



ASHESI UNIVERSITY

**EXPLORING THE HUMAN FACTOR IN DECISION MAKING:
ANCHORING BIAS AND INVESTOR BEHAVIOR**

Undergraduate Thesis submitted to the Department of Business Administration,
Ashesi University in partial fulfilment of the requirement for the award of Bachelor of
Science degree in Business Administration

B.Sc. Business Administration

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DECLARATION PAGE

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation, laid down by Ashesi University College.

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ABSTRACT

The objective of this study was to explore how anchoring affects the dynamics of investor decision making with regard to mutual funds and how this bias differs amongst genders and level of financial knowledge. The study adds to the body of knowledge on the influences of behavioural biases in the sub-region to make investors aware of their biases in order to minimise the influence of these biases on their investment decisions.

An experimental research design was adopted to uncover the relationship between the variables under study; this involved the use of a questionnaire with an embedded experiment. Data obtained from the study were analysed using Pearson's chi-square test and two-way analysis of variance. The objectives were to investigate the extent to which Ghanaian investors are affected by the anchoring bias as well as explore the degree to which differences in gender and expertise affect the levels of influence from the anchoring bias. The results showed an association between participants' susceptibility to anchor with both gender and the level of financial knowledge of participants. However, this result is not statistically significant and thus cannot be generalized to the entire population. Females were observed to be more likely to anchor than their male counterpart. Also, a higher level of financial knowledge did not help to reduce the possibility of anchoring but rather increased it.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Economic and financial models are propounded based on the rational choice theory, which considers humans as a *Homo economicus*, meaning one who always behaves logically and optimally. The theory is based on the core assumptions of utility maximization, information symmetry and individualism (Wittek, 2013). It has, however, been shown through experiments that in complicated, real-world decision-making, consumers might not succeed at maximising their utility.

The assumption of rational choice theory underlies some pivotal financial theories, among which is the Efficient Market Hypothesis. As explained by Brealy, Myers and Allen (2017), the efficient market hypothesis assumes informational symmetry and asserts that prices in the market are a reflection of all widely known data. Based on the hypothesis, investors do not get the chance to benefit abnormally from the market as changes are known by everyone and prices quickly correct to shifts in the market.

According to the efficient market hypothesis, market efficiency is either weak, semi-strong or strong. The weak-form efficient market describes markets within which prices reflect only past information. It is the form within which investors have the highest potential to make abnormal returns as prices do not quickly react to new or current information. The semi-strong-form efficient market describes markets where past and current prices are a reflection of information available to everyone. The strong-form efficient market is the market where prices reflect every form of information; whether past or current and public or private (Brealy, Myers & Allen, 2017).

The efficient market theory has formed the basis for ensuing market theories. However, as criticised, market anomalies such as bubbles, market crashes and insider trading have failed to be adequately explained by it. In the search for answers, researchers such as Tversky and Kahneman turned to psychology. Their works led to the birth of *Behavioral Economics* and then consequently, *Behavioral Finance*. Huckle (2005) described Behavioural Finance as a branch of finance that employs scientific models to explain how individuals make real-world financial decisions as opposed to the choices they are supposed to make based on theory. *Behavioural Finance* is, therefore, an essential element in decision making and policy writing as it explains market inefficiencies and unpredicted phenomena in financial markets.

In determining how investors make decisions, contradictory explanations are provided by Behavioural Finance and Modern Portfolio Theory (MPT). While proponents of the former tout its ability to model how financial markets *actually* work in the real world (Tversky & Kahneman, 1979; Strack & Mussweiler 1997; Chapman & Johnson, 2002), the latter presents a theoretical outlook of how markets *would* work in the ideal world. Modern Portfolio Theory is a basis used for the structuring of investment portfolios. The theory claims to provide an efficient tool upon which the rational investor may apply to select a diversified range of asset classes that significantly reduce his risk exposure while maximising his returns (Grujić, 2016). Analysts and fund managers of actively managed portfolios commonly employ MPT.

Behavioural Finance demonstrates that investors rely heavily on heuristics, especially when making decisions under uncertainty. *Heuristics* are cognitive shortcuts that help to reduce complex decision-making processes into simpler ones. People are restricted by the concept of bounded reality which Simon (1982) described as restrictions on one's cognitive resources due to limitations in thinking capacity,

time and available information (as mentioned early on, markets have informational asymmetry; heuristics are therefore predominantly used). Heuristics lead to the influence of the inherent biases of humans resulting in flawed decision making.

Behavioural biases are the collective term used to describe these irrational beliefs that unconsciously influence our decision-making process. A number of these biases are loss aversion, framing, herding, overconfidence and anchoring. Of relevance to this study is the anchoring bias.

Anchoring biases are the tendency of investors to disregard new information (especially when it contradicts one's previous views) in decision-making processes because of being bound to existing opinions or information. The anchor could be a previous price or performance of the asset or some other reference item, and it leads to underreactions by investors. In stock markets, anchoring commonly influences stock prices. Analysts and investors alike make decisions based on a reference price which becomes an anchor. Anchoring may not always be negative or irrational, but wrong estimates from anchors could be problematic.

Evidence of the anchoring bias phenomenon in finance is observed from research on analyst forecasts. Cen, Hillary and Wei (2013) showed that sell-side analysts might be affected by anchoring biases when estimating the future profitability of firms. From their research, it was observed that analysts use the industry median forecasted earnings per share as an anchor upon which to base their forecasts. Another source of anchoring is historical numbers as was discovered by Campbell and Sharpe (2007), who found that analysts use past values as an anchor when forecasting. The anchoring phenomenon was also observed in the Ghanaian context by Donkor, Akohene and Acheampong (2016). However, their research focused on the effect of bias on the

investment decisions of Ghanaian bankers who proved to be significantly influenced by the anchoring bias when making investment decisions.

Research on anchoring in the context of mutual funds has shown that anchoring is a robust phenomenon and thus, perhaps, it is plausibly an influencer of the investment decisions of Ghanaian mutual fund investors. For instance, Lavine, Valle and Magner (2019) showed that the willingness to invest in a mutual fund or the evaluation of that fund's quality might be affected by anchoring. Tseng and Yang (2011) also found that mutual fund investors employ anchoring based on the fund manager's size to predict success or failure of the investment. Moreover, Benartzi and Thaler (2001) found evidence that mutual fund investors predict the future performance of an investment from its past performances.

1.2 Problem Statement

The creation of the stock exchange and thus, the capital market in Ghana in 1989 was pertinent as a tool which could help stabilise the then shaky financial sector through the provision of an organised trading system for the flow of money throughout the economy. Not long after this, the first mutual fund was introduced by DataBank Financial Services, the pioneering E-pack; an equity mutual fund (Antwi-Asare & Addison, 2000). Research on the state of Ghana's capital market by Acquah-Sam (2014), showed that the market is still underdeveloped. In his research, he states that the stock market remains small and illiquid while trading is discontinuous. He also identifies the bonds market as remaining heavily dominated by government bonds, which is mainly patronised by institutional and foreign investors. The study also revealed inadequate participation in the capital market by investors and business firms. It recognised the major influencers as low financial literacy, higher preference for money market instruments and low-income levels (Acquah-Sam, 2014).

Aside from the influencers identified by Acquah-Sam (2014), studies within other developing countries (Babajide & Adetiloye, 2012; Khawaja, Bhutto, & Naz, 2013; Gupta & Ahmed, 2017) have identified behavioural biases as a significant influencer of capital markets. These studies, however, focus on behavioural biases in the context of stock markets. They failed to relate or explain how various behavioural biases impact or affect the performance of the mutual fund markets in those countries. Other studies on behavioural biases in the financial sector of Ghana do not focus on the mutual fund sector (e.g., Donkor, Akohene and Acheampong, 2016). However, retail investors are increasingly choosing mutual funds as an avenue for investing, making it even more important to understand the dynamics involved with the holding and trading of mutual funds. The scarcity of research on mutual funds and behavioural biases not merely in a general sense but specifically in Ghana is the reason for conducting this study.

A study on the influence of behavioural biases among mutual fund investors showed that investors in Ludhiana city were susceptible to cognitive and emotional biases, specifically “cognitive dissonance bias, endowment bias and self-control bias” (Katyal, 2013). The study explored the investors’ level of familiarity with mutual funds as well as the presence of behavioural biases. Another study conducted explored the link between the biases involved in people’s decision making and their mutual fund investments, identifying a significant presence and influence of these biases (Bailey, Kumar, Ng, 2011). All these studies, though they show significant evidence of behavioural biases in mutual fund markets, failed to consider the possible influence of the anchoring bias on individual mutual fund investors. Lavine, Valle and Magner (2019), nonetheless, provide some evidence of the influence of the anchoring bias in their research which showed that an individual investor’s willingness to invest

in a mutual fund or his judgment of that fund's quality might be affected by the anchoring bias.

Although the presence of the anchoring bias is not extensively explored in the mutual fund market, its influence in stock markets is well-established, with research showing its dominance and influence among traders and analysts alike (Cen, Hillary & Wei, 2013; Campbel & Sharpe, 2007). This suggests, therefore, that a study conducted to explore the anchoring bias in mutual fund markets as traditionally done in stock market research could potentially yield similar results. This study, therefore, sought to explore the possible impact of the anchoring bias in the mutual fund market.

Research by Lewellen, Lease, and Schlarbaum (1977) showed that gender is an important determinant of an investor's investment style. Based on this idea, and the generally perceived notion that men and women are different, Niessen and Ruenzi (2006), conducted a study to determine the influence of gender in the US mutual fund market. They discovered interesting behavioural patterns; women were on average: less risky, less overconfident and, followed less radical investment styles and were steadier over time. These findings suggest that there are inherent behavioural differences between men and women that can be observed. Tversky and Kahneman (1974) describe the anchoring bias as an anchoring and adjustment heuristic. Overconfidence plays a role in this heuristic by lowering or increasing one's estimates. Relating this to the findings of Niessen and Ruenzi (2006), if females are less overconfident, then they should be able to provide better estimates. This study, therefore, sought to explore these concepts by investigating the possible influence of gender with respect to the anchoring bias in the Ghanaian mutual fund market.

1.3 Research Objectives

The objectives of this research are threefold:

1. First and foremost, this research sought to investigate the extent to which Ghanaian investors are affected by anchoring bias.
2. Secondly, this study aimed to explore the degree to which differences in gender affect the levels of influence from anchoring bias.
3. Lastly, this study explored the degree to which differences in expertise affect the levels of influence from the anchoring bias.

1.4 Research Questions

This study focused on anchoring biases in mutual fund markets. It hoped to uncover how anchoring affects the dynamics of investor decision with regard to mutual funds and the influence of anchoring in the process of mutual fund portfolio construction. The research was guided by the following questions:

1. To what extent are mutual fund investors affected by the anchoring bias?
2. To what degree does gender moderate the influence of anchoring biases on mutual fund investors?
3. To what extent does expertise moderate the influence of anchoring biases on mutual fund investors?

1.5 Value of the Study

The findings of this research seek to add to the body of knowledge on the influences of behavioural biases in the sub-region by providing empirical evidence on the behavioural bias of anchoring in the Ghanaian mutual fund market. Such information is relevant to investors and those thinking of investing, as a consciousness

of one's inherent biases helps one to minimise the influence of these biases in investment decisions.

1.6 Scope of the Study

The purpose of this research was to contribute to the existing literature on the subject area. It focused on the anchoring and adjustment heuristic and its extent and influence on mutual fund investors in Ghana. The study spanned ten months, from August 2019 to May 2020. The data that were used were obtained from respondents between 18 to 60 years from Accra and Kumasi, the two major cities in Ghana. Caution should, therefore, be exercised in making generalizations from the findings of this research. The research results are limited to the bias studied, regions and age groups considered and a reasonable time frame from the conduct of the study.

1.6 Overview of Research Methodology

This study adopted, to some extent, the methodology of Kudryaytsev and Cohen (2011). Using data obtained from a designed questionnaire and experiment, anchoring estimates were generated based on the equation used in their study. Similar to Katyal (2013), the study carried out chi-square tests to establish associations between the variables. This study differs from these earlier studies in that it analyses the presence of anchoring as influenced by a completely different set of variables (expertise and gender). The research also combined an analysis of Likert type data and anchor measures to conclude.

1.6 The Organisation of the Thesis

The rest of the paper is organised as follows: chapter two outlines the literature review and provides theoretical and empirical evidence of the variables of the study. Chapters three, four and five discuss the methodology, results and conclusion respectively.

CHAPTER TWO: LITERATURE REVIEW

This chapter is broadly divided into two major parts. The first section considers the theoretical frameworks that provide a further understanding of the context of the study as well as the variables used. The second major part, which dwells on empirical evidence of the anchoring bias, as observed in several studies, follows the outlined theoretical frameworks.

2.1 Theoretical Frameworks

2.1.1 Expected Utility Theory

The expected utility theory, first introduced by Daniel Bernoulli and Gabriel Cramer in their bid to resolve the *St. Petersburg Paradox*¹, is one of the oldest theories in economics. The theory stipulates that people consider the value of alternatives and act based on the alternative with the highest utility (value). It considers how people make decisions when faced with a level of risk and seeks to explain people's aversion towards risk based on several axioms. The expected utility theorem paves the way to understand the decision making of people and is considered one of the most essential theories in demonstrating actions under risk and uncertainty. However, it does not provide an adequately precise depiction of choice behaviour, and studies undertaken by other researchers (e.g. Prospect theory by Kahneman and Tversky) have disproved some of the axioms within the theory, showing the occurrence of several behavioural bias activities (Yaqub, Saz & Hussain, 2009).

¹ The *St. Petersburg Paradox* is derived from the St. Petersburg game where a fair coin is tossed till it lands on heads. The player is awarded $\$2 \times n$, n being the number of times the coin is tossed. The paradox arose because rational choice theory stipulates that it is rational to pay any finite fee for a single opportunity to play the game although a modest reward is most likely. Yet this claim is absurd. The solution to the paradox revealed that the value of a gamble is the expectations of relative values placed on monetary outcomes by people (Bernoulli, 1738).

2.1.2 Efficient Market Hypothesis (EMH)

An efficient market, as explained by Fama (1965), is a market within which exists rational people looking to maximise profit and thus compete with one another in predicting future market values in the presence of freely available current information. Competition in efficient markets promotes the efficiency of the market by ensuring that actual prices already reflect the effects of past, current and expected future information.

Three main arguments form the EMH: the first is in line with the rational choice theory and asserts the rationality of investors which ensures rationally valued securities. The second argument is in line with the idea of a “random walk” which describes a series of prices where the next day’s price change has no bearing on the previous day’s price. It states that in the situation where investors are not rational, trades cancel out each other without affecting price since they trade randomly. The last argument considers the role of arbitrage and states that rational arbitrageurs eliminate the impact of irrational investors (Brealy, Myers & Allen, 2017).

According to the EMH, as previously stated within the introductory paragraphs, there are three levels of market efficiencies: the weak-form efficient, semi-strong-form efficient and strong-form efficient markets. The efficiency of a market increases as one moves from the weak-form to the strong-form efficient market. The increase in efficiency matches the fall in opportunity for investors to make abnormal profits from the market as prices react quickly to market changes and information.

Critics of the EMH theory point to the observable inefficiencies of world markets such as seen from the dot.com bubble and the 2008 financial crisis. Aside

from these common anomalies, other observable facts are the occurrences of insider trading pointing to informational asymmetry as well as leveraged company buyouts and hostile takeovers which are possible due to under-valuations by stock markets (Yaes and Bechhoefer, 1989).

2.1.3 Prospect Theory

Tversky and Kahneman, two Israeli psychologists, propounded prospect theory in 1979 to explain how people manage risk under uncertainty. In explaining the theory, they state that people base their decisions on their perceived gains rather than losses and that people value gains and losses differently (Kahneman & Tversky, 1979). The theory provides knowledge which contradicts and seeks to explain the major deviations from the expected utility theorem, including the certainty, isolation and framing effects. *Certainty effect* refers to the tendency of people to underweight probable outcomes as against outcomes obtained with certainty. This explains the theory's claim that humans are not consistently risk-averse, but rather risk-takers in certain loss situations. At the same time, aversion exists in certain gains [the fundamentals of risk aversion bias].

Additionally, the *isolation effect* shows that people generally discard components shared by all prospects under consideration. Restorff (1933) explained it best, stating that in a situation where multiple stimuli are presented, people are likely to remember that stimulus that differs from the rest. This effect leads to *framing effects* where the difference in the presentation of the same choice leads to inconsistent preferences (Tversky & Kahneman, 1979).

The original prospect theory, as per Barberis (2013), did not allow for stochastic dominance² as it viewed decision making as deterministic (without room for variation). To solve this problem, a cumulative prospect theory was developed to complement the stochastic (unpredictable and without a stable pattern or order) nature of people's decision-making process.

Prospect theory, according to Barberis (2013), is made up of four elements. The first element, which is *reference dependence*, states that people gain value from gains and losses measured based on a reference point. *Loss aversion*, the second element says that people have more sensitivity towards losses than gains of the same degree. Thirdly, *diminishing sensitivity* states that people are risk-averse over moderate gains and risk-seeking over losses. Finally, *probability weighting* is when people weigh outcomes by transformed probabilities and not on objective probabilities (Barberis, 2013).

Prospect theory differentiates two phases in the choice process: editing and evaluation. *Editing* is the process of categorising outcomes as losses and gains based on a reference point. At the same time, *Evaluation* is the process of choosing an alternative from several outcomes with the highest utility (Tversky & Kahneman, 1979).

² *Stochastic dominance* is the dominance of one data set over another relative to the value of the outcomes. For instance, in comparing the value between two investments, for assets A and B, the asset with a higher expected rate of return is stochastically dominant.

2.1.4 Modern Portfolio Theory

Modern Portfolio Theory (MPT) is a framework in investments which is used in the selection and construction of investment portfolios based on a maximised return against a minimised investment risk (Fabozzi, Gupta & Markowitz, 2002). The theory comprises Markowitz' normative theory of Portfolio Selection and William Sharpe's positive theory of Capital Asset Pricing Model (Veneeya, 2006). A *normative theory* is one that describes the standard of behaviour that investors should follow in constructing a portfolio. A *positive theory*, on the other hand, hypothesises how investors *actually* behave, as against how they *should* behave (Fabozzi, Gupta & Markowitz, 2002).

The core concept of the MPT is the concept of diversification, which is defined by Brealy, Myers & Allen (2017) as a strategy to reduce risk by spreading one's portfolio of assets across many different investments. As stated by Markowitz (1952), the selection of a portfolio should be based on the assets' overall risk-reward characteristics instead of just lumping together a group of assets with attractive individual risk-return characteristics.

MPT is one of the most fundamental and followed theories in finance. However, the assumptions underlying the theory are not exempt from criticisms. MPT can be considered as to how investors and the market as a whole should function and is used widely by analysts in their analysis of stock markets. However, the assumptions on which the theory is built renders it flawed. The rationality of investors, for instance, has been challenged by research showing that cognitive biases profoundly influence investor decisions. On the assumption of information symmetry, which assumes full and timely information relevant to investors, studies and mere observation show that information is asymmetrical with some people having more

information than others in the market. There is also the occurrence of insider trading to consider. Additionally, it would be irrational to think that investors have access to unlimited borrowing capacity at a risk-free interest rate as every investor has his borrowing limit. Lastly, MPT assumes the efficiency of markets. Yet, markets are not perfectly efficient as decades of booms, bubbles and market crises have shown.

2.1.5 Heuristics

Heuristics was explained by Simon (1990) as procedures which employ little amounts of computation to obtain desired results. Heuristics are cognitive shortcuts that help to reduce complex decision-making processes into simpler ones; for instance, relying on rules of thumb, intuitive judgment or common sense (Abreu, 2014). People are restricted by the concept of bounded reality which Simon described as restrictions on one's cognitive resources due to limitations in thinking capacity, time and available information (Simon, 1982). As demands on cognitive resources heighten, people may employ methods that will make analysing information much more straightforward. Heuristics are, therefore, methods of simplification and effort-reduction that lead to time efficiency. Although heuristics can be considered a useful tool in complex decision making, it may lead to wrong estimates.

Hirshleifer (2001) states that, most decision and judgement biases stem from the roots of heuristic simplifications, self-deception and emotional loss of control. He identified four categories of biases based on the roots:

- First, “perception, memory and processing;
- then narrow framing, mental accounting and reference effects;
- followed by representativeness; and
- finally, belief updating and combining effects” (Hirshleifer, 2001).

However, other authors on the topic proposed different groupings. Shefrin (2002), for instance, fragmented the biases influenced by heuristics into seven categories, namely: “availability, representativeness, regression to the mean, gambler’s fallacy, overconfidence, anchoring and adjustment, and aversion to ambiguity” (Shefrin, 2002). Kahneman and Tversky (1974) also recognised three categories: “availability, anchoring, and representativeness”.

Based on these roots, Abreu (2014) organised the errors that affect individual investors in financial markets under five overarching categories: “perception and processing, framing and mental accounting, representativeness, emotions, and combining effect”. Within these main categories are the biases of herding mentality, anchoring and adjustment heuristic, overconfidence, loss aversion and others.

2.1.6 Anchoring

According to Kahneman (2011), humans are better at relative thinking than at absolute thinking. We, therefore, incline to base our decisions or predictions on “familiar starting points” and make decisions based on or adjust estimates towards the starting point. Different perspectives have been provided concerning the explanation of this phenomenon which is formally known as anchoring. It was first explained by Tversky and Kahneman (1979) in their work titled *Judgement under uncertainty* as an anchoring-and-adjustment heuristic. They described anchoring as a phenomenon where estimates toward an initial value presented [*the familiar starting point*] are inadequately adjusted towards that initial value to yield wrong estimates (Tversky and Kahneman, 1979). Since the initial value acts as an anchor, different initial values would lead to different estimates. An individual’s decision/estimate, therefore, is

influenced by prior existing knowledge received or known which may or may not have a bearing on the right decision/actual value.

Strack and Mussweiler (1997) further explained that the anchor values serve as a reference for the adjustment of one's boundary of the range of possible values of an estimate, assuming the anchor value is more extreme than one's boundary value. In other words, estimations made toward the initial value relied heavily on an adjustment process explained as the movement of the range of plausible estimates based on the anchor value. However, Strack and Mussweiler (2005) asserted that the adjustment process may not always occur during anchoring and thus could not always explain the phenomenon. Instead, it only explained the effect when the anchor value is more extreme than the boundary value for one's range of possible answers (Strack and Mussweiler, 1997).

Later studies on the anchoring effect viewed the phenomenon under the lenses of confirmatory hypothesis testing (Chapman and Johnson, 1994; Strack and Mussweiler, 1997). It proposes that anchoring occurs when information consistent with the anchor value is activated. Here, people first regard the anchor as a probable answer and then they look for ways their own estimates resembles the anchor. They argue that this process shows that confirmatory search and selective accessibility contribute to the mechanisms that lead to the anchoring effect.

However, Epley and Gilovich (2001) argued that different mechanisms account for the generation of anchoring effects. They discovered that adjustment accounts for the anchoring effect where the anchor values are self-generated as the person recognises the value to be wrong from the onset. They, therefore, adjust from this wrong estimate which they know is close to the true value. On the other hand,

selective accessibility accounts for the anchoring effect when the anchor value is externally derived as the person believes it to be accurate or related to the true value.

In the financial sector, anchoring plays out when investors rely on past experiences or past prices, ignore new information in the market, fixing prices before buying or selling stocks as well as gauging the best time to trade stocks (Murithi, 2014).

2.1.7 Investment Decisions

An investment is a current commitment made in monetary or other forms with the expectation of gaining some benefit from the commitment in the future (Bodie, Kane, & Marcus, 2014). Investment management refers to the proficient management of investment funds whereby the management is conducted by the consumer himself or delegated to a professional investment fund manager (Griffiths, 1990). The management of funds may take the form of either passive, active, aggressive or conservative management, which is dependent on the investor's preferences. Benefits which are in the form of a return on the investment choice is dependent on the type of investment, the level of risk and the quality of management.

Per Kumar (2004), the features of an investment, such as its covariance of returns, institutional ownership or average price, determine how investors will perceive it in terms of possible returns and thus the level of patronisation. He discovered that investors seem to trade more in stocks whose price is above or below the highest or lowest price respectively within the 52 weeks benchmark. This shows that past price extremes affect trading choices of investors.

Investors increasingly prefer mutual funds as an avenue for investment. French (2008) discovered that individual investors in the US are increasingly employing mutual funds as an avenue to invest more in the equity market than investing directly from a stock exchange. The percentage of individuals holding equity stocks fell from 47.9% in 1980 to just 21.5% by 2007. This was matched by an increase in open-ended mutual funds from 4.6% to 32.4% by the same time range (French, 2008).

Research by Goetzmann and Peles (1997) has shown that mutual fund investors tend to gravitate towards funds with good past performance. His findings were confirmed by Capon and Roger (1996) who observed a similar situation. Mutual fund investors exhibit a behavioural bias of chasing after fund performance where the investors rely on the past performance of fund managers to gauge their abilities. This is an interesting phenomenon as, although performance could measure a fund manager's ability, performance has been shown to fluctuate; with successful funds persisting only in the short term (Chevalier & Ellison, 1997).

Investor decisions are also affected by anchoring biases. For instance, as Brooks (2011) showed, investors who are hooked to a recent "high" that a particular stock has achieved will buy up the stocks of the company when the stock price falls since they believe the drop in the price provides a discount.

Hilgert, Hogarth, and Beverly (2003) discovered a strong link between financial knowledge and returns. Agarwal, Driscoll, Gabaix and Laibson (2009), also discovered that the age of an investor influenced his or her susceptibility to behavioural biases, and thus, a flawed financial decision. He also discovered that the young and elderly who were most affected also had the lowest cognitive ability and

financial knowledge. This points to the fact that low financial knowledge may be a significant factor for increased effect from behavioural biases.

Investment decision making, especially long-term decision making, can be a difficult task. This is because most investors make decisions contrary to their long-term goals, which result in poor decision making. This mainly stems from risk aversions and poor judgement of the market, leading to wrong timing and investor sentiment (Winchester, Huston & Finke, 2011). People are capable of rational thought and action, but there are some situations which exceed the average person's capacity to judge probabilities and make a right decision (Gärling, Kirchler, Lewis & Van, 2009).

Individual investors may, therefore, employ a portfolio or fund manager to manage their fund. These professionals understand that investment decisions must be guided by set asset allocation decisions based on an acceptable level of risk, and consistent with investor goals and time horizon.

2.2 Empirical Review

This section outlines empirical evidence of the variables related to the study as well as other related evidence. It covers, first of all, the empirical studies that demonstrate the existence of the anchoring phenomenon. Studies that considered the degree of differences in genders, age and experience with the level of affect from anchoring biases (which formed part of the variables that were observed in this study) are further discussed. Other evidences that do not directly relate to the study are also discussed; this includes the relationship between culture, moods and the anchoring bias.

2.2.1 Evidence of the Anchoring Bias

The anchoring bias has been shown to be a very robust phenomenon occurring in about every area and aspect of life. Studies on the bias have seen it play out in the legal system where judges anchor to a certain number of sentencing years, and in negotiations where it impacts deals and settlements (Orr & Guthrie, 2006). In the field of finance, which forms the context of this study, there have also been a wide array of research conducted which show the prevalence of the anchoring bias. The research includes experimental settings, stock markets, mutual funds markets and real estate markets to name a few.

Tversky and Kahneman (1979) demonstrated the effect of the influence of the anchoring bias in an experiment where subjects were to estimate the percentage of African countries in the United Nations. In the experiment, the subjects were first put into different groups and then asked to indicate if the percentage was higher or lower than a specific initial percentage chosen from the spinning of a wheel with numbers between 0 and 100 (each group received a different value). They were then to estimate the actual value, moving upward or downward from the given percentage. It was observed that the estimates made by the subjects were affected by the initial percentage. For instance, for the group that had an initial percentage of 10, the median estimate was 25 while for those given an initial value of 65, there was a median estimate of 45 (Tversky and Kahneman, 1979).

The anchoring bias was again observed in a study on the role of buy-side anchoring bias in the real estate market in Taiwan. The study was conducted using the hedonic price model on a large archival sample where data on real estate transaction between 2005 and 2010 were used for a total of 6,956 observations. The study discovered that buyers tend to use a reference price (which serves as an anchor) to

ascertain the value of a property. However, since they are not able to properly adjust away from the reference price, it leads to wrong estimates in the value of the property. The study also discovered that informational uncertainty greatly influences the occurrence of anchoring bias when purchasing real estate (Chang, Chao & Yeh, 2016). This finding is in line with the premise that our dependence on heuristics due to bounded rationality, increases the chances of being affected by behavioural biases.

In the context of mutual funds, Gillespie (2006), in a study on mutual fund investors in the United States, discovered that returns on their investment was far more dependent on investor behaviour than on the mutual fund's performance. Mutual fund investors who attempted to time the market, and thus succumbing to anchoring to reference prices, earned lower real returns consistently relative to those who did nothing. Also, with respect to decisions on purchasing of mutual funds, Lavine, Valle and Magner (2019) showed that the willingness to invest in a mutual fund was strongly affected by the anchoring bias.

2.2.2 Factors Explaining the Degree of Anchoring Effects

2.2.2.1 *Informational Relevance*

Research on the anchoring and adjustment heuristic has shown that informational relevance, moods, and expertise influence the level of anchoring effect. In a study by Englich, Mussweiler and Strack (2006), it was indicated that the anchoring effect is vulnerable to the relevance of the reference value in the task. As such, the more relevant the initial point, the stronger its influence on the estimate or decision. Other studies, such as the spinning wheel test by Tversky and Kahneman previously stated, however, have also shown that anchor values of no relevance to the

estimates also affect judgmental decisions. As such, both irrelevant and informationally relevant anchors have similar effects in judgmental decisions.

2.2.2.2 Moods

Concerning the influence of moods on the anchoring bias, English and Soder (2009) stated that emotions might indirectly affect decisions due to its ability to change how people process information at any given time. From their study, they observed that anchors had more influence on sad people than their neutral counterparts. Bodenhausen, Gabriel and Lineberger (2000) made a similar observation in research on the susceptibility of sadness to judgmental biases. Other works have, however, attributed a happy mood to a greater possibility of influence from anchors. Bodenhausen, Gabriel and Lineberger (2002) proposed that people in a sad mood are more prone to the effects of anchoring bias than neutral people because of an increased mental effort in a sad state. Nevertheless, both states of sadness or happiness is associated with a heightened mental effort and thus involve similar amounts of mental processing.

Chen (2013) states that if both happy and sad moods involve an increase in elaboration, then, the anchoring-and-adjustment heuristic would predict both moods to decrease anchoring effects since as mental processing increases, one can better adjust from estimates. This is, however, the opposite under the selective accessibility model where a heightened mental effort is linked to a more significant anchoring effect. The ability of a researcher to observe an influence of anchors would, therefore, depend on the type of anchoring bias he or she is studying. Further research could be done on testing this hypothesis. Moods may prove important in this research, where

the moods of participants may act as a moderator, affecting the correlation between the variables.

2.2.2.3 Expertise

Englich & Soder (2009) also showed that emotions only affect the extent of anchoring with non-experts. From their study, they concluded that experts within the field for which the decision or estimate is to be made tend to be influenced by anchors regardless of their mood. This is because experts tend to engage in more deep thinking, comparing the reference information to their prior knowledge, leading to the plausibility of biases in judgement. Another valid reason is the influence of overconfidence. Experts' confidence about their abilities could lead them not to consider important factors or rely too much on their abilities and thus be influenced by the anchor.

On the contrary, Morris (1993) presented a different perspective to explain the presence of anchoring in experts. In his research on the analysis of auditors' perceptions and over-reliance on negative information, he hypothesised that auditors use their initial mindset as an anchor. He conducted a laboratory experiment to determine this and discovered that the auditors did use their initial mindsets as anchors and were thus affected by the anchoring and adjustment heuristic. On the contrary, Chapman and Johnson (1994), in their study, concluded that higher expertise reduces the influence of anchoring. Similar observations were made by Kaustia, Alho and Puttonen (2008). In their study involving 300 Scandinavian financial market professionals and 213 university students, it was observed that professionals had a lower degree of effect from the anchor presented. The study was conducted to observe if an individual's level of expertise reduces anchoring effects. The results showed a

considerable anchoring effect on the long-term stock returns expectations of the students, but the professionals exhibited much smaller anchoring effect. The data shows that all experts are also affected by anchoring biases. Perhaps, the difference in results could be attributed to the different professions of the experts. As the available research mainly compares experts with non-experts, further studies may need to be conducted on the degree by which different kinds of experts are affected by anchoring biases.

2.2.2.4 Gender

As per Rajdev and Raninga (2016), gender is not dynamic in nature, but constant and dependent on one's biological category. It has been observed from research that gender plays a role in heuristics. While some biases seem to affect males to a greater extent than females, other biases seem to do the opposite. Kudryaytsev and Cohen (2011) conducted an experiment involving 120 MBA students from the Israeli Institute of Technology, Technion, and the University of Haifa to investigate the role hindsight bias and anchoring bias play in the perception of economic and financial information and whether the degree of this role is more pronounced for women or men. Employing an extensive experimental questionnaire, it was discovered that women were more affected than men for both hindsight and anchoring biases. This is confirmed by Chang, Chao & Yeh (2016) who obtained similar results in a study of anchoring biases in the real estate market.

However, a study conducted by Onsomu, Kaijage, Aduda and Iraya (2017) provides contradictory results. The study, involving 279 investors, was carried out among local investors at the Nairobi Securities Exchange in Kenya, on how demographics impact investor biases. It was discovered that men were more affected

by anchoring biases than women. The difference in results of the two studies could be as a result of sample differences (one sample involved MBA students while the other, local investors), study design, or cultural differences, as one involved participants from Israel and the other participants from Kenya.

2.2.2.5 Culture

Although it has not been studied extensively, culture has been shown to influence the degree of anchoring effects. Cultures under cultural finance literature is separated into two: cultures that rely on analytic reasoning (western cultures) and cultures that are intuitive or holistic thinkers (Asian cultures) (Breuer and Quinten, 2009). Choi, Koo and Choi (2007) and Nisbett, Peng, Choi & Norenzayan (2001) hypothesised that people with a holistic thinking style would be more prone to anchoring as against analytic thinkers as they focus more on the broader context of information instead of on specific elements like analytic thinkers. A study by Czerwonka (2017) confirmed this hypothesis when research conducted showed that 35.5% of Polish students showed effects of anchoring, while 72.8% of Indian students showed anchoring effects. However, Cheek and Norem (2016) in another study, discovered that people with a holistic way of thinking were less disposed to the anchoring bias unlike those with an analytic way of thinking.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The purpose of this study was to investigate the presence of the anchoring phenomenon amongst mutual fund investors in Ghana and how this phenomenon varies in degree of influence with regard to gender and expertise. The following sections outline a detailed description of the research design employed to investigate the phenomenon. Also described is the period for the study, limitations of the methodology, and how the data analysis was carried out.

3.2 Research Design

A quantitative research design composed of a survey and designed experiments was employed in this study. An experimental design was applied because the study sought to establish a cause-effect relationship between the variables under study. The study was designed to determine whether mutual fund investors are affected by the anchoring bias and to assess if there are differences in the level of effect between genders and between mutual fund knowledge levels. As this study sought to observe how a psychological phenomenon impacts investor decision, a primary data set was more suitable and thus, it was employed, since it was capable of sufficiently reflecting the inner motivations of investors (Lin, 2011).

The experiment was embedded within the survey as it is a more natural way to collect information from people. The time frame for the research was eight months, spanning September 2019 to May 2020. The study design was influenced by the questionnaire of Murithi (2014), and by the experimental design of Lin (2011) as well as Kudryavtsev and Cohen (2011). To properly test the dimensions of the anchoring

bias, the empirical questions were broader than the scope of irrelevant anchors tested by these researchers. All questions and scenarios under the experiment, though significantly influenced by their works, were self-generated.

3.3 Sample Description

The population for this study consisted of all the mutual fund investors in Kumasi and Accra. A sample of 145 respondents was obtained from the population under study using a convenience sampling approach. Participants were randomly assigned to two groups to control the effects of anchoring bias at the experimental section of the questionnaire:

- Control Group

Participants in this group are not provided with external anchors but are made to present their best estimate for each question.

- Anchoring group

Participants in this group receive the same questions as those in the control group, but an “anchor” is presented or invoked (the treatment group).

3.4 Hypothesis

The theoretical and empirical review in Chapter 2 suggests that anchoring is a robust phenomenon and varies in degrees of influence based on a varied number of factors.

The hypotheses tested in this study are defined as follows:

Hypothesis 1: anchoring bias is an observable phenomenon among mutual fund investors.

Hypothesis 2: the degree of anchoring effect falls with increasing level of mutual fund investor expertise.

Hypothesis 3: the degree of anchoring effect is higher among women than men.

3.5 Method of Data Collection

Primary data were collected through an online questionnaire consisting of three sections and contained closed-ended questions, designed experiments and questions based on a Likert scale. The first section contained questions pertaining to the demographic profile of investors and included variables such as age, gender, occupation and educational qualification. The second section contained questions about the extent of knowledge on mutual funds participants have while the final section contained questions on the anchoring bias. This section has the experimental questions and Likert type questions to help draw inferences on the levels of anchoring bias that exists among participants.

The experiment involved participants guessing the answers to four different questions. The purpose of the experiment was to establish evidence of the anchoring phenomenon among the participants and is a mixed-model design of two variations. Variant one was given to the control group and contained no experimenter-provided-anchoring-items while variant two which contained experimenter-provided-anchoring-items was administered to the anchor group. The expectation was that if anchors do not affect participants' answers, then the estimates generated by participants from both groups should be very close.

3.6 Definition and Measurement of Variables

3.6.1 Anchoring Bias

The anchoring bias represents the individual anchoring bias measures obtained from two sources: calculations from the Likert type questions and the mean anchor measure of each participant (equation 3). It represents the dependent variable in this study and is considered as ordinal data for analysis with three levels: Low, Moderate and High.

The calibrations for these three levels can be seen in the *table 1* below:

Table 1: Calibrations for Levels of Anchor Measure

| Source of anchor measures (range of scores) | Low | Moderate | High |
|--|---------------|-------------|-------------|
| Likert questions (0 – 10) | Less than 3 | 3 to 5 | 6 or more |
| Experimental questions (0 – 1) | Less than 0.3 | 0.3 to 0.49 | 0.5 or more |

Source: Author's own computations

To calculate for anchoring measures from the experiment, a method consistent with that of and Kudryavtsev and Cohen (2011) was employed. First, the anchoring measure for each answer by each respondent in the Anchor Group was calculated employing the formula:

$$A_n^i = 1 - \frac{|RA_n^i - I_n|}{DC_n} \text{ (equation 1)}$$

Where; A_n^i represents the anchoring measure for question n and person i

RA_n^i represents the estimate to question n by respondent i .

I_n represents the anchor indicator for question n

DC_n represents the mean deviation from the anchor for question n in the

Control Group also calculated as: $DC_n = \frac{\sum |RC_n^j - I_n|}{NC}$ (equation 2)

Where; RC_n^j represents the estimate to question n by respondent j in the control group

I_n represents the anchor indicator provided to participants in the anchor group for question n

NC represents the total number of participants in the control group ($n=35$)

After obtaining the anchor measure for each question, the mean anchor measure for each participant (which represents the anchor measure obtained from the experimental questions) was determined from the average of the sum of their individual anchoring measures of each question using the equation:

$$AP^i = \frac{\sum_{n=1}^{NQ} A_n^i}{NQ} \text{ (equation 3)}$$

Where; AP^i represents the personal anchoring measure for participant i

A_n^i represents the anchoring measure for question n and person i

NQ represents the total number of questions in the questionnaire (4 questions)

3.6.2 Gender

The gender variable represents the sexual orientation of the participants. The boundaries of sexuality described by Rajdev and Raninga (2016), were used, and thus, participants are either male or female. Such categories were also used because the Ghanaian society frowns on other forms of sexual orientation. Therefore, it is to be expected that more than a majority will identify their sexuality only within these gender groups. The gender variable is an independent variable in the study and is considered as nominal data for analysis with two levels: Male and Female.

3.6.3 Expertise

The expertise variable is multifaceted and determined by a calculation based on a participant's level of knowledge in mutual funds and the number of years investing in mutual funds. It is an independent variable in the study and is considered as ordinal data for analysis with three levels: Low, Moderate and High.

The measure of expertise is obtained from adding up a participant's score in the mutual fund quiz (7 questions) and their investing years score using the equation:

$$E_i = MQS_i + IY_i.$$

Where; E_i is the expertise measure of participant i

MQS_i is the mutual fund quiz score of participant i

IY_i is the number of years participant i has been investing.

And: $IY_i = 3$ if participant has been investing for three years or more

$IY_i = 2$ if participant has been investing for one to two years

$IY_i = 1$ if participant has been investing for more than one year

The expertise measure ranges from a score of 1 – 10 and thus, a participant is placed in the Low category for a score of 4 or less, in the Moderate category for a score of 5 to 7 and in the High category for a score of 8 or more.

3.7 Data Analysis

Data obtained from the questionnaire was analysed through various means. Excel was employed to compute the measures of anchoring from the experimental questions as well as the Likert questions. Based on a self-generated formula, the level of expertise

was also calculated using Excel. As the variables do not represent pre-test and post-test observations, Pearson's chi-square test was deemed an appropriate non-parametric test to assess the associations between the categorical variables under study. A two-way Analysis of Variance (ANOVA) was also employed to evaluate the interactions between the anchoring bias and gender and expertise variables.

3.7.1 Pearson's Chi-square Test Assumptions

As per McHugh (2013), every non-parametric test has its own set of assumptions that ensure the most accurate results with fewer errors. Accordingly, the following are the assumptions of the Pearson chi-square test, which was employed on the data to detect any possible violations. The necessary corrections and adjustments were conducted to ensure that more accurate inferences were drawn.

i. **Assumption 1: *two categorical variables***

The expertise and anchoring bias variables, initially interval data, were collapsed into ordinal categories (McHugh, 2013).

ii. **Assumption 2: *two or more levels for each variable***

The anchoring bias variable and expertise variable both have three levels: Low, Moderate, and High. The gender variable has two levels: Male and Female.

iii. **Assumption 3: *independence of observations***

Variables are independent of each other as they did not involve the observation of pre-tests and post-tests. There was also no relationship or pairing of any of the categorical variables (McHugh, 2013).

iv. **Assumption 4: *relatively large sample size***

The value of expected frequencies for each cell should be at least five for 80% of the cells, and no cell should have an expected frequency of less than one (Bewick, Cheek & Ball, 2003). The Fisher exact test was used as an alternative for pairs that violated this assumption.

3.7.2 Two-way ANOVA Assumptions

The two-way ANOVA test was employed to determine the relationship between all three variables. The assumptions for the two-way ANOVA are outlined below. The necessary corrections and adjustments were thus conducted to ensure that more accurate inferences were drawn.

i. **Assumption 1: *normality of distribution***

Like many parametric tests, ANOVA requires the data to be normally distributed. Normality was established using the Shapiro Wilk test. Data transformation techniques as described by Chambers, Cleveland, Klierer and Tukey (1983) were employed to ensure normality.

ii. **Assumption 2: *homogeneity of variance***

The homogeneity in group variances was determined through the Fligner-Killeen test for homogeneity of variances.

iii. **Assumption 3: *independence of observations***

Variables are independent of each other as they did not involve the observation of pre-tests and post-tests. There was also no relationship or pairing of any of the categorical variables (McHugh, 2013).

iv. **Assumption 4: *sample size uniformity***

The sample sizes employed in the test were equal ($n=70$).

3.8 Limitations of Methodology

As this study involved the analysis of inherent behavioural biases, the best procedures to use would be longitudinal studies that observe people's behaviour over a reasonable timeframe. However, this research was limited in this regard, making such tools impractical to use. The use of a questionnaire was a good substitute as it afforded the ability to garner a vast pool of data in a small amount of time. But this instrument was limited in its ability to gauge the true behaviour of the respondents fully. The addition of an experiment helped to reduce this limitation to an extent.

Another limitation was the use of online surveys as they reduced the level of control over the research: questions that were difficult to understand could not be addressed; unlike that of an in-person interview and this could impact on the true answers. Other less likely factors that might have affected the research design are biased answers resulting from the participant's mood or critical understanding of the study.

CHAPTER FOUR: DATA COLLECTION AND ANALYSIS

4.1 Introduction

This section discusses the analysis of primary data collected from mutual fund investors in order to assess their extent of knowledge in mutual funds and behaviour towards the anchoring bias. Data were collected through hardcopy forms and soft copy using the google forms software. To fulfil the objectives, the extent of mutual fund knowledge was determined, and the anchoring bias was also calculated and studied using Excel and R statistical software. The chapter is divided mainly into two subsections: Descriptive Analysis and Inferential Analysis

4.2 Descriptive Analysis

4.2.1 Participation rate

The study targeted mutual fund shares owners within Accra and Kumasi, two of the largest cities in the south of Ghana. Though not representative of the entire population, these two cities have some of the highest concentration of people from across the regions and thus participant variation was likely to be higher if sampled from within them. The desired sample size for the study was 100 participants and from data collection, 143 responses were obtained, of which 75 participants were from the anchor group and the remaining 68 from the control group. The desired sample size was thus achieved; however, approximately 49% of these responses were used in the analysis as that was the number of participants who owned mutual funds. This 49% or in exact terms, 70 responses, obtained after cleaning the data and discarding uncompleted forms, were evenly distributed in the anchor and control groups (35 each).

4.2.2 Demographic profile of mutual fund investors

The investors were asked questions related to their demographic profiles: age, gender, occupation, level of education and years investing (see *table 2* below). Of the participants, 59% were male, representing the majority. The most representing age group was the “18 – 24” age bracket accounting for 28.6% of all responses.

Interestingly, the “50 and above” age bracket accounted for the lowest responses with respect to age (4.3% of responses). The occupation of participants was evenly distributed. Occupation thus has a fair representation in the data sample.

Approximately 66% of all participants have or are pursuing an undergraduate degree. This could be as a result of the high number of participants belonging to the lower age brackets (approximately 63% of participants in the control group are below thirty years of age and 74% of participants in the anchor group also are below thirty years).

An analysis of the investing years of participants showed an almost even distribution across the three categories. However, a comparison of the investing years categories to that of gender had more information. More males accounted for the middle spectrum of investing years while more females accounted for highest and lowest spectrums of investing years (see *figures 5 and 6* in the appendix). From *table 2* it was observed that 68% of the participants were between the 20 to 30 age range which is noted in the concept of life cycle investing as the stage most appropriate for risky investing. High risk investing is more prone to the influences of behavioural biases and thus, it was likely that a high proportion of participants would be heavily or moderately affected by anchoring.

Table 2: Demographic profile of mutual fund investors (n=70)

| <i>Demographic profile</i> | <i>Type</i> | <i>Frequency</i> | |
|----------------------------|----------------------------------|------------------|-------------------|
| | | <i>Number</i> | <i>Percentage</i> |
| <i>Gender</i> | Male | 41 | 59.0% |
| | Female | 29 | 41.0% |
| <i>Age</i> | 18 – 24 | 27 | 38.6% |
| | 25 – 30 | 21 | 30.0% |
| | 31 – 39 | 14 | 20.0% |
| | 40 – 50 | 5 | 7.1% |
| | 50 and above | 3 | 4.3% |
| | | | |
| <i>Occupation</i> | Student, finance related | 17 | 24.3% |
| | Student, non-finance related | 17 | 24.3% |
| | Not Student, finance related | 21 | 30.0% |
| | Not Student, non-finance related | 15 | 21.4% |
| <i>Level of education</i> | Senior high school or less | 9 | 12.9% |
| | Undergraduate | 46 | 65.7% |
| | Masters/ Doctorate | 15 | 21.4% |
| <i>Investing years</i> | Less than 1 year | 20 | 28.6% |
| | 1 – 2 years | 22 | 31.4% |
| | 3 or more years | 28 | 40% |

Source: Author's own computations

4.2.3 Level of expertise in mutual fund investing

The level of expertise possessed by mutual fund investors is a key variable in this study. The variable is determined from a combination of scores from 7 questions on general facts about mutual funds and number of years spent investing. The assumption is that investors with higher investing years and perhaps higher levels of education will averagely score better in the mutual fund quiz and thus have a higher expertise score.

Table 3: Level of expertise on mutual fund market by participants

| Expertise | Low (%) | Moderate (%) | High (%) |
|--------------|----------|--------------|------------|
| Participants | 21 (30%) | 34 (48.6%) | 15 (21.4%) |

Source: Author's own computations

The resultant measure of the extent of knowledge possessed by investors (expertise) is seen in *table 3* above. Although a lot more people had a low score in the mutual fund quiz— 41.4% of total sample (see *table 4* below), it appears that overall, the majority of participants rather have a moderate expertise level instead of a low one. This is because majority of the participants have been investing for a long period and so possess a higher investing years score (IY_i) which led to a higher expertise measure overall.

Table 4: Mutual Fund Quiz Results by Investing Years

| Investors by years investing | Count (%) | | |
|---|------------|--------------|------------|
| | High score | Medium score | Low score |
| Less than 1 year | 6 (30.0%) | 6 (28.6%) | 8 (27.6%) |
| 1 – 2 years | 3 (15.0%) | 7 (33.3%) | 12 (41.4%) |
| 3 years or more | 11 (55.0%) | 8 (38.1%) | 9 (31.0%) |
| Column total (% to total sample) | 20 (28.6%) | 21 (30.0%) | 29(41.4%) |

Source: Author's own computations

As expected, investors who had been investing for three years or more had a higher score on average. However, the mid-range years seemed to perform much poorly than those who had been investing for less than a year, with a greater proportion having a low score. This was an unexpected outcome.

The results from the mutual fund quiz (see *table 14* in the appendix) show that many investors do not have a solid foundational understanding of mutual funds. Over half of the investors (82.9%) seemed to believe that mutual funds do not suffer losses because they are diverse. Almost half of all participants (representing 70% of responses) believe that mutual funds can be listed on the stock exchange. A whopping 95.7% think that buying a single company's stock usually provides safer return than a

stock mutual fund and another 87.1% believe that if a mutual fund were to suffer losses, your investment is insured against losses.

4.2.4 The Extent of the Anchoring Bias

The goal of this research was to determine if anchoring bias exists among Ghanaian mutual fund investors. The measure of anchoring is obtained first from the experiment described in detail in *section 3.6* of the methodology and then compared with the measures from the Likert questions.

4.2.4.1 Calculating anchoring measures from the experimental questions

The level of anchoring is determined between 0 and 1 with $A_n^i = 0$ representing no anchoring and $A_n^i = 1$ representing anchoring; as such, a positive A_n^i indicates some level of anchoring. However, A_n^i was negative in a few instances, and this was as a result of a participant from the Anchor group providing an answer that deviated from the anchor provided much farther than the average answer from the control group. The general expectation is that participants in the Anchor group will, on average, provide estimates closer to the anchor indicators than the participants in the Control Group will. This was keenly observed to be true especially for question 2 which involved guessing if a set of pencils were more or less than 45 (with 45 being the anchor). 37.142% of estimates from the Control group who were not exposed to the anchor were below 30 but only 11.429% of the participants in the Anchor group provided estimates below 30 (more specifically, the mean deviation from 45 was 8.13 in the Anchor Group while it was 12.69 in the Control Group). This shows that the number 45 *did* act as an anchor and influenced the decisions of the participants in the Anchor group.

The obtained anchor measures for each participant was then categorized under the three levels of the anchoring bias variable shown in the *table 5* below:

Table 5: Levels of Anchoring Bias Measure from experimental questions

| Expertise | Low (%) | Moderate (%) | High (%) | No anchoring (%) |
|-----------|-------------|--------------|------------|------------------|
| Investors | 10 (28.57%) | 12 (34.29%) | 6 (17.14%) | 7 (20%) |

Source: Author's own computations

Contrary to expected outcomes, a majority of participants did not obtain a high anchor measure but a moderate measure while 20% of participants had no anchoring at all. No anchoring resulted from participants having a negative mean anchor measure or a measure that was approximately zero. Notwithstanding, 51.43% of the participants had a considerable anchor measure (moderate or high).

4.2.4.2 Calculating anchoring measures from the Likert questions

In order to generate measures of anchoring from the Likert type questions (see questionnaire in the appendix), a matrix (see *table 15* in the appendix) was generated to score participants answers to the questions. Questions were modelled to be skewed toward the anchoring phenomenon. As such, if a participant agreed to any statement, they were confirming their likelihood to anchor when making investment decisions. The anchor measures from the Likert type questions were deemed an important and reliable source of participant's likelihood to succumb to anchoring behaviour. The resultant measures of the anchoring bias from the Likert type questions are seen below:

Table 6: Levels of Anchoring Bias Measure from Likert type questions

| Expertise | Low (%) | Moderate (%) | High (%) | No anchoring (%) |
|-----------|-----------|--------------|------------|------------------|
| Investors | 8 (11.4%) | 25 (35.7%) | 32 (45.7%) | 5 (7.1%) |

Source: Author's own computations

The anchor measures from the Likert type questions were not too similar to those from the experimental questions. However, much like the latter, the measures from the Likert questions showed that a considerable number (71.4%) were prone to be significantly influenced by the anchoring bias. The results show that approximately 46% of participants were likely to be influenced by the anchoring bias by a high degree while only 11.4% were likely to be influenced by the anchoring bias by a low degree. This supported the earlier claim in *section 4.2.2* that more participants are likely to have a high or moderate anchor measure due to the youthful nature of the sample. A few participants were also observed to not be influenced by anchoring behaviour at all when making investment decisions. The differences seen in both sources of anchor measures could be due to the fact that the anchor measures from the experiment represented only that of the Anchor group while that from the Likert questions represented the entire sample studied.

4.2.5 Relationship between the Demographic Variables and the Extent of the Anchoring Bias

The anchor measures obtained from both the experimental questions and the Likert questions were compared with the other demographic variables.

4.2.5.1 Demographic variables and experimental anchoring measures

Table 7 provides the summary statistics of the relationship between the demographic profile of participants and their anchor measures from the experimental questions. The expectation was that participants in the Anchor Group would exhibit anchoring behaviour and thus it is hypothesized that the mean anchor measure would be positive for all categories.

Table 7: Descriptive Statistics of Anchoring Measure by each Participant

| Category of participants (number of participants) | Anchoring Measure by Participant | | | | | No. (percent) of positive |
|---|----------------------------------|--------|--------------------|---------|---------|---------------------------|
| | Mean | Median | Standard Deviation | Maximum | Minimum | |
| Total Sample (35) | 0.2292 | 0.2278 | 0.2066 | 0.7198 | -0.1289 | 31 (88.6) |
| Gender: | | | | | | |
| Male (21) | 0.1729 | 0.1266 | 0.1848 | 0.5526 | -0.1289 | 18 (85.7) |
| Female (14) | 0.3136 | 0.3362 | 0.2089 | 0.7198 | -0.1051 | 13 (92.9) |
| Age: | | | | | | |
| 18 – 24(13) | 0.2072 | 0.1543 | 0.234 | 0.1798 | -0.1289 | 11 (84.6) |
| 25 – 30(13) | 0.2540 | 0.2856 | 0.1891 | 0.5889 | -0.1051 | 11 (84.6) |
| 31 – 39(6) | 0.3070 | 0.3657 | 0.1730 | 0.5526 | 0.0399 | 6 (100.0) |
| 40 and above (3) | 0.0611 | 0.0762 | 0.0355 | 0.0950 | 0.0122 | 3 (100.0) |
| Level of education: | | | | | | |
| SHS or less (4) | 0.0885 | 0.0969 | 0.0669 | 0.1738 | -0.0138 | 3 (75.0) |
| Undergraduate (24) | 0.2056 | 0.2129 | 0.2018 | 0.5889 | -0.1289 | 21 (87.5) |
| Masters/Dr. (7) | 0.3905 | 0.3027 | 0.1789 | 0.1798 | 0.7198 | 7 (100.0) |
| Investing years: | | | | | | |
| Less than 1 year (8) | 0.2623 | 0.2856 | 0.2546 | 0.7198 | -0.1289 | 7 (87.5) |
| 1 – 2 years (11) | 0.2224 | 0.2278 | 0.1419 | 0.5191 | -0.0537 | 10 (90.9) |
| 3 or more years (16) | 0.2172 | 0.1254 | 0.2154 | 0.5889 | -0.1051 | 14 (87.5) |

nFR= non-finance related FR= finance related Dr. = doctorate

Source: Author's own calculations

On average, 31 out of 35 participants were shown to exhibit anchoring behaviour with their anchor measures ranging from -0.129 to 0.720 and a total mean of 0.23. As the means across all categories was positive, it may be deduced that participants under all categories experience the anchoring bias. No category was observed to have high anchor measures on average, however, females and participants in the mid-range years (25 – 39) were showed to exhibit higher influence from the anchoring bias.

4.2.5.1 Demographic variables and Likert anchoring measures

Table 8 provides the summary statistics of the relationship between the demographic profile of participants and their anchor measures from the Likert questions. The expectation is that the anchoring bias impacts participants' investing decisions. As such, scores of more than 0 was expected.

Table 8: Descriptive Statistics of Anchoring Measure by each Participant

| Category of participants (number of participants) | Anchoring Measure by Participant | | | | | No. (percent) of positive |
|---|----------------------------------|--------|--------------------|---------|---------|---------------------------|
| | Mean | Median | Standard Deviation | Maximum | Minimum | |
| Total Sample (70) | 5.0714 | 5.0 | 2.6797 | 10 | 0 | 65 (92.9) |
| Gender: | | | | | | |
| Male (41) | 4.7804 | 5.0 | 2.8414 | 10 | 0 | 37 (90.2) |
| Female (29) | 5.4828 | 6.0 | 2.3726 | 10 | 0 | 28 (96.6) |
| Age: | | | | | | |
| 18 – 24(27) | 4.6667 | 5.0 | 2.8545 | 10 | 0 | 24 (88.9) |
| 25 – 30(21) | 5.3810 | 5.0 | 2.6273 | 10 | 0 | 20 (95.2) |
| 31 – 39(14) | 5.2857 | 5.5 | 2.3430 | 8 | 0 | 13 (92.9) |
| 40 and above (8) | 5.2500 | 5.0 | 2.5860 | 9 | 2 | 8 (100.0) |
| Level of education: | | | | | | |
| SHS or less (9) | 4.6667 | 4.0 | 2.9814 | 10 | 1 | 9 (100.0) |
| Undergraduate (46) | 4.9783 | 5.0 | 2.5494 | 10 | 0 | 42 (91.3) |
| Masters/Dr. (15) | 5.6000 | 7.0 | 2.8000 | 8 | 0 | 14 (93.3) |
| Investing years: | | | | | | |
| Less than 1 year (20) | 5.2000 | 5.0 | 2.6944 | 10 | 0 | 19 (95.0) |
| 1 – 2 years (22) | 4.9545 | 5.5 | 2.7712 | 9 | 0 | 19 (86.4) |
| 3 or more years (28) | 5.0714 | 5.0 | 2.5902 | 10 | 0 | 27 (96.4) |

Source: Author's own calculations

On average, 65 out of 70 participants were shown to exhibit anchoring behaviour. The means across all categories show that on average, participants had a moderate anchor measure. Much like was observed from the experimental measures, females and participants in the mid-range years (25 – 39) were showed to exhibit higher influence from the anchoring bias.

4.3 Inferential Analysis

In order to draw conclusions from the sample and possibly generalize results to the entire population, an inferential analysis was conducted. The anchor measures employed was those obtained from the Likert questions. This is because it represented the measures of the entire sample and thus could enable the analysis of the entire sample.

4.3.1 Chi square Analysis

With the aid of the R statistical software, the associations between the expertise and gender variables with respect to the anchoring bias variable was determined. The Pearson's Chi square test of independence was identified as a good analytical tool. However, in the instances where the number of cell observations violated its assumptions, the fisher exact test was rather employed.

The hypothesis for the tests below are:

H_0 : there is no relationship between the gender and anchoring bias variables.

H_1 : there is a relationship between the gender and anchoring bias variables.

H_0 : there is no relationship between the expertise and anchoring bias variables.

H_1 : there is a relationship between the expertise and anchoring bias variables.

Table 9: Pearson's Chi square test between anchoring bias variable and gender and expertise measures

| Variables | Appropriate Test performed | P-value | Indication |
|-------------------|----------------------------|---------|---------------------|
| Gender | Pearson's Chi square test | 0.0653 | fail to reject null |
| Expertise measure | Fisher exact test | 0.4489 | fail to reject null |

Source: Author's own computations in R

The analysis shows that although gender is independent of the anchoring measures, it has a weak independence. This is important because it suggests that there exists some association between a participant's gender and their anchoring bias measure. This is the first evidence of associations between this key variable and my dependent variable. The expertise measure, on the other hand, showed that there was no relationship between the two variables. This suggests that the level of expertise of participants does not predict or cannot determine their susceptibility to the anchoring bias.

4.3.2 Multivariate analysis

The two-way Analysis of Variance test was deemed an appropriate test to explore the interactions between the gender and expertise variables on the anchoring bias variable. Prior to carrying out the test, the assumptions under the two-way ANOVA had to be met. To test for normality, the Shapiro-Wilk test was employed while homogeneity of variance was established from the Fligner-Killeen test.

4.3.2.1 Assumption testing

Shapiro-Wilk test for normality

Most parametric tests require that the data be normality distributed. A test for normality is thus an important step in deciding on parametric versus nonparametric tests. The test provides W , a test statistic “obtained by dividing the square of an appropriate linear combination of the sample order statistics by the usual symmetric estimate of variance” (Shapiro and Wilk, 1965). The test was not employed on the gender variable as nominal variables are already known to be non-normal. In testing for normality with the Shapiro-Wilk test, the following hypothesis were tested:

H_0 : Sample is normally distributed

H_1 : Sample is not normally distributed

The results of the Shapiro-Wilk Test are as follows:

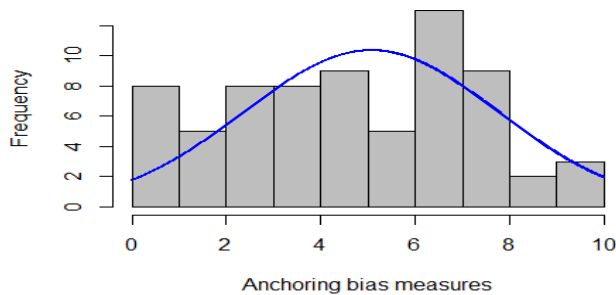
Table 10: Summary of Shapiro-Wilk Test for Normality

| Variables | W | P-value |
|----------------|---------|---------|
| Anchor measure | 0.95008 | 0.0187 |
| Expertise | 0.93289 | 0.0129 |

Source: Author’s own computations

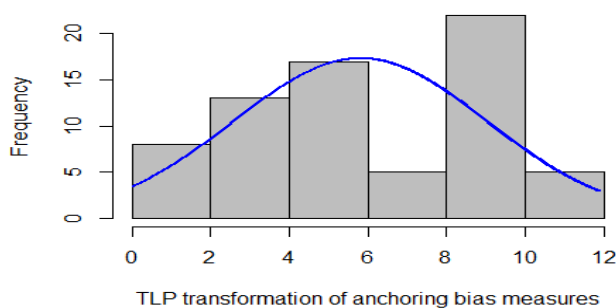
The results of the Shapiro-Wilk test presented in *table 10* above suggest that both variables are significant at 5% significance level. The null hypothesis is therefore

rejected, and it is concluded that the distributions of both variables are non-normal, As it can be observed in *figure 1* and *figure 3*. The non-normal distribution observed is expected since the dataset employed has a small sample size. The Tukey's Ladder of Powers (TLP) transformation was applied on both variables using R in an attempt to transform the data to establish some normality. This transformation did not establish the normality sought after from the Shapiro-Wilk test but improved the distribution significantly as can be observed in *figure 2* and *figure 4*. A normal distribution will however be assumed since the sample size is larger than 30 ($n=70$).



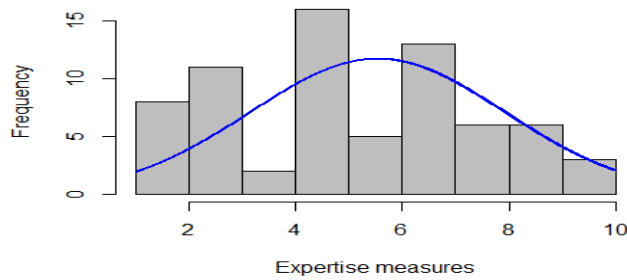
Source: Author's plot using R

Figure 1: Graph showing distribution of anchoring bias measure



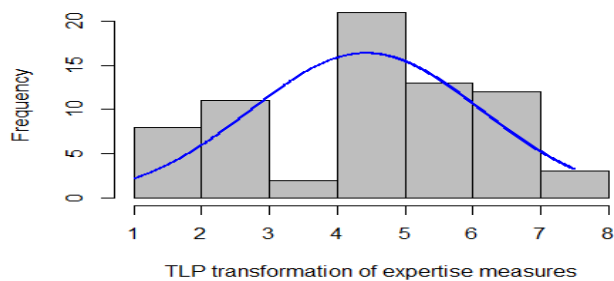
Source: Author's plot using R

Figure 2: Graph showing the distribution of transformed anchoring bias measure



Source: Author's plot using R

Figure 3: Graph of distribution of expertise measures



Source: Author's plot using R

Figure 4: Graph of distribution of transformed expertise measure

Fligner-Killeen test for homogeneity of variances

Another assumption to be determined is whether or not there is homogeneity in the variances of my data. The Fligner-Killeen test for homogeneity was employed as a suitable test as it is a good test for non-normal data and data with outliers. As my data is not the most normally distributed, this is appropriate.

In testing for homogeneity of variances with the Fligner-Killeen test, the following hypothesis were tested:

H_0 : group variances are equal

H_1 : group variances are not equal

The results of the Fligner-Killeen test are as follows:

Table 11: Summary of Fligner-Killeen test for homogeneity of variances

| Variables | Chi-squared | Df | P-value |
|--------------------------|-------------|----|---------|
| Anchor measure*expertise | 13.6000 | 9 | 0.1373 |
| Anchor measure*gender | 0.7557 | 1 | 0.1852 |

Source: Authors own computations

The results of the Fligner-Killeen test presented in *table 11* both show p-values that are above 0.05. Hence, the null hypothesis that the group variances are equal cannot be rejected. As the homogeneity of variances has been established, the two-way ANOVA test can be performed even without a normal distribution.

4.3.3.2 Two-way ANOVA results

The purpose of the two-way ANOVA is to determine if an interaction exists between the independent variables (gender of participants and level of expertise in mutual funds) on the dependent variable (level of susceptibility to anchoring bias). Once statistically significant interactions have been determined, the Tukey HSD post-hoc test will be conducted to analyse the simple main effects.

The hypothesis under the two-way ANOVA to be tested are:

H_0 : the means of the gender groups are equal

H_1 : the means of the gender group are not equal

H_0 : the means of all expertise groups are equal

H_1 : the means of at least one expertise groups is not equal

H_0 : there is no interaction between the gender and expertise

H_1 : there is interaction between the gender and expertise

To conduct the ANOVA, two models are generated. Model one assumes there is no interaction between the gender and expertise variables while model two assumes that there is an interaction between the two variables. *a* 12 shows the results of the Model one while the results of Model two can be observed from *table* 13.

Table 12: Summary of Two-way ANOVA (Model 1)

| Variables | Df | Sum sq | Mean sq | F value | Pr(>F) |
|-----------|----|--------|---------|---------|--------|
| Gender | 1 | 8.4 | 8.377 | 1.152 | 0.287 |
| Experts | 2 | 14.5 | 7.255 | 0.998 | 0.374 |
| Residuals | 66 | 479.8 | 7.269 | | |

Source: Author's own computations

Table 13: Summary of Two-way ANOVA (Model 2)

| Variables | Df | Sum sq | Mean sq | F value | Pr(>F) |
|----------------|----|--------|---------|---------|--------|
| Gender | 1 | 8.4 | 8.377 | 1.134 | 0.291 |
| Experts | 2 | 14.5 | 7.255 | 0.982 | 0.380 |
| Gender*Experts | 2 | 7.0 | 3.480 | 0.471 | 0.627 |
| Residuals | 64 | 472.8 | 7.387 | | |

Source: Author's own computations

The results of Model one shows that there is no statistically significant difference in the level of susceptibility to anchoring by both gender groups ($f= 1.152$, $p>0.05$) and by level of expertise ($f= 0.998$, $p>0.05$). Similarly, Model two also shows that there is no statistically significant difference in the level of susceptibility to anchoring by both gender groups ($f= 1.134$, $p>0.05$), by level of expertise ($f= 0.982$, $p>0.05$) and by their interaction ($f= 0.471$, $p>0.05$).

The null hypothesis, therefore, cannot be rejected in all cases and it may be concluded that gender and expertise and their interaction do not have a statistically significant effect on anchoring bias. Comparing the models, it was identified that

Model one, which assumes no interaction, is the best fit for the data and this explains the largest amount of variation in the anchoring bias variable. A post-hoc analysis was deemed unnecessary for the data as the p-values show no significance at a 5% level. A test of homoscedasticity was performed. It was discovered that the model weakly fits the assumption of homoscedasticity (see *figure 8* in appendix).

4.4 Discussion of Results

This section provided a discussion of the results from the data analysis with regards to the questions driving the study. In order to answer the research questions, the general hypothesis of the research ought to be satisfied.

Hypothesis 1: *anchoring bias is an observable phenomenon among mutual fund investors.*

From the results of the experiment and the computations from the Likert scale, it can be concluded that the anchoring bias is indeed an observable phenomenon among mutual fund investors. In observing the phenomenon for the entire sample using anchoring bias measures obtained from the Likert type questions, it was identified that 45.7% of participants had a high susceptibility to the anchoring bias while only 11.4% of these participants experienced low anchoring (see *table 6* in *section 4.2.4.2*).

Hypothesis 2: *the degree of anchoring effect falls with increasing level of mutual fund investor expertise.*

Inferential analysis on the relationship between the level of expertise and anchoring bias measures were found to be statistically insignificant. However, an analysis of the variables' cross tables shows an interesting occurrence. Females recorded higher expertise levels overall with 24.1% of all females in the high expertise level rank

while only 19.5% of males were ranked in the high expertise level group (see *table 16* in the appendix). Also, 10% more males were observed to be in the Low expertise rank than females. However, although more females were seen to have a higher expertise level, an analysis of the association between the gender and anchoring bias variables show that more females were prone to anchor (58.6% of participants with a high anchor score were females and also only 6.9% of participants with low anchor measures were female)(see *table 18* in appendix).

This is suggestive that a higher expertise level will not shield an individual from anchoring. As the expertise level is obtained from the years spent investing and scores on a mutual fund quiz, these two measures were compared against gender to determine if the same results would be seen. 55% of participants who had a high score were female while males accounted for 66.7% of participants with a low score. Similarly, *table 17* in the appendix shows that females had been investing longer years than males overall. Thus, the degree of anchoring effect **does not** fall with increasing level of mutual fund investor expertise.

Hypothesis 3: the degree of anchoring effect is greater among women than men.

Much like the results obtained for the expertise-anchoring bias association, it was also found that there was no statistically significant difference between the gender and the presence and level of anchoring bias. Thus, the gender of the individual cannot be regarded as a good predictor of his or her susceptibility to the anchoring bias. It must be noted, however, that females on average had a higher anchoring bias measure than their male counterpart (see *table 18* in appendix) which agrees with hypothesis 3. This suggests that a larger sample size could potentially have resulted in a statistically significant difference between genders and the presence and level of anchoring bias and thus the observation could be generalized to the entire population.

With regard to the tested hypothesis from the two-way ANOVA and the Pearson's Chi square test of independence, it was surprising not to find a statistically significant influence of the gender and expertise variables on the susceptibility of participants to anchor. These results, perhaps, may be due to the relatively higher similarity of participants (most participants were either mutual fund investors from DataBank Financial Services or Ashesi University students) or more probable, the low sample size.

The lack of this statistically significant influence means that the strength of the relationship observed in the sample may more likely not be observed in the total population. Thus, the observed results cannot be made a basis for inferring about the entire population

4.5 Summary of Data Analysis

The study involved 70 mutual fund investors from the cities of Accra and Kumasi of which 59% were males. The occupation of participants was fairly representative among the sample. As the sample was characteristically youthful it was not strange that many participants had an educational level of up to an undergraduate level.

Results from calculating the anchoring measure from the experimental and Likert questions showed different patterns but regardless, it was observed from both measures that a greater proportion overall were prone to be significantly influenced by the anchoring bias. Also, a greater proportion of participants were observed to have a moderate level of expertise. As expected, participants who had been investing for 3 years or more obtained higher scores on average than the rest.

The chi-square and ANOVA were used to conduct inferential analysis. From the results it can be concluded that gender plays a fairly significant role with respect to a participant's likelihood to succumb to the anchoring bias and the extent to which the bias influences their decision making; females were shown to be more prone to anchor. The results however could not be generalized to the whole population.

Expertise was not shown to be much of an influence on anchoring. As such, it may be concluded that the degree of anchoring effect **does not** fall with increasing level of mutual fund investor expertise.

CHAPTER FIVE: CONCLUSION

This section summarizes the study and then draws an appropriate conclusion based on the findings. Included in this chapter are the recommendations for further research.

5.1 Conclusion

The purpose of this study was to establish the presence of the anchoring bias among mutual fund investors in Ghana and to determine if observable anchoring bias behaviour is influenced by a participant's level of expertise or gender. In reviewing past literature, it was observed that information on the Ghanaian mutual fund market and its relationship with behavioural biases was lacking. It was also observed that in a general sense, anchoring bias research into the capital market had focused more on the stock market than other sectors like the mutual fund market. The study was therefore necessitated to fill these gaps.

The study involved the use of an online administered structured questionnaire with an embedded experiment. Data obtained were analysed using Pearson's chi-square test and two-way analysis of variance. The evidence from this study suggests that gender and mutual fund investors' expertise in the mutual fund market have little or no explanatory power with respect to the level of susceptibility to anchor by Ghanaian mutual fund investors.

Although generalizing to the population cannot be achieved, an analysis of the associations presents relationships between the variables studied with respect to the participants of the study. That is, females appeared to have stronger anchoring effects which is in line with the works of Kudryaytsev and Cohen (2011) and Chang, Chao & Yeh (2016). Also, participants with a higher level of expertise in the mutual fund

market also showed stronger anchoring effects. This refutes the claims of Chapman and Johnson (1994) and Kaustia, Alho and Puttonen (2008) that higher knowledge and expertise reduces anchor effects.

5.2 Recommendation

The study showed that a lot of people have a low knowledge of the mutual fund market. This is problematic as a growing knowledge of mutual funds will lead to increasing participation of Ghanaians in the mutual fund sector which will promote overall development. Policy makers are, therefore, encouraged to intensify efforts to increase financial literacy among Ghanaians.

5.3 Recommendation for further studies

The results suggest that a higher level of expertise is linked to a higher susceptibility to anchor. This supports English & Soder's (2009) study on overconfidence and anchoring bias where experts succumbed to anchoring due to their overconfidence in their own abilities. Further research on the interplay between overconfidence and the anchoring bias within the context of the Ghanaian mutual fund market would, therefore, be prudent to build upon this research and perhaps confirm the findings of this research.

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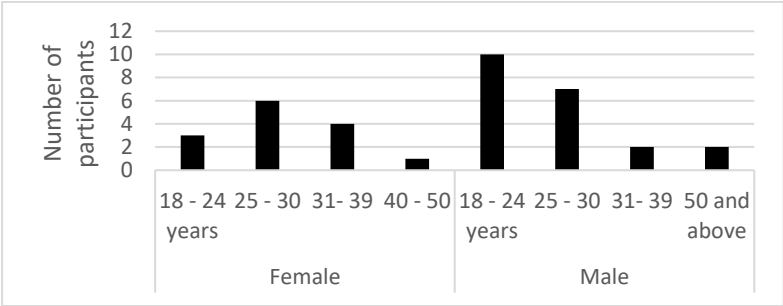
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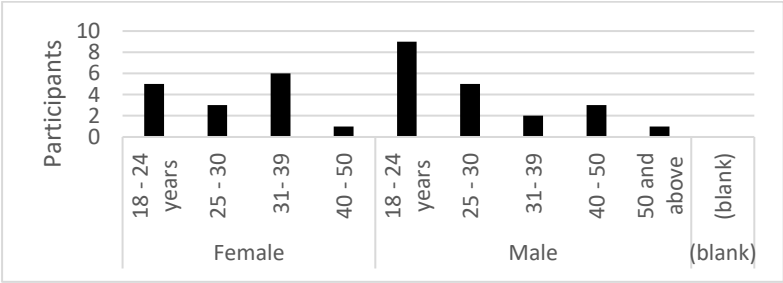
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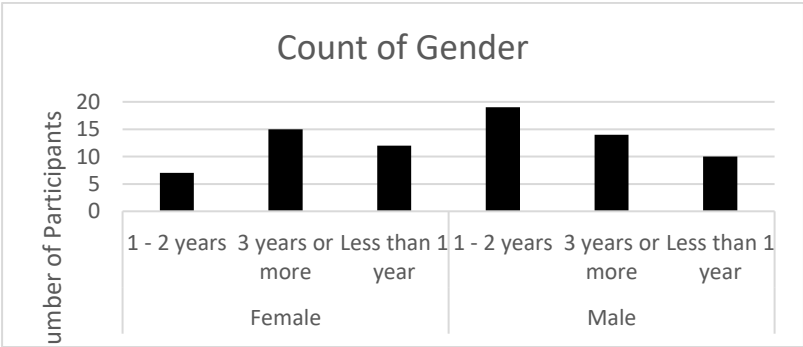
APPENDICES



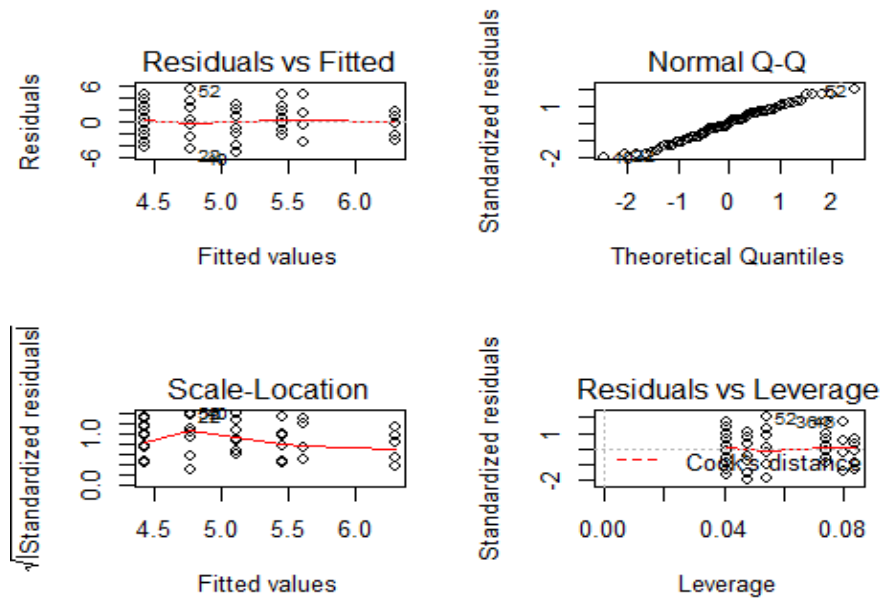
Source: Author’s plot using excel
Figure 5:Distribution of Age Ranges by Gender in Anchor Group



Source: Author’s plot using excel
Figure 6:Distribution of Age Ranges by Gender in Control Group



Source: Author’s plot using excel
Figure 7:Distribution of Participants within each Investing Bracket by Gender



Source: Author's plot using R

Figure 8: Plot for the tests of homoscedasticity

Table 14: Mutual Fund Quiz Questions

| Q.No | Questions | Frequency (%) | |
|------|--|---------------|-----------|
| | | Accurate | Wrong |
| 1. | Mutual funds do not suffer losses because they are diverse | 12(17.1%) | 58(82.9%) |
| 2. | Mutual funds can be listed on the stock exchange | 21(30.0%) | 49(70.0%) |
| 3. | A lot of people come together to own a mutual fund | 48(68.6%) | 22(31.4%) |
| 4. | Buying a single company's stock usually provides safer return than a stock mutual fund | 3 (4.3%) | 67(95.7%) |
| 5. | If a mutual fund were to suffer losses, your investment is insured against losses | 9 (12.9%) | 61(87.1%) |
| 6. | If a mutual fund were to suffer losses, you would lose a proportion of your investment | 41(58.6%) | 29(41.4%) |
| 7. | Mutual funds may have front-end loads/ back-end loads | 37(52.9%) | 33(47.1%) |

Source: Author's own computations

Table 14 depicts the knowledge possessed by investor. *Accurate* is obtained from the count of right answers to a question. *Wrong* is a combination of the count of wrong answers chosen and the selection of the option "I don't know".

Table 15: Matrix of scores for Likert type anchoring questions

| Questions | Scores | | | | | |
|---|-------------------|----------|-------------------|----------------|-------|----------------|
| | Disagree Strongly | Disagree | Somewhat Disagree | Somewhat Agree | Agree | Agree Strongly |
| 1 | 0 | 0 | 0 | 1 | 2 | 2 |
| 2 | 0 | 0 | 0 | 1 | 2 | 2 |
| 3 | 0 | 0 | 0 | 1 | 2 | 2 |
| 4 | 0 | 0 | 0 | 1 | 2 | 2 |
| 5 | 0 | 0 | 0 | 1 | 2 | 2 |
| Where: high anchoring = 10 - 6, moderate anchoring = 5 - 3, low anchoring = 3 - 0 | | | | | | |

Source: Author's own computations

Table 16: Level of Mutual Fund Knowledge by Gender Categories (%)

| Gender | Expertise level | | | Totals |
|--------|-----------------|----------|------|--------|
| | High | Moderate | Low | |
| Female | 24.1 | 51.74 | 24.1 | 41.4 |
| Male | 19.5 | 46.3 | 34.1 | 58.6 |
| Totals | 100 | 100 | 100 | 100 |
| (N) | (15) | (34) | (21) | (70) |

Source: Author's own computations

Table 17: Gender by Investing years (%)

| Investing years | Gender | | Totals |
|------------------|--------|------|--------|
| | Female | Male | |
| Less than 1 year | 50.0 | 50.0 | 28.6 |
| 1 – 2 years | 18.2 | 81.8 | 31.4 |
| 3 years or more | 53.6 | 46.4 | 40.0 |
| Totals | 100 | 100 | 100 |
| (N) | (29) | (41) | (70) |

Source: Author's own computations

Table 18: Level of anchoring bias by Gender Categories (%)

| Gender | Anchoring bias level | | | Totals |
|--------|----------------------|----------|------|--------|
| | High | Moderate | Low | |
| Female | 58.6 | 34.5 | 6.9 | 41.4 |
| Male | 36.6 | 36.6 | 26.8 | 58.6 |
| Totals | 100 | 100 | 100 | 100 |
| (N) | (32) | (25) | (13) | (70) |

Source: Author's own computations

Questionnaire

Below is a sample of the questionnaire used in the study. The sample shows the questionnaire administered to participants in the Anchor Group. The exact same copy was administered to participants in the Control Group. However, the anchor items provided in the *Anchoring Bias and Investment Behaviour* section of the questionnaire are missing in the Control Group's version of this questionnaire.

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

My name is Sally Peaches Owusu, and I am a student at Ashesi University, Ghana. This is to invite you to participate in my research study on the influence of behavioral biases in the mutual fund market in Ghana.

You will be asked to respond to a questionnaire that will take approximately 10 minutes of your time. All information will be kept anonymous and no one will be able to trace your identity to your specific answers. Data will also be treated in aggregate. The benefit of this research is that you will be helping to expand the body of knowledge on the influences of behavioral biases in the Ghanaian mutual fund market.

There are no possible risks of physical or mental harm from participating in this study.

If you have any questions about participation in this study, you may contact me at sally.owusu@ashesi.edu.gh / +233 20 765 4931. You may also contact my supervisor, Esther Afoley Laryea, at Ashesi University [ealaryea@ashesi.edu.gh]

This research protocol has been reviewed and approved by the Ashesi university Human Subjects Review Committee. If you have questions about the approval process, please contact the committee through irb@ashesi.edu.gh.

*** Required**

1. Do you agree to participate in this research study after fully reading and understanding the statements above? *

Mark only one oval.

- ☐ Yes
☐ No

Let's get started!

2. Do you own shares in a mutual fund? *

Mark only one oval.

- ☐ Yes
☐ No

Demographics

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

3. 1. What is your age? *

Mark only one oval.

- ☐ 18 - 24 years
- ☐ 25 - 30
- ☐ 31 - 39
- ☐ 40 - 50
- ☐ 50 and above

4. 2. What is your gender? *

Mark only one oval.

- ☐ Female
- ☐ Male

5. 3. What is the highest level of school/ education that you have completed? *

Mark only one oval.

- ☐ Senior high school or less
- ☐ Undergraduate
- ☐ Masters/ Doctorate
- ☐ PhD
- ☐ Other: _____

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

6. 4. Which of the following best describes your current occupation? *

** finance related = students who have taken courses such as accounting, investments and finance OR workers within such fields (fund managers, financial analysts, accountants, bank managers, auditors, etc)

Mark only one oval.

- ☐ Student, finance related
- ☐ Student, non-finance related
- ☐ Not student, finance related
- ☐ Not student, non-finance related

Investment Experience

7. How did you come to know of mutual funds? (choose all that applies) *

Check all that apply.

- ☐ Friends
- ☐ Mutual Fund agent
- ☐ Media(Newspaper/ tv/ radio)
- ☐ School
- ☐ Family

Other: ☐ _____

8. What type of funds are you investing in? (choose all that applies) *

Check all that apply.

- ☐ Equity funds
- ☐ Index funds
- ☐ Balanced funds
- ☐ Debt funds
- ☐ Socially responsible funds
- ☐ Money market funds
- ☐ I don't know

Other: ☐ _____

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

9. How long have you been investing in mutual funds? *

Mark only one oval.

- ☐ Less than 1 year
- ☐ 1 - 2 years
- ☐ 3 years or more

10. For the following questions, please answer: True/ False/ Not sure. *

Mark only one oval per row.

| | True | False | Not sure |
|--|-----------------------|-----------------------|-----------------------|
| Mutual funds do not suffer losses because they are diverse | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mutual funds can be listed on a stock exchange | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| A lot of people come together to own a mutual fund | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Buying a single company's stock usually provides a safer return than a stock mutual fund | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If a mutual fund were to suffer losses, your investment is insured against any losses | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If a mutual fund were to suffer losses, you would lose a proportion of your investment | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mutual funds may have front-end loads/ back-end loads | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Behavioral Traits

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

11. In choosing my current mutual fund(s), my decision was mainly influenced by: *
- Please rank your influences where 5= strongest influence and 0= no influence.

Mark only one oval per row.

| | 0 | 1 | 2 | 3 | 4 | 5 |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Mutual fund manager | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Parent | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| sibling | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Media (tv /radio /newspaper ads) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Friend | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

12. If "other", from the previous question, please state.

Anchoring Bias and
Investment Behavior

For the following section, please fill the blanks with your best guess to the following questions.

A 4 bedroom house (fully furnished)



2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

13. What do you think is the price of the house above? (clue: it is not more than \$600,000) *
-
14. What is your current age? Subtract 10 from this number and then add 5. Please type this number in the space provided *
for example, for a 20-year old, subtracting 10 = 10; then adding 5 = 15
-
15. What do you think is the current return on the 91-day treasury bill? *
Please provide your best guess to this question
-

Below is a painting. People who have studied it say they see numbers. On the day it was made, 900 other paintings were made by different painters worldwide.



16. How much do you think the painting above which is one of the 900 paintings made on a particular day worldwide is worth? *

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

Colored pencils arranged in a circle



17. Without Counting! Would you say the colored pencils are more or less than 45?

*

Mark only one oval.

- ☐ More than 45
- ☐ Less than 45

18. Without Counting! Give your best guess of the total number of pencils in the picture *

2/25/2020

Exploring the Effects of Anchoring Bias on Investment Behaviour_A

19. For the following questions, please select what best describes your investment behavior. If you have not encountered such a situation, please select the one which best describes what you are most likely to do. *

DS= disagree strongly D= disagree SDA= somewhat disagree SA= somewhat agree A= agree AS= agree strongly

Mark only one oval per row.

| | DS | D | SDA | SA | A | AS |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I use the treasury bill rate as a benchmark for selecting a mutual fund to invest in | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I hear views from a famous analyst that conflicts with my own opinions about a mutual fund, I would change my opinion immediately | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I see the current return on my money market fund as high if it is above the 91-day treasury bill rate | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I use my portfolio's past month performance as a measure to determine my continued investment | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I chose this mutual fund because I felt I would gain more on it than other mutual funds in the same category based on its estimated return. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

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