a tendency of underestimating the risk factors and overestimating the expected profit by such investor (Baker & Nofsinger, 2010). When investors forecast the trend, they overestimate their own ability and therefore it generates the adverse forecasting results (Shefrin, 2000). Sometimes overconfidence of the traders may lead to take place an excessive trading on stock exchanges, which results in low returns for traders (Odean, 1998). According to Chen et al. (2007) since the Chinese investors are suffering from overconfidence bias, they make poor trading decisions or do some trading mistakes. Waweru et al. (2008) suggests that overconfidence bias affected the institutional investors' financial decisions on the Nairobi Stock Exchange. Kengatharan and Kengatharan (2014) proposed that this overconfidence bias has negative significant influence on investment related choices and their performance as well. Gamage et al. (2021) has found that overconfidence has no significant impact on individual investment decisions of equity investors at CSE.

**Representativeness Bias and Investment Decision Making**

Representativeness can be described "as the degree of similarity that an event has with its parent population" (De Bondt & Thaler, 1995) or "the degree to which an event represents its population" (Tversky & Kahneman, 1974). Investors provide more value to recent experience and try to ignore the average long-term rate due to this representativeness (Ritter, 2003). According to Shefrin (2008) sometimes individuals make forecasts which are not appropriate for the relevant situations because representativeness puts much trust in stereotypes. As per the many studies, there are two kinds of representativeness bias. They are base-rate neglect (When assessing the likelihood of a particular investment outcome, the decision maker considers the irrelevant information) (Pompian, 2006) and sample-size neglect (Decision makers inaccurately assume that small sample sizes are representative of populations or they try to depend on too few samples rather than complex data) (Barberis & Thaler, 2003). Under this representativeness heuristic, some researchers argue that most individuals are insensitive to the sample size as they incorrectly believe that small samples of events, people etc. are some kinds of representatives of the entire populations from which the sample is drawn.

When considering the representativeness bias with investment decision making, some scholars have found a positive relationship among them. That means, because of the representativeness bias investment decisions are improved. According to Toma (2015) identified that returns of the individual investors increased because of the representativeness bias. Ikram (2016) found

that there is a positive relationship between the representativeness bias and decisions of individual investors who are trading on the Islamabad stock exchange. On the other hand, some researchers disagree with the above view that there is a positive relationship between representativeness bias and investment decision-making. That means investors who are suffering from representativeness bias make some trading mistakes and make poor trading decisions, which lead them to an irrational behaviour. Gamage et al. (2021) has found that representativeness has no significant impact on individual investment decisions of equity investors at CSE. According to Lakonishok et al. (1994) due to the representativeness problem many companies engage in poor investments.

**Availability Bias and Investment Decision Making**

When making judgements or forecasting, if the people rely too much on easily available information that can be defined as the availability bias (Ngoc, 2013). If some investor assesses the possibility of an outcome by depending on how easily the outcome comes to mind, availability bias occurs (Tversky & Kahneman, 1974). According to many studies, the decision makers who are suffering from availability bias are unable to diversify their investment portfolio and they try to choose investments without going for a thorough analysis of the options and so that they fail to choose alternative investments when suitable since they limit their investment opportunities.

When considering the availability bias with decision making of the investors, many studies have identified that there is a positive relationship among them. That means, because of the availability bias investment decisions are improved and returns of the individual investors are also increased. According to Khan (2015) also identified that there is a significant impact of availability bias on the individual investors' decision-making. Gamage et al. (2021) proposed that availability heuristic has a significant impact on individual investment decisions of equity investors at CSE. But some researchers disagree with the above view and they have identified some situations where the availability bias negatively affects individuals' investment decisions. A study conducted by Waweru et al. (2008) indicated that financial decisions of institutional investors who trading on the Nairobi Stock Exchange are affected by the availability bias. Moreover, some scholars found that individuals' stock picking decisions are also affected by the availability bias (Massa & Simonov, 2005).

**Anchoring & Adjustment Bias and Investment Decision Making**

Anchoring and adjustment bias occur during the decision-making process and it explains when making the investment decisions or judgements, there is a high tendency of investors to rely excessively on the initial piece of information provided. When there is the initial piece of information, then all other assessments or judgements revolve around that. As a result, there may be a chance of occurring an error or bias towards interpreting the other information as well. According to the Kahneman and Tversky (1974) "different starting points yield different estimates, which are biased towards the initial value" and that phenomenon is called anchoring. Pompain (2006) suggest that when making the investment decisions there may be a tendency of individual investors to "anchor" their ideas or thoughts to a logically irrelevant reference point and that can be explained as the anchoring and adjustment bias.

When focusing about the decision-making, Waweru et al. (2008) found that anchoring and adjustment bias affected for the financial decisions of institutional investors who are trading on the Nairobi Stock Exchange. Some researchers have identified that there is a positive impact of anchoring and adjustment bias to the risky investment decisions (Ishfaq, M. & Anjum, N., 2015). According to Kengatharan and Kengatharan (2014) anchoring heuristic has a positive significant influence on investment decision making and performance of the individual investors. As per the study conducted by Abraham et al. (2014) indicates that anchoring and adjustment bias

impact to the investment decisions of listed property fund managers in South Africa. Some scholars have shown that this bias influences the various type of decisions like "real estate acquisitions, job performance

evaluations, judges' rankings in competitions and personal injury verdicts etc.". Moreover, this bias may lead to some errors in judgements and the potential missed gains.

**Conceptualization and Hypothesis Development**

When focusing about the conceptualization of the current study, it basically assesses the relationship among the core constructs of heuristic biases and investment decision making of the individual investors. Elaborating in detail, individual investors' decision making is the dependent variable and the heuristic biases are the independent variables which comprise of four main heuristic biases called overconfidence bias, representative bias, availability bias, anchoring and adjustment bias.

Based on the literature review, researcher developed the conceptual framework for the study as follows. It graphically explains how the research study achieves the questions and objectives of the study.

***Independent Variables*** ***Dependent Variable***

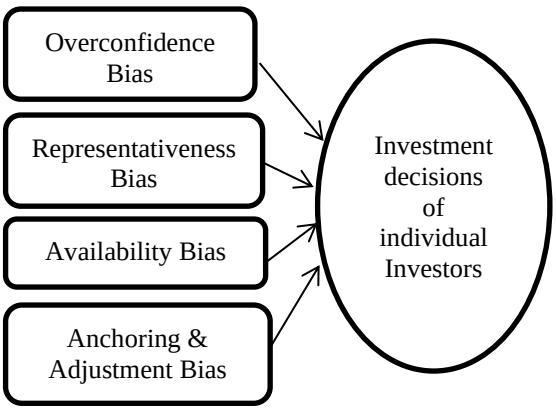


**Figure 01 – Conceptual Framework**

**Hypothesis**

As per the discussion in the above section and with the support of the existing literature, this study establishes the following hypotheses.

- H1: Overconfidence bias has a significant impact on the investment decisions of individual investors in CSE.
- H2: Representativeness bias has a significant impact on the investment decisions of individual investors in CSE.
- H3: Availability bias has a significant impact on the investment decisions of individual investors in CSE.
- H4: Anchoring and adjustment bias has a significant impact on the investment decisions of individual investors in CSE

**RESEARCH METHODOLOGY**

Research design is the central part of a good research. Kothari (2004) indicates that the research design as "the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurements and analysis of data" Moreover, the research design should be based on the research objectives and the scope of the study followed by the research questions. Recalling the main objective of this study is to determine the impact of heuristic biases on the investment decisions of individual investors in CSE. That means, here it is focused to identify the IV (Heuristic biases) DV (Investment decisions of individual investors) relationship based on the hypothesis testing supported by the available literature. Thus, this is mainly a correlational study. Accordingly, the positivist philosophy and the deductive reasoning are more appropriate to achieve the research objectives of the study and hence, mainly utilizes the quantitative research methods in data analysis purposes.

Under operationalization, the current study consists of five main constructs (1) Investment decisions of individual investors is the endogenous or dependent variable and (2) Overconfidence bias (3) Representativeness

bias (4) Availability bias (5) Anchoring and Adjustment bias are the four exogeneous or independent variables of the study. In order to measure each construct, the study employed a standard questionnaire and the following section will elaborate how each construct was operationalized and the measurement scales used for measuring each construct in detail and following table produces the summary of the measurement scales.

**Table 01 - The Summary of the Operationalization of Personal Information (Part A of the Questionnaire)**

| Part A | No. of items | Sources |
|---|---|---|
| Personal Information (PI) | 7 items (PI1, PI2, PI3, PI4, PI5, PI6, PI7) | Nada and Moa'mer (2013), Prasad et al. (2015) |

*Source - Developed by the researcher*

**Table 02 - The Summary of the Operationalization of Main Constructs (Part B of the Questionnaire)**

| Part B - Construct | No. of items and Measurement scale | Sources |
|---|---|---|
| Investment Decision Making (ID) | 7 items (ID1, ID2, ID3, ID4, ID5, ID6, ID7)<br>Five-point Likert Scale | Nyamute (2016) |
| Overconfidence Bias (OB) | 4 items (OB1, OB2, OB3, OB4)<br>Five-point Likert Scale | Awan et al. (2010), Odean (1999), Barber and Odean (2000) |
| Representativeness Bias (RB) | 4 items (RB1, RB2, RB3, RB4)<br>Five-point Likert Scale | Nada and Moa'mer (2013) |
| Availability Bias (AB) | 4 items (AB1, AB2, AB3, AB4)<br>Five-point Likert Scale | Nada and Moa'mer (2013) |
| Anchoring and Adjustment Bias (AAB) | 4 items (AAB1, AAB2, AAB3, AAB4)<br>Five-point Likert Scale | Nada and Moa'mer (2013) |

*Source - Developed by the researcher*

When considering the unit of analysis, since the focus of this study is to determine the impact of heuristic biases on individual investors' decision making, the unit of analysis can be identified as the "individual level". That means, all the data required for this study was collected from individual investors in CSE.

When determining the sample design, the population for this study was identified as all individual investors in Colombo Stock Exchange because, this study was conducted in the Sri Lankan context and the topic was relevant to investment decisions of individual investors. Out of this population, 140 individual investors were selected for the final analysis. That means, the sample of this study includes 140 individual investors who have registered under three main stockbroker firms (Asha Securities Limited, Asia Securities (Pvt) Ltd, Capital Trust Securities (Pvt) Ltd) in CSE. Here, since this study basically employed in the quantitative research approach the probabilistic sampling methods were deemed to be more appropriate. So, as the sampling technique the researcher used systematic

random sampling for the study. That means, first the researcher considered all the stockbroker firms which are registered in CSE and it was 29 stockbroker firms. As per the stockbroker rules, three stockbroker firms were considered as inactive firms. That means, they have inactivated their operations and so that, such inactivated firms cannot open client accounts as well as they shall not be permitted to transact on the CSE on behalf of their clients. Therefore, except those three inactivated firms, researcher communicated all other 26 stockbroker firms. Out of them, only three stockbroker firms called Asha Securities Limited, Asia Securities (Pvt) Ltd and Capital Trust Securities (Pvt) Ltd permitted for the researcher to access their investors. Then the researcher distributed the questionnaire for individual investors of these three firms by following a systematic way. Here the procedure is, researcher distributed the questionnaire to investors at regular intervals in which the researcher handed over it to one investor and then left the next immediate investor and gave it again to next after (1st investor, then 3rd investor, then 5th investor…. likewise) out of who visited the above three stockbroker firms within three weeks at regular days in regular period of time. Thus, the sampling technique of this study can be identified as systematic random sampling.

When considering the data collection method, primary data (a structured questionnaire) was used as the data collection method because of some reasons. According to Bryman, A. and Bell, E. (2007) as a data collection method, questionnaires are more appropriate for this study because of time and cost savings as compared to other methods, such as interviews, video conferencing and brainstorming. Another reason was that, since the respondents of this study were individual investors, they might have not much time for interviews and so that by using a method like questionnaires, investors are able to complete it within a small time like ten minutes. A total of 162 questionnaires were directly distributed to individual investors. Out of them only 138 questionnaires were fully completed by the investors and used for the analysis. "In quantitative research data collected from at least 100 respondents is needed to get reliable results from the data analysis statistical tools" (Hair, J.F. et al., 1998). According to that, since this study is mainly a quantitative study based on primary data, it was used a structured questionnaire for data collection. That means all items in the questionnaire were responded to using a five-point Likert Scale from 1 (strongly disagree) to 5 (strongly agree). Moreover, the questionnaire was prepared both in English language and in Sinhala language to facilitate attaining real data from the participants. This questionnaire comprises of two sections namely Section "A" and Section "B". In section "A", the respondents were asked 7 questions (PI1, PI2, PI3, PI4, PI5, PI6, PI7) about their personal information. In this section researcher aimed to identify the investors' gender, age category which they are belong to, educational level of the investors, which Province they are from, current employment sector of the investors, frequency of buying and selling stocks of the investors and time period of attending the stock market etc. Section "B" includes questions regarding core constructs of the study and are measured in five-point Likert Scales. This section endowed with 23 questions. That means, first 4 questions (OB1, OB2, OB3, OB4) represent overconfidence bias, second 4 questions (RB1, RB2, RB3, RB4) represent representativeness bias, third 4 questions (AB1, AB2, AB3, AB4) represent availability bias, fourth 4 questions (AAB1, AAB2, AAB3, AAB4) represent anchoring and adjustment bias and final 7 questions (ID1, ID2, ID3, ID4, ID5, ID6, ID7) represent investment decision making.

Here, since the researcher is going to test the hypothesis, this study mainly used Multiple Regression for data analysis purpose and achieving the research objectives as well. And these data were analysed using SPSS 23.0 version.

## DATA ANALYSIS AND RESULTS

### Reliability Analysis

Reliability is a more important concept which can be used to evaluate the quality of a

research. According to Sekaran (2003) utilizing better research instruments will eventually increase the accuracy of the results, which in turn, will enhance the quality of the entire research. Hence, it's needed to assess the goodness of measurements used for the study. Thus, reliability plays a significant role in this regard. Reliability of a measure is recognized by testing for both consistency and stability. That means, the reliability specifies the internal consistency of the questionnaire, which used to obtain the survey results. Here, the researcher has used Cronbach's coefficient Alpha to assess the reliability of the items. As a standard measurement, it is advocated to have general cut off or minimum 0.7 Cronbach's alpha value of a given set of questions. The closer Cronbach's alpha is to 1, the greater the internal consistency reliability. So, the following table represents the Cronbach Alpha Coefficients for the main constructs of the study.

**Table 03 – Results of Reliability Test**

| Construct / Factor | Number of items | Cronbach Alpha Coefficient |
|---|---|---|
| Overconfidence Bias | 4 | 0.836 |
| Representativeness Bias | 4 | 0.721 |
| Availability Bias | 4 | 0.827 |
| Anchoring and Adjustment Bias | 4 | 0.711 |
| Investment Decision Making | 7 | 0.720 |

*Source – Primary Data*

As shown in the above table, all Cronbach's alpha values were above 0.7 for all constructs indicating sufficient internal consistency of the items in the questionnaire. That means, all the independent variables supported the dependent variable of the study. So, the study was reliable as per the statistics.

**Statistics for Demographic Variables**

The sample for the research was composed of 76.4 per cent male and 23.6 per cent female, individual investors in CSE. The major proportion of the sample lied within the age level of 25-34 years, while 21.4 per cent representing 35-44 years, 15.7 per cent representing 45-54 years, 12.9 per cent representing below 25 years and above 55 years in terms of age groups. When it comes to the educational background 37.9per cent held bachelor's degree, 12.9 per cent held a master's degree, 15.7 per cent of the respondents had done diplomas, while 30 per cent of respondents had done up to advanced level examinations. Half of the investors are from the Western Province which is 51 per cent while other half of the investors are from all the other provinces. 27.1 per cent investors from North Western Province, 10 per cent investors from Central Province, 7.1 per cent investors are from Southern Province and all the other investors dispersed among other provinces. The investors' occupation is different and most of them are work for the private sector which is 71 per cent. Other investors consist of, 10 per cent of self-employees, 7.1 per cent employed in the government sector which is a very low representation of investors from that sector and 12.1 per cent investors represent many various occupations and professions. When it comes to the capital market transactions a significant number of transactions took place occasionally which represent 42.1 per cent. 14.3 per cent transactions took place once a month, while 15 per cent transactions were taking place 2-3 times a week. On the other hand, 18.6 per cent transactions were done on daily basis. When it comes to attending to the stock market, it demonstrates that how long (the time period) an investor registered in the CSE. 31.4 per cent sample investors joined over 11 years ago, 25.7 per cent investors joined 1-3 years ago, and 19.3 per cent investors joined CSE more recently, mostly less than a year.

**Multiple Regression Analysis**

***Testing for Normality***

For the analysis of data, it should be tested for normality of the collected data. In the numerical method of normality test it is expected to measure the skewness and the kurtosis. Here it is considered Z score value of the skewness and Z core value of the kurtosis. The Z score value of the skewness and kurtosis between -3.29 to +3.29 in each variable means the data set is normally distributed.

**Table 04 – Skewness and Kurtosis**

| Z | Skewness / Std. Error | Kurtosis / Std. Error |
|---|---|---|
| OB | 2.995 | -0.898 |
| RB | 2.905 | -1.191 |
| AB | 0.468 | -2.874 |
| AAB | -0.700 | -3.020 |
| ID | 0.165 | -2.651 |

*Source - Developed by the researcher*

As shown in the above table Z score values of skewness and kurtosis for each variable are within the range. Therefore, it concludes that the data set is normally distributed.

***Testing for Linearity***

Linearity test aims to determine the relationship between independent variables (Overconfidence bias, Representativeness bias, Availability bias, Anchoring and Adjustment bias) and the dependent variable (Investment decision making) is linear or not. The linearity test is a requirement in the linear regression analysis. Good research in the regression model there should be a linear relationship between the independent and dependent variables.

Linearity assumption can be tested by using scatter plots. A relationship has no correlation when the points on a scatterplot do not show any pattern. A relationship is non-linear when the points on a scatterplot follow a pattern but not a straight line or curve shape line. A relationship is linear when the points on a scatterplot follow a somewhat straight-line pattern. In this data set, all the variable's scatter plots had a straight line. That means their relationship was linear and the linearity assumption was satisfied

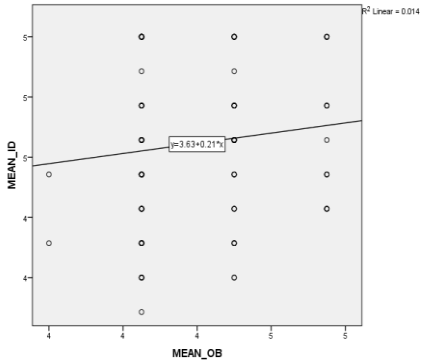


Figure 02 – MEAN_OB

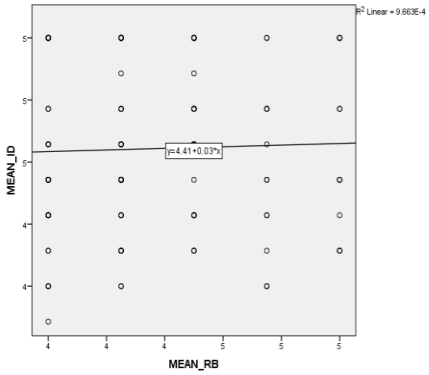


Figure 03 – MEAN_RB

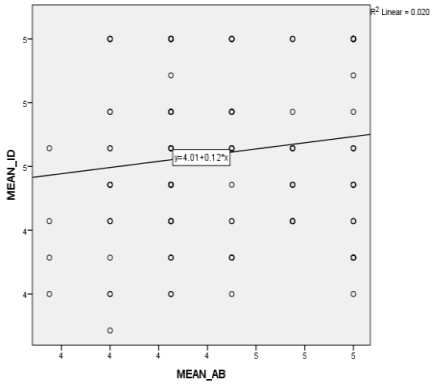


Figure 04 – MEAN_AB

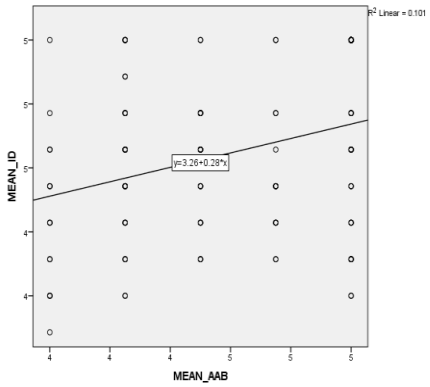


Figure 05 – MEAN_AAB

### *Testing for Homoscedasticity*

Homoscedasticity refers to a condition in which the variance of the residual, or error term, in a regression model is constant. That is, the error term does not vary much as the value of the predictor variable changes. However, the lack of Homoscedasticity may suggest that the regression model may need to include additional predictor variables to explain the performance of the dependent variable.

As shown in the above scatterplot this study satisfied the homoscedasticity assumption.

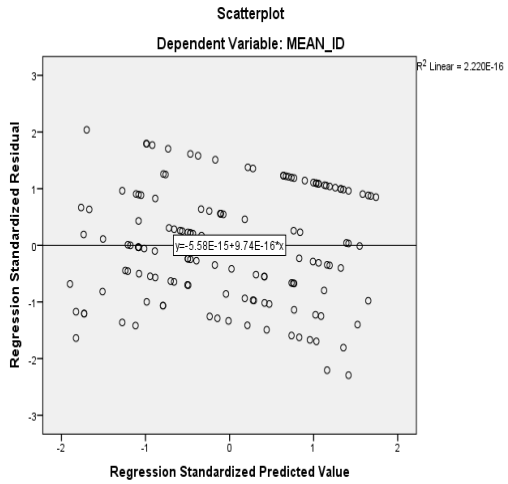


Figure 06 – Scatterplot

### *Model Summary*

**Table 05 – Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .331[a] | .110 | .083 | .307 | 1.870 |

a. Predictors: (Constant), MEAN_AAB, MEAN_RB, MEAN_OB, MEAN_AB

b. Dependent Variable: MEAN_ID

The model summary table reports the strength of the relationship between the model and the dependent variable (Investment Decision Making). As per the findings, R-square value as shown above is .110. The R-square value explains the proportion of variance in the dependent variable, which can be predicted from the independent variables. The study indicated that 11% of the variance in investment decision making will be explained by the heuristic biases collectively. This shows the overall strength of association in the model. Adjusted R-square represented that 8.3% of the dependent variable (Investment Decision Making) has been described by the individual variables. As the value was less than 60%, the regression model wasn't well fitted.

The Durbin-Watson static test is a test performed in order to assess the presence of autocorrelation in the regression model of the study. Autocorrelation refers to a situation where similarity of a time series exists over subsequent time intervals. The presence of autocorrelation can lead to underestimation of the standard error reported in the study. The Durbin-Watson statistic ranges in value from 0 to 4. A value near 2 indicates non-autocorrelation; a value toward 0 indicates positive autocorrelation; a value toward 4 indicates negative autocorrelation. According to the above table a value of 1.870 means that there was no autocorrelation in the test model.

***Analysis of Variance (ANOVA)***

**Table 06 – ANOVA**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1.567 | 4 | .392 | 4.153 | .003[b] |
| | Residual | 12.737 | 135 | .094 | | |
| | Total | 14.305 | 139 | | | |

a. Dependent Variable: MEAN_ID

b. Predictors: (Constant), MEAN_AAB, MEAN_RB, MEAN_OB, MEAN_AB

*Source – Primary Data*

"An analysis of variance (ANOVA) helps to examine the significant mean differences among more than two groups on an interval or ratio-scaled dependent variable" (Sekaran & Bougie, 2016). It is a statistical test often used in instances where there are more than two groups, 0.000 – Statistically Significant or 0.05, or any value less this will result in significant effect while 0.05 or any value greater than this value is non-significant. According to the table 06 shown above the overall model is significant under 5% confident significant level. The "P" value of the analysis showed a value of 0.003 which is <0.05 indicating that this overall model is statistically significant.

***Coefficients of Independent Variables***

**Table 07 – Coefficients of Independent Variables**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | Tolerance | VIF |
| (Constant) | 2.562 | .776 | | 3.299 | .001 | | |
| MEAN_OB | .126 | .147 | .071 | .852 | .396 | .952 | 1.050 |
| MEAN_RB | .013 | .085 | .012 | .152 | .879 | .994 | 1.006 |
| MEAN_AB | .041 | .074 | .048 | .559 | .577 | .899 | 1.112 |
| MEAN_AAB | .262 | .075 | .295 | 3.495 | .001 | .923 | 1.084 |

a. Dependent Variable: MEAN_ID

As shown in the above table, all four of these independent variables have a positive impact on the individual investors' investment decision making. When considering the regression coefficient of each independent variable; overconfidence bias, representativeness bias and availability bias are insignificant with positive beta values. But the probability of anchoring and adjustment bias is statistically significant with a positive beta value. This says, all the heuristic biases (overconfidence bias, representativeness bias, availability bias, anchoring and adjustment bias) have a positive impact on investment decision making of individual investors in CSE. But, the impact of all the other three variables except the anchoring and adjustment bias is insignificant on investment decision making.

### *Multicollinearity*

Multicollinearity (or collinearity) is a statistical phenomenon in multiple linear regression analysis where two (or more) independent or predictor variables are highly correlated with each other, or intercorrelated. Presence of multicollinearity violates one of the core assumptions of multiple linear regression analysis and as such it is problematic; the predicted regression coefficients are not reliable anymore.
Multicollinearity can be checked from the tolerance and VIF values in the above coefficients table 07. To assume that there is no multicollinearity problem in variables, tolerance should be higher than point one and VIF value should be less than ten. As per the above tolerance and VIF values, researcher can assume that there is no multicollinearity problem in variables.

### *Hypotheses Testing*

Based on the outcome of regression analysis, the researcher has tested the hypothesis and following conclusions can be arrived.

**Table 08 – Hypotheses testing**

| | Hypotheses | Status |
|---|---|---|
| H1 | Overconfidence bias has a significant impact on the investment decisions of individual investors in CSE. | Not Supported |
| H2 | Representativeness bias has a significant impact on the investment decisions of individual investors in CSE. | Not Supported |
| H3 | Availability bias has a significant impact on the investment decisions of individual investors in CSE. | Not Supported |
| H4 | Anchoring and adjustment bias has a significant impact on the investment decisions of individual investors in CSE. | Supported |

*Source - Developed by the researcher*

## CONCLUSION AND RECOMMENDATIONS

In the traditional financing, it has been concluded that the investors tend to make more rational decisions rather than being biased. In contrast, it has been identified in the behavioural finance literature that the investors are behaving irrationally because of various biases due to various factors and forces. Therefore, the aim of this study was to explore the impact of heuristic biases on the decisions of individual investors who are trading at CSE. To achieve this research objective, there were four heuristic biases which have been considered as the independent variables of the study that are respectively the overconfidence bias, representativeness bias, availability bias and anchoring & adjustment bias. The investors' decision making is considered as the dependent

variable. The data were collected over these variables from 140 respondents who were the investors of Colombo Stock Exchange with the usage of a primary source of data collection which is the questionnaires. This sample of 140 investors in CSE were selected from the population of investors with the usage of systematic random sampling. The questionnaire was responded using five-point Likert scale that was ranging from strongly disagree to strongly agree. The section A of the questionnaire has been reserved for the collection of investors' demographics while the section B has been allocated for the collection of data over the four heuristic biases on the core constructs of this research. The data has been analysed with the usage of Pearson's correlation and multiple regression analysis.

At a given time the overconfidence of the investors can create biases due to the overestimation of their own knowledge, skills, personal financial records and intuition etc. Not only that but also the investors might behave due to the biases that get formed because of the preference over the most recent events consideration and ignoring the average long-term return. In addition, the convenience of easily available information for decision making can force the investors to behave from

their rational behaviour as well. Being humans, the investors sometimes may try to make their investment decisions by relying excessively on the initial piece of information provided when making decisions. The results of the study show that overconfidence bias, representativeness bias and availability bias have no significant impact on the investment decisions of individual investors in CSE. These findings do not support the hypothesis H1, H2 & H3. Meanwhile Anchoring and adjustment bias (the heuristic bias which creates from the human beings' tendency to rely excessively on the first piece of information provided when making decisions) has a significant impact over the investment decision making of individual investors who are operating at CSE and this supports the hypothesis H4. When considering the existing literature, Gamage et al. (2021) have found that overconfidence bias and representativeness bias have no significant impact on investment decisions of equity investors at CSE. Kengatharan and Kengatharan (2014) has found that anchoring bias has positive significant influence on investment decision making and performance of individual investors. Rajeshwaran (2020) has also found that there is high influence of anchoring bias on the performance of investors who are trading at CSE. Therefore, researcher can conclude that the findings (regarding overconfidence bias, representativeness bias and Anchoring & adjustment bias) of this study are consistent with the existing literature as well. But according to Gamage et al. (2021) availability heuristic has a significant impact on individual investment decisions of equity investors at CSE. And also, Khan (2015) also identified that there is a significant impact of availability bias on the individual investors' decision-making. Therefore, researcher can conclude that findings of this study relating to availability bias are contradict with the results of existing literature. So, based on the empirical results, ultimately the researcher would make the recommendation for the investors of the Colombo Stock Exchange not to rely too much only on the initial piece of information of the stocks that are traded. Therefore, the investors must continue the detailed consideration of information in addition to the initially available data.

## LIMITATIONS & FUTURE RESEARCH DIRECTIONS

This research has several limitations that need to be addressed by future research. The first limitation is the size of the sample. If there is a larger sample, it would have given more results that are trustworthy and will be able to address a more extensive scope of the investigation. The second limitation is, even though there are multiple behavioural factors that affect the investment decisions of individual investors such as herding factors, heuristic factors, prospect factors and market factors, this research is based only on heuristic factors. , the third limitation of this study is the difficulty to find out heuristic biases and individual investors' decision-making relationship literature within the Sri Lankan context since the behavioural finance is a very new area to be explored. In addition to that another factor that might distort the outcomes is the existence of inefficient markets for the security exchange and sometimes the reluctance of the key investors to share the secret information on the stock market investments.

Further, the researcher suggests the future empirical studies to consider a sample that is consisting a greater number of investors (Respondents) and to associate the other factors those influence on the investment decision making such as herding factors, prospect factors, and market factors.

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