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Abstract

THE SUPERIORITY OF VALUE INVESTING: A NAIROBI SECURITIES EXCHANGE EMPIRICAL ASSESSMENT

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The comparative better performance of some investment styles in circumstances of varied operating market conditions has been a subject of research interest overtime with investment professionals constantly scouring the literature to identify predictor variables of the superior performance of these investment approaches. With the value stocks outperformance of growth stocks documented phenomenon in mind, this study attempted to increase learning on this occurrence from a Kenyan perspective.

The dissertation employed the methodology implemented by The Brandes Institute (2009) from the pioneering work of Lakonishok et al. (1994). More specifically, equities data over the period 2011-2019 were used. The price-to-book (P/B) value ratios for the Nairobi Securities Exchange All-Share Index (NASI) firms were computed to determine the predictability of the comparatively better returns results of the value stocks over the growth ones.

Using the comparative price to book ratios, a ranking of monthly stocks was carried out. This was followed by constructing subsequent, for each month, four newly constructed portfolios of investment portfolio. The growth stock portfolios constituted the topmost quarter of P/B ratio

equity stocks while value portfolio stocks comprised the lowest quarter of P/B ratio stocks. From this, a quartile-based performance was analysed over the subsequent five-year periods. The comparative value to growth portfolio performance was checked against the valuation difference multiple to identify any existence of valuation disparities as well as the subsequent comparative performance results relationship of value vis-à-vis growth stocks. The study found a Nairobi All Share Index (NASI) relationship of the valuation difference multiple and the ensuing return outcome of value and growth portfolios of equity stocks. A higher valuation difference multiple correlated with a higher subsequent superior performance of value equities throughout the following five-year period vis-à-vis the growth counterparts.

The dissertation also researched the returns performance of certain value investment approaches in the Kenyan stock market based on nine company fundamentals from published financial statements of public companies, following the Piotroski (2000) work. The dissertation examined the alternative stock performance forecast combination methods that fully use the financial statements data.

The finance discipline, just like economics, is a social science as the data thereof come from human economic transactions. However, a big portion of research in this field is done by methods that mimic those used in the natural sciences (physical laboratory) tests. The appearance of a semblance of scientificity in this area together with the increased credibility in the research process and outcomes is vitally important, although the research outcomes' evaluation yardstick varies from that used in the natural sciences. For example, alternative research results that do not

confirm the efficient markets hypothesis have traditionally been set aside as outliers and hence leading to the concluding assumption that the entirety of the hypothesis has been validated.

This dissertation assumed the presence of persistent inefficiencies in the stock market from which investors could derive benefits. Using the published financial statements data of firms listed on the Nairobi Securities Exchange (NSE), the correlation significance of firms' financial ratios and their subsequent stock returns was determined. A few combination methods of the financial statement data derived variables were performed with the aim of increasing the investment strategy's profitability. The dissertation's finding was that, generally, classifying securities based on certain internal criteria of financial soundness can separate future winner stocks from loser ones and thus confirmed previous study results on the US market. It showed that a range of combination methods was able to isolate profitable investment strategies with those measuring profitability being the central predictors of the future performance of a stock. It was found that increased complexity in investment methods did not improve the consistency and performance of the simple methods.

Declaration

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own.

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Dedication

This thesis is dedicated to my children, Natalie Rouse and Deaton Dean.

Acknowledgments

With deep gratitude, I acknowledge the guidance, and best wishes in the course of writing this dissertation given to me by my supervisor, Dr Solomon Olajide Fadun.

Special thanks to my friends and colleagues within financial services industry in Kenya who laughed with and at me and gave their continued assurance of my academic capacity.

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Finally, I put forth my thankfulness to my children for their kindness, curiosity on what I was doing on the laptop and as to how many degrees I have! Without you, Natalie and Dean, this journey would have been dry and a chasing after the wind!

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CHAPTER 1: INTRODUCTION

In this chapter an overview of the motivation behind the dissertation topic that analyses the superior investment results that arise from implementing the value investing style. In addition, the performance of accounting information-based fundamentals analysis investment strategy in the Kenyan stock market is presented. A highlight of research objectives and ways in which the dissertation contributes to the body of knowledge of the literature from providing solutions to the research questions is given.

Several motivations drive the savings and investment decisions of individuals and institutions with the general assumption being the expectation of a return or profit as the overriding motive as extensively discussed in Williams (1938) thesis on the theory of investment value and later buttressed in the economics writings of Modigliani (1966) in his publication of the life cycle hypothesis of saving. This savings-investments literature set out other objectives beyond making a gain on the investment as built up in the 1980s macroeconomics texts, for instance, in Branson (1989) and recently expanded and mathematicised, for example in Romer (2019). These other investment objectives include altruistic considerations such that the saving and investment decisions are made for the purposes of creating wealth for other generations and preserving the invested value Dornbusch et al. (2018). Investors once settled on the objective(s) of investing need then to select the investment vehicle and approach (Schredelseker, 2022; Peters and Taylor, 2017).

There has developed a profession of money management where individuals and institutions put their money in the hands of money managers (mostly institutions) where the money is then

invested with a specific expected level of return and risk (Durand et al., 2019). The money managers charge a fee (based on the value invested and investment performance). The money managers are then under pressure to produce returns above the market average otherwise they lose their clients (Anadu et al., 2020). This competition for client retention by consistently producing above market returns has kept the use of value investing as an active investment strategy alive (Fisch et al., 2019; Lochstoer, and Tetlock, 2017; Toit, 2012). The active investment style thus believes in the existence of market pricing anomalies and thus possible for an investor or professional money manager to outperform the market consistently (Lehto, 2021; Anadu et al., 2020). This approach differs from the passive investment strategy whose assumption is that markets are efficient such that asset prices always reflect full information that is available as per the Efficient Market Hypothesis (EMH) (Bocher, 2022; Fama and French, 2020; Fisch et al., 2019). This way, assets are considered to be priced correctly and thus total unlikelihood of consistently outsmarting the market save by chance, when the EMH proposition holds. The Passive investment approach/strategy is then based on market weights, normally called indexing (Fisch et al., 2019; Sushko and Turner, 2018; Crane and Crotty, 2018).

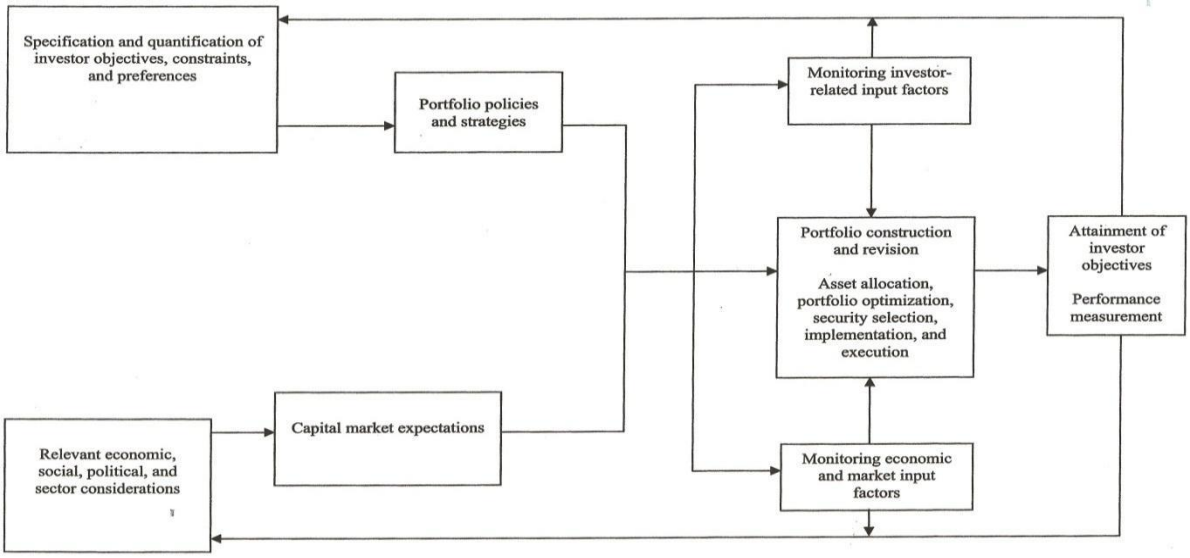
The active management style philosophy reconciles with the market equilibrium notion in that active managers seek out assets they believe to be mispriced hoping for a higher return when the asset is finally priced properly out of market correction (Cremers, 2017; Cremers and Pareek, 2016). Asset market prices are constrained within slim margins out of the money managers competition (Israel et al., 2020; Fisch et al., 2019). Where no manager beats the market, cost minimization would be the next option while following a passive investment strategy (Bofinger, et al., 2022; Lehto, 2021). This would then drive active managers/investors out of business, voiding

asset prices of the analyst research and forecast information. A new ensuing mispricing would then attract another crop of active investors to the market who spot the opportunity for potential above-market returns (Bofinger et al., 2022; Fisch et al., 2019; Stambaugh and Yan, 2016; Stambaugh et al., 2015). This then implies that active investing will always have a place in the investment world notwithstanding the belief in market efficiency (Takaishi, 2022; Crane and Crotty, 2018). In sum, there are two broad investment styles: active and passive styles. Active investment styles believe that that the market can be outperformed and thus produce returns above market averages, indicating market imperfections that keep the EMH at bay. In the active category, the two competing styles are value investing and growth investing and thus whichever of these outperforms the other, consistently, is the superior investment style (Fox and Hammond, 2020; Anadu et al., 2018; Toit and Krige, 2014). This thesis thus argues that value investing is the superior investment style and thus compares its performance to that of growth investing to establish this argument.

Regardless of whether an investor follows the passive or active style, the construction of a portfolio of investments is guided by the need to meet certain objectives as alluded to in, for instance, Anadu et al. (2020), Fisch et al. (2019), and Sushko and Turner (2018). Additionally, the portfolio construction process is complicated by the dynamism of the global investment markets that are prone to economic cycles and unexpected shocks that create unforeseen crises and anomalies (Jin, 2022; Fisch et al., 2019). Formal portfolio construction theory has its roots in the Markowitz (1952) work that differentiated efficient and inefficient portfolios based on the mean (expected) returns and risk (the variance of returns) selection criteria (Dew-Becker et al., 2017). Extensions of the Markowitz (1952) work in Sharpe (1964) changed the thinking around portfolio construction, eventually evolving into the portfolio construction concept as seen in the modern era.

This was also accomplished in Treynor and Black (1973). Modern portfolio theory says that an investor seeks the highest yield for each level of risk and, as a corollary, to minimise portfolio risk for any given expected return level (Fisch et al., 2019; Yan and Zheng, 2017; Elton et al., 2014). Deciding on the acceptable risk level then becomes a crucial step in the process of choosing investments. The portfolio construction and management process is dynamic as it needs continually evaluating and adjusting the portfolios' objectives and expectations (Figure 1.1). Benchmarks for comparing portfolio performance are also crucial in this process as a critical input in evaluating the performance of the chosen investment strategy given the obtaining market conditions (CFA Institute, 2010).

Figure 1.1: The Process of Constructing, Monitoring, and Revising Portfolios



Source: CFA Institute (2010)

Of vital importance is the selection of an investment strategy that leads to the attainment of investor aims and goals. Studies show that the selected investment style has a huge bearing on

the expected returns (for example, Wichlinski and Rajaram, 2019; Yan and Zheng, 2017) and the risk-return trends of varying investment approaches have been an attractive research area. In these studies, investors were categorised as falling in either of active or passive styles with indexing being the most common passive strategy used by investors. Indexing comprises complete replication, stratified sampling, and optimization (Ramos, 2021; Anadu et al., 2020). A combination of the two opposite extremes comes in the form of semi-active investment styles, for instance, enhanced indexing or risk-controlled active investing (Cremers, 2017; Cremers and Pareek, 2016). In the active style category, there are subdivisions that are based on the strategies chosen by the investors and vary from value to growth to market-oriented investing (Holthausen and Zmijewski, 2020; Langa, 2016; Toit, 2012). Some investors adopt a relative firm size approach to investment and classify firms into large, medium (mid), and small capitalisation (cap) categories and a mix of approaches is not uncommon. Supporters of imperfect market information and hence the existence of mispriced securities leading to consistent market outperformance attempt to exploit the systematic market inefficiencies that emanate from the presence of information asymmetry. The underlying stock valuations and price multiples form the basis of value and growth strategies. For instance, momentum-based investors (a sub-group of growth investors) follow recently underperforming stocks believing that an upward price movement will be sustained following a recent recovery (Holthausen and Zmijewski, 2020). On the other hand, contrarian-based investors (a value investing subgroup) pick out-of-favour stocks that seem unattractive to other investors.

Growth investing has been defined as an investing style that seeks securities with prospects of growth potential. This investment approach was promoted by Babson (1951) and gained

prominence in the post-World War 2 period (Israel et al., 2020; Langa, 2016; Toit, 2012). The argument then was that investing was better than speculating and that superior returns could only be obtained from investments in companies with superior management with expected earnings and dividends higher than inflation and economic growth rates. Thus, the main criterion under growth investing was seen to be a high future expected growth notwithstanding a prevailing high price. Since growth investors don't actively seek low-priced stocks, a portfolio of growth stocks would generally have high price multiples, that is, price-to-earnings (P/E), price-to-book value (P/B), and price-to-cash flow (P/CF) ratios (Gagliolo and Cardullo, 2020).

Value investing, on the other hand, is an investment approach introduced in the 1930's by Benjamin Graham and later championed by Warren Buffet but hitherto still not much is known as to why it appears to be effective with some academic strand of literature labelling it a statistical anomaly (Greenwald et al., 2020; Siddiquee, 2017) and therefore, given its impressive performance outcomes for over four decades, continued in-depth study is still warranted. Value investing approaches investment practice from the standpoint that there is an intrinsic value in stocks that is not observed in the current stock price and thus selects stocks that are trading at a discount (Cornell, 2021; Siddiquee, 2017). This approach is anchored in Benjamin Graham's fundamental analysis as a mandatory step in the stock selection process and therefore advised picking stocks not favoured by the market and thus exchanging at prices lower than their ascribed intrinsic value as described in Graham and Dodd (1934) and defined intrinsic value as the present value of future expected cash flows of a firm (Pätäri, et al., 2018). The measurement of future cashflows is exposed to the risks of subjective judgement and may vary from analyst to analyst. Because of the value stocks' tendency to have lower prices than their intrinsic values, their Price

to Earnings (P/E), Price to Book (P/B), Price to Sales (P/S) and price to Cashflow (P/CF) ratios tend to be lower than average and higher dividend yields (Lee et al., 2021; Yan and Zheng, 2017). The assessment of future cashflows inherently involves subjective judgments, which can result in variations among different analysts. In the context of value stocks, these stocks are known for having prices that are lower than their intrinsic values. Consequently, they exhibit lower Price to Earnings (P/E), Price to Book (P/B), Price to Sales (P/S), and price to Cashflow (P/CF) ratios compared to the market average. Furthermore, value stocks often offer higher dividend yields (Lee et al., 2021; Yan and Zheng, 2017).

Value investing is a widely recognized investment strategy that involves the identification and selection of stocks that are deemed undervalued in the market. These undervalued stocks are characterized by a low Price to Earnings (P/E) ratio and a low book-to-market (BM) ratio, indicating a relatively low price in relation to their earnings and assets. In contrast, growth stocks exhibit high P/E and B/M ratios, reflecting the market's expectation of robust future growth and a willingness to pay a premium for such stocks (Cornell, 2021; Lee et al., 2021; Arnold, 2008). The terminology used to classify these stocks has been a subject of debate within the academic literature. Previous studies, such as Lakonishok et al. (1994) and The Brandes Institute (2008), referred to the favored stocks as "glamour stocks." However, Lakonishok et al. (1994) contested the notion that value stocks outperform glamour stocks due to the perceived higher risk associated with the former. As an alternative, Fama et al. (1992) argued that stocks with low price-to-book (P/B) ratios, a commonly employed value measure, entail greater risk, suggesting the use of the term "growth" instead of "glamour."

For the purpose of the present dissertation, the distinction between growth and glamour stocks is not of central importance. The term "growth stocks" is employed in its conventional sense, denoting well-established firms exhibiting P/E, P/B, and P/S ratios that exceed the average ratios observed within their respective economic sectors. Despite the popularity of value investing and its potential for generating higher returns by capitalizing on undervalued securities, the theoretical underpinnings supporting its efficacy have yet to yield a definitive consensus. Consequently, scholarly interest in this area remains unabated, as researchers endeavour to further investigate and comprehend the factors influencing the performance of value investing strategies.

Value investing's higher yields achieved through selecting securities that are trading under their intrinsic value is yet to be concluded in a body of theory and thus research interest persists with no sign of settling the debate (Cornell, 2021). This dissertation empirically analyses whether investments in value stocks leads to better realization of the investment objective of superior yield as compared to investments in growth stocks. Of course, the search of what can be called value has been ongoing with investors looking to identify what might be the perfect indicator of value that then leads to future outperformance (Greenwald et al., 2020; Speidell, 2017). This search has evolved into the production of an eclectic number of investments valuation models as well as investment style evaluation frameworks. The latter are applied on the money managers while the former are applied to the securities in question (Lehto, 2021).

The occurrence and reoccurrence of market volatilities behoves a re-examination of these frameworks. For instance, in the late 1990s a number of growth indexes outperformed value indexes in nearly six consecutive years leading to investors asking questions on the sustainability

of value investing as a successful investment approach (Durand et al., 2019). This phenomenon gave rise to the belief in a "new era" where technology stocks arising from the revolutionary impact on business by technology suddenly defied rational portfolio choice analysis with a dichotomy emanating of 'New Economy" stocks vs "Old Economy" stocks (Durand et al., 2019; Ababio, 2018) to extinction. However, another argument also came up where growth stocks, according to some investors, were purely technologically driven and was deemed to be a bubble waiting to burst thereby forcing a return to classical fundamental security analysis that favours value stocks (Binfare and Zimmerschield, 2022; Zakaria and Hashim, 2017; Subramanyam, 2010).

Evidence exists, in early studies, confirming the superior results from value stocks over growth stocks, like in the case of Basu (1983), where supernormal returns for low P/E stocks against the high P/E ones on the US Market were observed. Fama et al. (1992), while explaining why value stocks outshine growth stocks, suggested that this comes about from the inherent risk in value stocks. This, however, was not supported in Lakonishok et al. (1994) where their study on US stocks found value stocks to be of lower risk relative to growth stocks but still did better than growth stocks. Similar evidence has been uncovered in many later studies confirming the superiority of value stocks over the growth alternatives, for instance, Fama and French (2020) found supernormal returns for low P/E stocks vis-à-vis high P/E stocks on the U.S markets. Fama et al. (1992) attempted to provide an explanation as to why value stocks had superlative outcomes over the growth stocks and suggested that the situation arises because of the riskiness of value stocks. However, Lakonishok et al. (1994) carried out a study to test this explanation on the U.S market and concluded that in fact value stocks were contrarily less risky relative to growth stocks, and still returned better results than the growth ones. Recent studies point to the confirmation of

the better performance of value stocks, for instance, in Fama and French (2020), Siddiquee (2017), Kumsta (2015), and Gharghori, et al. (2013), found risk adjusted value premiums in all the markets they tested. Before 2008, financial markets had had been lulled into stable growth rates with muted volatilities in business cycles (Bernanke, 2018). The view had changed by the end of 2008, following the September crisis that climaxed in Lehman Brothers bankruptcy and the salvage of AIG and Merrill Lynch by the US Treasury. Stock markets around the globe and particularly Europe and Asia were hit hard.

An investment strategy based on fundamentals provides investors with an operationalizable tool that can produce stock returns that are reliable and consistent. But there's an academic controversy around this principle as it assumes varied perceptions of financial statement information and its incorporation in the stock prices by market participants (Yohn, 2020; Pätäri, et al., 2018). This variation in investor perceptions creates convertible profit opportunities using a suitable investment strategy. This necessitates assuming two conditions. First, there's the expectation of stock market information inefficiency implying non-random stock price movements and hence their forecast-ability, in contrast with the efficient market hypothesis (EMH), a belief that has dominated modern finance for decades (Bocher, 2022; Fama and French, 2020; Lo, 2004). In Fama (1970), it was stated that asset prices reflected all available information about the asset. The EMH has faced criticisms since then. Grossman and Stiglitz (1980) argued against the reality of market efficiency based on what they called "logic" whereby if it were true that all information was always priced in then no investor would continue spending resources into information collection and trading thereof leading to the eventual market cession. This academic debate resulted into the emergence of an alternative theory that relaxed some of the EMH's strong

assumptions (Takaishi, 2022). Thus, the main assumption overriding stock investing was that markets were efficient as prescribed in Fama (1970) hypothesizing that the price observed in a market security contained all the information and the underlying asset's value. However, empirical literature has militated against this hypothesis, for example, Grossman and Stiglitz (1980) suggested that it was untenable to have perfect information and that the existence of investors who try to beat the market meant that information asymmetry must exist (Takaishi, 2022; Fama and French, 2017).

The behavioural finance school proposes that investors should be seen individually as opposed to a herd in the financial markets such that rational behaviour in economic decision making is tampered with individual feelings and emotions (Choi and Robertson, 2020). This then implies that there would be difficulties predicting investor actions as they might deviate from rational expectations and thus, create market inefficiencies. Because of the EMH's reliance on mathematics in attempting to understand financial markets' operations and thus assuming that prices follow a stochastic process (Takaishi, 2022; Lo, 2004), behavioural finance terms EMH as suffering from what is called "physics envy". The Bennis and O'Toole (2005) counter response suggested that social sciences such as finance heavily borrowed from the physical sciences (particularly mathematics and physics) where the resulting research findings lacked a practical application evaluation rigour. However, behavioural finance has also come under the same criticisms and questions have been asked as to the transferability to financial markets of test findings from psychological experiments, from which behavioural finance is founded (for instance, Hommes and Veld, 2017; Barberis and Thaler, 2005).

Even after addressing the preceding matters, determining the investment strategy most suited to convert the market anomalies into investment benefits remains a key question yet to be conclusively answered. As discussed elsewhere in this section and as delineated in Ke and Ramalingegowda (2005) and in the later studies of Fama and French (2015), investors come in the categories of transient (active traders, of which value investing is part), dedicated or quasi-indexing investors (target low turnovers in portfolios) and each category needs different investment approaches (Kok et al., 2018; Hommes and Veld, 2017). The overall overriding aim is return maximization no matter the strategy chosen. The criticism of data mining has been levelled on the idea of searching for the optimal strategy but the same was moderated in Richardson et al. (2010) and Kumsta (2015) where the use of theory was recommended as a measure that avoids the temptation of data mining. This dissertation sought to make a contribution to the literature in the dedicated investors field in accordance with the Ke and Ramalingegowda (2005) definition above.

Emanating from the physics envy is the finance theorists' challenge where it is not always possible to rigorously apply the scientific method closely integrated with a positivist research methodology in the physical sciences. Kumsta (2015) gave an illustrative analysis of this challenge, the Black–Scholes model. This model's formula was derived to aid in options pricing based on observable input variables. The model was described as producing a 40% divergence between actual and forecasted option price in the periods immediately after it was presented (Ferraro et al., 2005). The model was then observed to be improving in its accuracy as time went by (Kozak et al., 2018). The assumption taken was that the options market evolved such that it started corresponding to the formula since the formula stayed as originally developed (Mackenzie and Millo, 2003) and hence the regarding of the options market as efficient since the options prices

contained and reflected complete information as posited in Fama (1970) efficient market hypothesis. But efficiency here is observed only because of the participants' use of the model and not because of any innate pricing mechanism discovery in the Black-Scholes options market. Since its wide application came from the accuracy it portrayed, the observed efficiency was unlikely to change anytime afterwards (Bocher, 2022; Singh et al., 2021; Kozak et al., 2018).

Contrastingly, there are other models in the equity markets that are not as accurate, for example the capital asset pricing model, the arbitrage pricing theory or the Fama–French -factor models (Cox and Britten, 2019; Siddiquee, 2017). This arises possibly due to financial theory versus practice divergence. This has been observed, for example, in Graham and Harvey (2001) where it was found that the differences in project evaluation methods application by finance managers of small and large firms could significantly alter equity prices (Yousuf and Makina, 2022; Hanson and Sunderam, 2013). Hence, hitherto, Black-Scholes continues to occupy a preeminent place in the stock markets as a single pricing formula (Kozak et al., 2018). This is hardly a limitation since, given that there is found a reliable investment strategy, the investor has reasonable assurance of an actual correlation between firm fundamentals and returns on securities. Of course, it is plausible to expect that similar outcomes can be obtained from other strategies.

It was posited in this dissertation that value investing with stock valuation avails intrinsic value observed through discounted cash flows valuation models and others. Although, quoted stocks were chosen in this study as the primary investment vehicles for analysis, a simple investment model of identifying value stocks was investigated and proposed as a composite value investing tool. The stock markets analysis was particularly studied because of its long period of

data availability.

The study generated knowledge in answering two fundamental questions faced by investors: Would a value stocks investment portfolio yield better returns than a growth stocks portfolio on the Nairobi Securities exchange? How would a framework of value investing be constructed in an investment basket to ensure optimum investment returns? This study was secondarily motivated to find some of the factors that lead to a successful value investing in a behavioural finance environment and specifically tested i) the fundamentals-based investment approaches in the Kenyan equity markets; ii) extended these strategies with the aim of improving them by a better data combination of different indicators; iii) to provide an investor with a readily operationalizable investment choice tool; iv) to minimise data-mining possibilities through the emphasis of the finance theory of the interplay of variables of input and the alternative approaches' implementation following the recommendations in Singh et al. (2021) and Lee et al. (2020).

The rest of the chapter is arranged in the following manner. Section 1.2 the problem statement, gives the rationale for the subject of study choice. Section 1.3 elaborates on the objectives of this study. The nature and significance of the research is discussed in section 1.4. Section 1.5 lists the research questions and hypotheses tested.

Statement of the Problem

Having identified the two broad investment approaches of active and passive styles and that active investment styles believe in the possibility of consistently outperforming the market, it

was determined that the two competing active investment styles of value investing and growth investing form the centre of determining the superiority of value investing since whichever of these two outperforms the other is the superior investment style since it produces the highest above-market returns (Fox and Hammond, 2020; Anadu et al., 2018; Toit, 2012). This thesis thus argues that value investing is the superior investment style and thus compares its performance to that of growth investing, its direct competitor.

The consistent superior performance of value investing debate has remained alive since the early studies of Basu (1977) and with continued evidence in favour of value stocks outperformance of the other active investing counterparts over long investment horizons but what explains this phenomenon remains debatable (Kozak et al., 2018). Additionally, practitioners have been working towards identifying standard predictor variables of a relative value or growth cycle. Notwithstanding the fact that past results do not assure of future outcomes, historical data is important in understanding the future. Studying the style effects and average return interactions improves the knowledge of which style variables are important in predicting future value and growth portfolio returns (Chinco et al., 2019). If one can identify the relevant cycle of either growth or value stocks in advance, then s/he can construct a portfolio that leads to better returns in all time periods by identifying and timing turns in cycles (Aremu et al., 2019).

The primary intention of value investing is to preserve the capital invested while yielding long-term returns on invested funds, as espoused in the literature (Siddiquee, 2017; Buffet, 201; Subrahmanyam, 2010). There are at least four stages involved in the investment's lifecycle,

namely: capital building/formation/accumulation (from lifetime earnings), protection of capital (through smart investments), postponed consumption (for retirement support), and wealth distribution (through donations and bequeathals) (Dornbusch et al., 2018). Investing for value ensures maintenance of purchasing power since the original funds invested are protected against inflation and other risks. It has also been stated in the literature that the wish/desire to improve the economic conditions of people and their maximization of net worth is what drives the behaviour of investors (Petrova, 2015).

Evidence of the above has been observed in the investment and behavioural finance literature where stock buying appears to be motivated by profit taking chances while minimizing potential losses (thus a dual constrained optimization problem) (Varian, 2002). With the motivation of making a profit, investors work hard to insure against losses while aiming to return a profit on their investment (Singh et al., 2021; Burton and Shah, 2015; Pompian, 2011).

Recently, Kelikume et al. (2020) studied the African stock markets, applying a wavelet unit-root analysis and found that institutional constraints affected market efficiency, and thus African stock markets activities were carried out in the context of market inefficiencies, concluding that stock prices are relevant in the prediction of future stock returns in Africa and thus negating the efficient market hypothesis (EMH) propositions and thus existence of value premiums. It was argued in their study that, defying the EMH assumptions, African stock markets were bullish and have created strong interest from private investors and their integration into world markets continues to increase. The number of active stock exchanges in Africa are now in excess of 30, all at different levels of advancement in terms of market size, listing firm numbers, volumes

traded, information and capital access as well as standardisation (Ehiedu and Obi, 2022). Added to these disparities, the presence of information asymmetry, the agent-principal challenges, regulatory frameworks issues and weak financial sector development impact on the EMHs relevance and investing in African stock markets (Ehiedu and Obi, 2022). With the Kenyan stock market still developing in an imperfect information setting (Kinyua, 2022), investors, regulators and other market players need to have a clear understanding of how efficient or inefficient the NSE is so as to mitigate potential crashes. Active investors would also be able to understand whether value investing works in this market given the market information imperfection. Other studies have looked at the market information risk's impact on price discovery on the Nairobi securities exchange (NSE) listed stocks motivated by the reason of the financial assets' price discovery's implications on investor portfolio construction, risk management and capital allocation (for example, Chogii et al., 2022; Ayako et al., 2015). The results have indicated significant market information risk and price discovery relationships and thus stock price discovery on the NSE highly depended on market information risk. This therefore imply the NSE peculiarities of inadequate information access, poor stock information content and underdeveloped price evolution process during trading (Kinyua, 2022; Chogii et al., 2022). Additionally, the NSE firms' performance have been found to be uniquely affected by the still developing corporate governance structures, and to a lesser extent, low liquidity, and small firm size (Ayako et al., 2015).

Given the above peculiarities, the question of whether value investing dominates growth investing is still valid and hence the presence of value premiums in stocks when financial crises and imperfect information are a reality need further studying. The problem in the literature and in the practice of investment is that the investment styles of value and growth investing have

produced mixed results and hence which style consistently beats the other, hence the superior active investing style, is still unsettled. There's also the definitional problem of what value and growth stocks are (Fama et al., 2006). The varied definitions give rise to variable choice challenges hence affecting the research results (Israel, et al., 2020; Speidell, 2017; Graham et al, 2013; Arnold, 2008). With the above, a study on the superiority of value investing in an African setting was considered important in generating new knowledge to the investment finance literature by addressing the key problems of value and growth style definitions, measurement, selection and investment methodology and related returns.

Purpose of the Study, Research Aims, and Objectives

Purpose of the study

The purpose of this quantitative study was to carry out an investigation to determine whether an investment basket of value stocks yielded superior returns compared to those of the growth alternative, in the active investment style class. The investigation was carried out in an African setting of the Nairobi Securities Exchange (NSE) in Kenya. The dissertation sought to determine the possibility of uncovering a link between returns in equities investments and the style of investment's characteristics. The relevant value phenomenon predictor variable, the valuation difference multiple, was core to this study. The study also purposed to validate a fundamentals-based investment portfolio construction methodology in the local environment.

It was anticipated that this would add to new data and knowledge to the field since there's only scanty research over this period in the chosen market of investigation. The study also provided a review and update of the literature with a view to providing alternative expositions on the value-

growth outcomes debate and at the same time reviewed the empirical research on the provided alternative expositions.

The study therefore primarily applied the revised Chan and Lalonishok (2004) methodology, in the manner used in The Brandes Institute (2009), to the Kenyan stock market to identify the existence of any significant relations in valuation differences and the consequential performance of value vs. growth stocks, in the first empirical test. The selected firms were segmented into value and growth portfolios on the basis of their relative price-to-book value (P/B) and Book- to- Market (B/M) ratios. This segmentation was followed by calculating the relative differences in valuation between the value and growth stocks. The various stocks portfolio performance was then tracked over the study data period. The valuation difference multiple served as a standardized valuation disparities proxy as in Toit and Krige (2014) and Toit (2012). The possible relationships in the past value cycles phenomena and the valuation difference multiple that were useful in making predictions of the future better outcomes of value stocks following Lee et al. (2020) were carried out. The second empirical test involved portfolio construction based on a firm's aggregate accounting information variables-based score (F_SCORE) following the Piotroski (2000) original procedure while introducing ranking extensions in lieu of the binary F-Scores and further introducing the book-to-market dimension.

The stock market data of each of the firms included in the NASI (the monthly closing prices, volumes traded and published accounting information in the financial statements) for the period 2011 to 2019 (the period over which the full data was available on the NSE, prior to the COVID-19 pandemic). The population consisted of the complete set of firms listed on the NSE in

each month over the period of study (2011-2019) and were thus part of the NSE All Share Index (NASI) constituent firms. The NASI had a total of 68 ordinary shares firms with a combined market capitalisation of KES 2.2 billion.

Aims of the study

This dissertation's aims were, first, to apply the revised Chan and Lalonishok (2004) methodology, in the manner used in The Brandes Institute (2009), to the Kenyan stock market to identify the existence of any significant relations in valuation differences and the consequential performance of value vs. growth stocks. In carrying out this test, the better performing basket of stocks pass the superiority test. The second aim of the study was to test the applicability of an accounting fundamentals-based investment approach effectiveness in selecting winner stocks from loser ones in the Piotroski (200) version and then extend into further. The tests were carried out on the Kenyan Nairobi Securities Exchange.

Objectives of the study

Among the early works on style investing are Stattman (1980) and Basu (1983) which compared book values of firms against their market values to test for the presence of a relationship with stock returns and identified positive stock return versus book-to-market (BM) ratio relationship. These were followed by investment professionals trying to explain the outperformance of value style within stated market environmental happenings. The value vis-à-vis growth investing styles' relative outperformance as well as their merits debate has continued to endure. The outperformance of value stocks has not been absolute as growth stocks' better outcomes have been observed in some periods. For instance, in the period of 2007 value stocks

widely underperformed their growth counterparts (Bernanke, 2018; Fama and French, 2017; Toit, 2012; Morgan, 2008). This growth cycle was under difficult operating conditions and renewed interest in the value-growth investing discussion with practitioners attempting to develop predictive models of returns from the two styles. Following the works of Lakonishok et al. (1994) and Fama et al. (1992), The Brandes Institute (2009) carried out its own study on the topic using historical P/B ratio disparities to compare with the subsequent value stock returns with an adjustment on the Lakonishok et al. (1994) methodology to determine the probable advance predictability of a value cycle.

This dissertation's overriding objective on the Kenyan stock market was to apply The Brandes Institute (2009) revised methodology to identify the existence of valuation disparities and the value and growth stocks relationship subsequent performance. This primary objective was implemented through segmenting the Nairobi Stock Exchange's All-Share-Index (NASI) stocks into value and growth portfolios on their P/B basis followed by a five-year period performance tracking of these portfolios. In effect, the overriding objective inevitably considers the relevance of the efficient market hypothesis given the presence of information asymmetry in the market. The second objective of the research was to determine the firm's fundamentals (financial statements derivatives) and the related return performance relationship. Embedded in this objective was the assumption of some form of stock market inefficiency.

The research objectives were thus to:

i. To determine which of the leading and competing active investment strategies of value and growth investing is superior.

ii. Explore how the possible framework of value investing portfolio construction can be derived to yield superior returns.

iii. To carry out an empirical test of a previous successful investment approach on the Kenyan environment.

iv. To extend this approach by applying forecasting principles with a view to improving the original investment strategy's results.

Nature and Significance of the Study

Nature of the study

Because the dissertation investigated the value stocks performance relative to the growth ones as measured by their returns, numerical data was exclusive and thus the quantitative method was used in the study (Schade, 2017; Grant and Trahan, 2009; Saunders et al., 2009). Hypotheses were then formed from the review of the literature.

Two alternative research methods are provided in Bryman and Bell (2011); the qualitative and the quantitative methods which can be used in data collection and analysis. The distinctions between the two methods, at the basic level is the fact that numbers are used in quantitative methods while words dominate the qualitative methods to describe events. At a deeper level, further distinctions are made among the two as follows (Gregory and Michou, 2003; Bogdan and Biklen, 1992). The quantitative method is to be experienced more in the deductive research approach where hypotheses are made from existing theories and then tested. The method does not dwell on details but moves quickly to generalizations from large samples such that general conclusions are suggested (Saunders, 2009; Altrichter and Somekh, 1996). Tools such as graphs,

tables, charts, and other statistical calculations are extrapolated and applied in making inferences (Bauman and Miller, 1998).

Significance of the study

This research's significance arises from its threefold uniqueness. First, it combines, in a single study, two different analytical approaches in the investigation of the competing active investing styles of value and growth investing's superiority (the use of the price multiples followed by the valuation differences multiple tests), which generate knowledge as to the best investment strategy to follow and inherently tests for market efficiency. Second, it replicates two different methodologies of style investing research ((The revised Lakonishok et al., 2004 as implemented in The Brandes Institute Methodology (2009) and the Piotroski (2000) F_Score methodology)) on an emerging stock market. Third, it extends these Fundamentals based methodologies into varied combinations and identifies which one is consistent in superior value stocks portfolio construction and effectively generates suggestions on mitigating behavioural factors in equities investing. The unique methodological approach as well as the addition of evidence on a different jurisdiction contributes to the investment finance knowledge on value investing, and the efficient market hypothesis.

Defying the EMH assumptions , African stock markets are bullish and have created strong interest from private investors and their integration into world markets continues to increase (Kelikume, 2020). Market size, listing firm numbers, volumes traded, information and capital access, the presence of information asymmetry, the agent-principal challenges, regulatory frameworks issues and weak financial sector development impact on the EMHs relevance and

investing in African stock markets (Ehiedu and Obi, 2022). With the Kenyan stock market still developing in an imperfect information setting (Kinyua, 2022; Chogii et al., 2022; Ayako et al., 2015), investors, regulators and other market players need to have a clear understanding of how efficient or inefficient the Nairobi Securities Exchange is so as to mitigate potential crashes and hence, investor loss, irrespective of the Grossman and Stiglitz (1980) argument for the impossibility of full and complete information being attained. Since there exist investors who daily try to do better than the market and thereby make a living out of it, then market information asymmetry must exist and therefore the attraction of active investing where value investing is hypothesised be the superior approach.

Active investors would also be able to understand whether value investing works in this market given the market information imperfection of inadequate information access, poor stock information content and underdeveloped price evolution process during trading. Illustratively, Grossman and Stiglitz (1980) argue for the impossibility of full and complete information being attained. They further argued that since there exist investors who daily try to do better than the market and thereby make a living out of it, then market information asymmetry must exist.

The policy makers and enforcers on the Nairobi securities exchange could derive benefits as to managing investor market reactions, desirable rules that reduce market information imperfections such as firm minimum financial disclosures, corporate reporting and news releases that eliminate insider trading and minimise noise trading.

Research Questions and Research Hypotheses

Research questions

Following from the research study problem statement and taking cognizance of the fact that the question of value stocks performing better than growth stocks has been empirically studied mainly in developed countries stock markets with a significant number concluding that value stocks do dominate growth stocks, this dissertation examined the situation of value investing in a developing country, Kenya. The following research questions were therefore investigated:

i. Would a value stocks investment portfolio yield better returns than a growth stocks portfolio on the Nairobi Securities Exchange?
ii. How would a framework of value investing be constructed in an investment basket to ensure optimum investment returns?
iii. What is the extent to which the working of a basic fundamentals-based investment approach can be transferred and applied to the Kenyan stock market?
iv. Which alternative strategies exist that are implementable by investors in achieving better outcomes and, if so, is the best identifiable?
v. Does a firm's B/M ratio drive the success of the identified investment strategy?

Hypotheses

The following is a summary presentation of the hypothesis which were developed in the literature review chapter.

Looking at the constructed growth and value stocks portfolios, the hypothesis that returns from value stocks exceed the returns from growth ones was tested. It was posited that value stocks are return superior to growth stocks. The test hypothesis concerned the value stocks (proxied by low P/B ratios) outperforming the growth ones (proxied by high P/B ratios). Consequently, the below hypothesis, null (Ho) and alternative (Hi) hypothesis, was formulated for the primary objective of the dissertation.

Hypothesis 1.1$_0$: A value-based portfolio's (characterized by low Price to Book ratios) returns are not lower than those of a growth portfolio (characterized by high Price to Book ratios).

Hypothesis 1.1$_1$: A value-based portfolio's (characterized by low Price to Book ratios) returns are higher than those of a growth portfolio (characterized by high Price to Book ratios).

A method of constructing investment portfolios to answer the research objectives was then developed. In this regard, and to answer research question two and three, the study evaluated the effectiveness of an investment approach that was a derivative of the original methodologies of fundamental analysis that were originally applied to advanced market of US and applied to the emerging market of Kenya. This was met by stating the first hypothesis under the secondary objective of the research as follows and is a test of robustness of the investment strategy.

Hypothesis 1.2: The F_Score investment approach together with its variants can identify stocks that will win in the future in the Kenyan stock market.

Once the robustness test was completed, the efficiency of the stated investment strategy was analysed that required a grading of the financial information in finer details add improvements

to a binary based system by applying a ranking system. The forecasting ability of each of the elements of the ranking system was measured and tested with the hypothesis stated as below.

Hypothesis 1.3: Combining the alternative F_Score components produces better performance relative to the original investment strategy in the Kenyan stock market.

This research sought to improve the original strategy's binary characteristics as part of the preceding hypothesis. All NSE listed firms were included, first, on practical considerations that the overall number of NSE listed firms is comparatively much lower and therefore leading to the reduction of the data amount by leaving out all low B/M firms (as was the case in the original study in US) could result in too low a sample size leading to inconclusive results. Secondly, using the complete data set available aided in proving the original strategy's robustness. A finding that the strategy works nullifies the need for investors to carryout additional work of classifying stocks based on their BM ratios as a first step before application. The hypothesis here was then formulated as:

Hypothesis 1.4: The Fundamentals (F_Score) approach and its variants can succeed in identifying winners and losers notwithstanding the link to a specific B/M ratio category.

The completion of the stated objectives improves the current state of the literature by the addition of a two-part dimension, first, the research being completed in different geographical and legal environment with characteristics that differ from the other studies and thus attempted to validate the earlier findings. Second, it extended a successful investment strategy and tested it for possible enhanced performance, with practical relevance being at the heart of the process.

Contribution of the study

The study is noteworthy for these reasons. First, it employs two distinct analytical approaches to compare the effectiveness of value and growth investing styles, thus contributing to our understanding of which investment strategy is superior. By using both price multiples and valuation differences multiples tests, the study also, inherently, tests for market efficiency. The results indicate that there existed a value premium for value stocks over the growth ones on the NSE over the study period's investment horizon and that valuation differences multiples shocks have a longterm impact on the excess annualised average stock returns. The value premium existence indicates the NSE is information inefficient as well. This contributes to knowledge that value stocks have superior above market returns even in the emerging market of Kenya that has not been rigorously studied, confirming the findings in advanced markets.

Second, the study replicates two different methodologies of style investing research (the revised Lakonishok et al., 2004, and the Piotroski (2000) F_Score methodology) on an emerging stock market, providing valuable insights into the effectiveness of these methodologies in different contexts. This presents a novelty of approach and thus adds to the rigour of the analysis and thus the soundness of the findings.

Third, the study extends these fundamentals-based methodologies into varied combinations and identifies which one consistently produces superior value stocks portfolios selection. This information is useful in helping investors to mitigate the impact of behavioural factors on their equity investing decisions.

Overall, the unique methodological approach employed in this study, as well as the addition of evidence from a different jurisdiction, contribute to the body of knowledge on value investing and the efficient market hypothesis. The study's findings are relevant to investment practitioners and academics alike and may help to inform more effective investment strategies in the future.

The study results advance knowledge as follows. Foremost, an individual starting life without initial capital either from inheritances or bequeathals, but now with cashflows can augment his/her capital through value investing as one of the investment strategies. Second, the original F_Score strategy of investment was demonstrated to be transferable and can be operationalised in an emerging market setting like Kenya. Third, there was no equal in this approach’s simplicity and possibly no improvements are tenable through introductions of complicated alternatives. Finally, the F_Score approach works beyond the high-B/M stocks and thus can be used in stock markets with a variety of attributes unlike the initial conclusion.

CHAPTER 2: LITERATURE

Introduction

This chapter's purpose was to layout the systematic development of the contributions to the finance literature showing these contributions' relevance to the stated research objectives of this dissertation. The chapter delved at length into the efficient market hypothesis, a market theory that has dominated the academic debate as far as modern finance is concerned since its introduction in the early 1970's. The relatively nascent concept of behavioural finance emerged as an alternative theory and an answer to the debate. Following the analysis of these two competing schools of thought, the chapter presents a critical scrutiny of past and present empirical studies while expounding the method and extent of the correspondence between theory and practice. The deviations of theory from research results have been sometimes so wide that the proponents of both schools have mostly accepted their existence. The chapter therefore gives a description of the main anomalies as deciphered from the empirical studies together with the attempts to explain these anomalies. Those parts of the literature most applicable to this study were condensed together and thus help in placing the research topic within the body of finance literature and show how the research contributed to the literature.

Therefore, the reviews and summaries of the relevant investment finance theories as well as the current research issues and findings in the research topic formed the key part of the chapter's presentation. This resulted in identifying the research gap which the thesis narrowed down to. This was after carrying out a rigorous analysis of the past and present writings on the topic as well as reviewing the current state of academic knowledge and ultimately linking the research topic to this body of knowledge. Further to this, a critical examination of the research frameworks implemented

by academic research was done to inform the subsequent chapters of the thesis, particularly the research design and methodology. The motivation here was to provide a road map that aided in implementing the research process, the thesis' thought process and argumentation and its final expectation.

The chapter was therefore structured as follows. It began with defining the vital concepts in the research topic in the conceptual framework section of the chapter. It then reviewed the relevant theories applicable to the topic after discussing what is meant by theory. The two dominant modern finance schools of thought were discussed at length thus laying the theoretical anchor for the need of the study topic. The various shortcomings of these schools of thought were highlighted within the section and the theories linked to the research topic thereby.

Having presented the theoretical framework, the practical implications of the theories were reviewed consisting of summaries, interpretations, and critical reviews of the current empirical work around the research topic. The general result pointed to the presence of anomalies in patterns of stock investment returns and thus indicating the failure of the key school of thought of efficient markets. The academic literature recognizes the existence of these anomalies and therefore the subsections in the empirical review part clarified the stances of the two dominant schools of thought on these anomalies as well as their explanations of this phenomena. The explanations provided on the anomalies vary from simple logic to extreme complexities with no settlement to an unambiguous explanation. The final section summarized the chapter discussions and related the body of knowledge to this research topic. The chapter therefore located the research topic within

the academic literature and motivated the topic's extension, variation and ultimately added to the body of knowledge with some concluding remarks embedded in the summary.

In carrying out the literature review, standard finance texts were reviewed as the starting point to gain a grasp of the concepts. The relevant references given in these books were then looked up. These mostly referred to classical papers in the topic. The articles were generally searched in Google and Google Scholar. Some articles are hosted on dedicated sites (databases). The main ones reached in this research were ResearchGate, Research Affiliates, Social Sciences Research Network (SSRN), Elsevier and Academia.edu. The references within the newest articles were looked up and then the references within these other articles were also looked up, eventually discovering names of authors that dominated the field of the research topic. These authors' most current articles were searched and then the relevant references in their articles looked up. The Key search terms were Value Investing, Growth Investing, Style Investing, Active Investing, Passive Investing, Investments, Portfolio Selection, Efficient Markets Hypothesis, Behavioural finance, and Behavioural economics.

Theoretical/Conceptual Framework

Conceptual framework

This section defined the key concepts applied in the dissertation to lay the foundation for reviewing the theories applicable to the research topic which then bridged into the empirical literature review of the current research relevant to the research topic. It started by differentiating investment from speculation before delving into the main theories relevant to the research topic.

Investment and speculation concepts

The general definition of investment entails the committing of money now or other resources expecting to reap future benefits or profit (Siddiquee, 2017; Bodie, Kane and Marcus, 2014; Damodaran, 2012a). Investment then therefore involves a postponement of gratification now so that future enjoyments can accrue from the current consumption denial. In Williams (1938) seminal work, it was stated that an investor holds an asset for income generation while a speculator buys an asset in the hope of making a profit through trading with other investors. In this regard, profit is a function of estimates of future incomes. In formal terms, an investor is an asset taker interested in dividends, coupons and the principal invested and therefore holds assets for long periods of time (Almagtome et al., 2020; Graham and Dodd, 2013; Dimson, 2012; Graham and Dodd, 2008; Williams, 1938), implying that an investor buys an asset investment below its current worth. A speculator, on the other hand, is only interested in an asset's resale price, thereby expects to make a gain from the sale. A speculator will promptly sell when the desired price above the purchase price is reached. This effectively means that speculating is for making capital gains while investment is for future cashflow receipts.

The above investment and speculation definitions lead to the question of the definition of the investment value of a given security. Williams (1938) exposition suggested the investment value of a security to be the current worth of all expected dividends in the future in the case of a stock and expected coupon receipts and the principle where the asset involved is a bond. It is therefore to be expected that rational humans seeking self-satisfaction would be willing to pay for an asset the present worth of expected future payments of dividends, coupons, and principal, for a stock and bond as the case may be.

The above investment definitions follow the standard academic texts in financial economics that define investment along the lines of giving up consumption now to augment the possibility for higher future consumption ability (see Lee and Wang, 2021; Mankiw, 2016; Bodie et al., 2014; Branson, 1989). This definition appears conceptually sound but lacks operational soundness, a point alluded to in Siddiquee (2017). Therefore, an operational definition was provided in Graham et al. (2008, p. 106) which has come to be what is now value investing:

"An investment operation is one which, upon thorough analysis, promises safety of principal and a satisfactory return. Operations not meeting these requirements are speculative".

Here, the important phrases that satisfy an investment definition comprise thorough analysis, guaranteed preservation of the principal amount invested, and a satisfactory return. Thorough analysis was explained in Graham et al. (2008) as entailing a detailed and deep study of the information available related to conventional measures in evaluating safety and value, safety of principal as the insurance against loss under foreseeable changes in operating circumstances, and a satisfactory return as something beyond adequate income and thus includes appreciations in capital resulting from profits, interest imputed and dividend yields. Protecting the principal against loss and the expectation of a rate of return that is satisfactory are hinged against the margin of safety concept – a central concept in value investing (Siddiquee, 2017; Graham et al., 2008).

In Kok and Ribando (2018), whether bull or bear markets are observed, an investor would still be one as long as the motivation is future cashflows rather than price movements, implying capital gains when assessing the validity of a stock price/cost. As speculators trade the stock price

(for capital gains), dividend and coupon flows are irrelevant in their decision function as their stock holding time horizons are too short. Speculators therefore contend with the problem of forecasting prices while investors stay with the firm's variables that influence the ability of future generation of cash (Bebchuk, 2021).

Osmond (2016) and Graham et al. (2008) stated that speculation would involve the ability to foresee changes in opinions of people's beliefs on intrinsic value. Opinion would generally be affected by news hence the forecasting task revolves around news forecasting. News is said to be predicted in two ways. One, is through cheating as in insider trading and other works by insiders. Tick ups in prices lead to further stock price rises as outsiders imagine they are mirroring the actions of insiders (Bofinger et al., 2022; Langa, 2016; Novy-Max, 2013). Two, is through studying the forces at work in line with Keynes (1937) where the market's belief was that imminent events announce themselves subtly before they take place (Penman and Zhu, 2016; Penman and Zhang, 2015). This therefore indicates speculation involves a constant search and sniffing of news with trades being executed any time news change whether good or bad. Securities are shorted when the news comes in of impending price declines and long positions are taken when news is interpreted as leading to price adjustments upwards.

It follows from the above that the typical investment definitions constitute a sentence, but Graham's definition is given in two and thus showing not only what investment is but also what it is not and therefore putting speculation on the spot (Siddiquee, 2017). This accords well with Graham's explicit statement that an investor is fundamentally required to be certain ……*"particularly as to whether they have a clear concept of the differences between investment and*

speculation" and *"between market price and underlying value"* (Graham, 2006, p. 10). Thus, the mere participation in financial markets does not make one an investor and it could therefore be simply an exercise in feeling good about owning some stock which when subjected to the economic analysis turns out to be non-value augmenting. With this understanding of investments, the thesis's work was then only concerned with acquiring, holding, and disposing securities in organized securities exchange markets with the awareness of the influence of speculators (noise traders) who can create distortions in the market.

The concept of margin of safety

The term margin of safety is considered to be the central theme in value investing and it refers to the practice of acquiring ownership in a security of either stock or bond at a considerably discounted underlying value and was metaphorically explained in Buffet (1984, p. 104) as:

"When you build a bridge, you insist it can carry 30,000 pounds, but you only drive 10,000-pound trucks across it. And the same principle works in investing".

Graham (2006, p. 519) in differentiating investment and speculation alluded to the necessity of the margin of safety:

"……it is injurious because it lends encouragement to the innate leaning of many people toward the excitement and hazards of stock-market speculation. We suggest that the margin-of -safety concept may be used to advantage as the touchstone to distinguish an investment operation from a speculative one".

Here, the indication is that without considering the margin of safety in a transaction dealing with securities, one cannot talk about investment as it would be a mere speculative exercise. In algebraic fashion, Siddiquee (2017) suggested a derivation of the form: Margin of safety equals

Intrinsic value subtract the Price of a stock divided by its intrinsic value and thus emphasizing the idea of a bargain. While this formulation gives an abstract definitional model of intrinsic value, its operational use is dependent on the proper definition and measurement of the explanatory variables of intrinsic value and price since it is possible to arrive at different results of the margin of safety using the same model but varying measures of the independent variables. That notwithstanding, the key message was that the result needs to be greater than zero no matter how the independent variables are defined. Graham (2006) thought of the margin of safety as crucially vital in investment as it safeguards the investor from unforeseen losses of income from the investment. Therefore, a margin of safety must exist to take care of the effects emanating from human error and other controllable factors (Buffet, 2016). As stated in the preceding section, when constructing a portfolio of either value, the criteria variables used are required to incorporate this concept for it to qualify as a value stock.

The concept of value

In the literature, Fama, Graham and Buffett use the term ‘value’ but with different fundamental meanings. Fama and French (1995) saw a value stock as that security or stock with a high B/M ratio. The Benjamin Graham’s perspective saw value beyond the ratios of Price to earnings (P/E), Price to book (P/B) or Price to Cashflows (P/CF). In the Graham – Buffett approaches to value, these ratios are merely used for initial screening of stocks as alluded to in Israel, et al. (2020) and Novy-Marx and Velikov (2016).

The Fama-French approach, also called the academic approach (Greenwald et al., 2020; Siddiquee, 2017; Fama et al., 1998), gave the rationale for the enduring stickiness of the variability

of returns across an extensive stock sample (Fama et al., 2007; Fama et al., 1992). With the Graham-Buffett approach, investors are assisted in finding real opportunities with sufficient margins-of-safety (Buffett, 2016; Buffett, 2008a). The Fama-French approach to value consisted in value being determined through a screening basis of stocks in a database by use of some ratios, mainly the book-to-market ratio (Kessler et al., 2020; Fama et al., 2017; Fama et al., 2012; Buffett, 2012; Fama et al., 1998). On the other hand, and in accordance with the Graham-buffet approach, a value investor defines value as being a dependent variable of the margin-of-safety identified singly when the market price is measured against a varied number of intrinsic values whose construction is conducted through conservatively estimated future cashflows (Greenwald et al., 2020; Siddiquee, 2017; Buffett, 2011; Buffet, 1994). This is the relevant understanding of the value concept taken in this thesis.

In the Graham et al. (1934) approach, financial statements analysis takes centre stage in determining the intrinsic value followed by the margin-of-safety before taking an investment decision (Bofinger et al., 2022). The Fama-French approach entails stock purchases considered cheaper than others, and thus looks at relative value while Graham's approach constitutes a stock's absolute value (Graham et al., 2012; Graham et al., 2006; Buffett, 1992, Buffett, 1976). The Graham-Buffett value perspective has stayed as originally intended in Graham et al. (1934) but the Fama-French factor approach has continued to mutate with additional factors being introduced in an attempt to update the explanations of persistent variability among a large selection of stocks (Fama et al., 2015; Fama et al., 1993). There were originally three factors of 'Small Minus Big (SMB), High Minus Low (HML) and the excess return on the market (Rm-Rf)' (Fama et al., 1998) with two factors added on later of 'Robust Minus Weak (RMW) and Conservative Minus

Aggressive (CMA)' (Fama et al., 2018; Fama et al., 2015). Another contrasting feature is that the Graham-Buffet approach leads investors to identifying businesses with strong fundamentals (strong wide moats) and to determine an approach range within which the intrinsic value falls that ensures a margin-of-safety sufficient to the investor (Kessler et al., 2020; Siddiquee, 2017; Graham et al., 2008; Buffett, 1988; Buffett, 1987). The Graham-Buffett conceptualization of value is what this thesis adhered to since it follows the margin-of-safety and intrinsic value elements that are core to value investment. This bolsters the selection criteria of value versus growth stocks and more importantly that security analysis using financial statements is required when sorting securities into value and growth stocks for empirical evaluation, a factor followed in this research (Yohn, 2020).

Value investing versus growth investing concepts

The advent of professional money managers who are paid a fee for their investment services came with a lot of pressure on these managers to produce results better than the market and their peers as well (Bebchuk, 2021; Chen and Ma, 2017). Two broad investment strategies emanated from this expectation, that is, active and passive investment strategies (Ramos, 2021). The passive investor believes markets to be efficient and therefore expects asset prices to reflect current information a 'la the efficient market hypothesis (EMH) where only by chance can an investor achieve results that are better than the market. The passive investor then constructs his/her investment portfolio based on market weights known as indexing (Lehto, 2021; Damodaran, 2015) that involves full replication, stratified sampling, and optimization. Contrastingly, the active investment strategy's belief is that a market is beatable consistently and therefore active investment managers are always in search of mispricing in the market and thereby hope to beat the market's

performance. Within active investing strategies, the divisions of value and growth-investing styles are found.

The intellectual origin of value investing was laid out in Graham and Dodd (1934), with the fundamental philosophy being that of the buying of assets that are undervalued (selling below their intrinsic value), a value justifiable only from the selling firm's fundamentals of earnings capacity, dividend yields, assets quality and other accounting measures of the firm's financial data. In the Graham et al. (1934) investing philosophy, the core principles of value investing are that:

i. Shareholding is akin to owning a portion of business that is already operating,
ii. Investable firms are selected due to their high quality as seen from sound fundamentals,
iii. Buying the selected firms' shares is done when their prices are determined to be below their estimated intrinsic values, and
iv. Investors must eliminate emotional trading, more so during periods of economic turmoil.

These principles indicate that value investing's focus is not on price movements as is the case in growth investing. The practitioners of growth investing style are referred to in the literature as growth investors and they buy into firms exhibiting above average growth rates notwithstanding the fact that the share price might appear to be expensive as measured along the metrics of price to earnings ratios or price to book ratios. It has been said that growth stocks can potentially outperform investments that exhibit slower growths like income stocks because of the capital gains reinvestment in the form of retained earnings or undistributed profits (Akinde et al., 2019; Craig, 2016).

Contrastingly, a value investor's objective is to look for bargains and therefore selects low priced investments using the relative factors of earnings, sales growth, net assets value and book values of the firms issuing stocks (Akinde et al., 2018; Damodaran, 2015). In this regard, popular blue-chip stocks might be deselected by a value investor despite stable and steady past growth because the share price is considered too high relative to the firms' fundamentals. So, the value investor would buy into solid companies that are currently selling low and hope for price corrections over the long run.

The underlying import of value investing is to yield long-term net positive returns to the investor without losing the principal invested (Pätäri, et al., 2018; Dimson and Stanton, 2016). The lifecycle hypothesis regarding investments approximates four investment stages, that is: capital formation (lifetime earnings), capital protection (risk protected investments), postponed consumption (for retirement support), and distribution (donations and bequeathals) (Dornbusch et al., 2018; Mankiw, 2016; Bauman et., al., 1998, Branson, 1989). The key theme of value investing is to preserve the capital funds invested and thus ensuring the protection of the investor's purchasing power. Therefore, to a value investor, the asset value forms the primary basis of making investment decisions with growth assets being considered as speculative and therefore an investment that is unreliable (Fama and French, 2020; Blakrishnan and Yogalakshmi, 2015; Jagongo and Mutswenje, 2014; Deaton, 2005). The value investor will therefore only buy into a firm when its trading price is below its assets value and any growth is treated as transitory.

According to Lee (2014), value investing takes place when the stock trades are done because of perceptions of a present misalignment of the ruling stock prices and the fundamental

value (defined as the present value of the expected future payments to stockholders). This investment style is anchored on two arguments. First, that stock share constitutes a mere partial claim on continuing operations of a company and that claim forms the basis of the continuing operation's eventual value (Ayako et al., 2015; Conqvista, 2015; Jagongo and Mutswenje, 2014; Beneish and Nichols, 2013). Second, that in the meanwhile short-term planning periods, there are bound to be substantial price deviations from the stock's long-run value. In this regard then value investing strategies entail buying stocks appearing to be cheaper than their intrinsic value and disposing of seemingly expensive stocks with short selling being envisaged in this situation (Yan and Zheng, 2017).

There are two sides to value investing such that value firms are not merely those selling cheaper in comparison to their capital stock but also comprise the cheap ones as compared to their future residual income's present value (Enache and Srivastava, 2018; Penman and Zhang, 2014). There is a misconception that value investing is the trading in cheap stocks relative to measures of the firms' capital as reflected in the accounting-based valuation methods where cheapness is expressed in lower market multiples (Wahal, 2018). However, the real value of a firm is fundamentally measured in two elements of capital and growth opportunities. The problem with the current accounting-based valuations is that the typical cheapness indicators of value only relate the stock prices to the capital in place (as measured by book values, capital earnings, or turnovers), leading to the exclusion of the second vital element of a firm's value in equity valuation: growth opportunities (Ponterotto, 2018; Yan and Zheng, 2017; Penman et al., 2014).

Successful value investing is to be viewed as consisting in the key elements of identifying quality firms and then buying into them at prices considered reasonable, implying value investing is made up of cheapness (low prices) and quality (Kok et al., 2018; Stambaugh and Yuan, 2016; Penman and Francesco, 2013). To Yan and Zheng (2017), cheapness is conventionally measured by a firm's market multiple relative to its asset base while a business' quality lies in its future expected residual income's present value (as evaluated based on various performance indicators known at present in a fundamental analysis). Graham et al. (1934) identified these indicators as lower gearing/leverage, high liquidity, and high steady growth rates and suggested firms exhibiting these characteristics to have the best of probability of producing future returns rates that are above the market. The importance of understanding value investing was succinctly put forth in Klarman (1991, p. 102), where he stated that value investing is presented as an *"overused and inconsistently applied phrase in the investment business…. with a broad range of strategies making use of the phrase as a pseudonym. Many have little or nothing to do with the phraseology of investing originally espoused by Graham"*. This is also emphasized in different words in Warren Buffet's letter to Berkshire Hathaway investors, Buffet (1992, para. 57-58) where he stated as follows:

"…. whether appropriate or not, the term 'value investing' is widely used. Typically, it connotes the purchase of stocks having attributes such as a low ratio of price to book value, a low price-earnings ratio, or a high dividend yield. Unfortunately, characteristics, even if they appear in combination, are far from determinative as to whether an investor is indeed buying something for what is worth and is therefore truly operating on the principle of obtaining value in his investments. Correspondingly, opposite characteristics as a high ratio of price-to-book value, a high price-earnings-ratio, and a low dividend yield are in no way inconsistent with a 'value' purchase….".

There are therefore two key core features of value investing gleanable from the foregoing.

First is the margin-of-safety, which is an asset's market price and its intrinsic value difference; and second is the requirement of thorough security analysis from the perspective of overall business ownership. This means that an investment in traded stocks should be done in a similar manner as the analysis and due diligence is done when acquiring a whole business. It is here worthwhile to quote Buffett (1996), from "An Owners' Manual" distributed to the investors:

"……. I hope that you do not think of yourself as merely owning a piece of paper whose price wiggles around daily and that is a candidate for sale when some economic or political event makes you nervous. We hope you instead visualize yourself as a prat owner of a business that you expect to stay with indefinitely, much as you might if you owned a farm or apartment house in partnership with members of your family" (Para. 4).

This message was repeated in Graham (2006, p. 523): The Intelligent Investor:

"Investment is most intelligent when it is most business like. It is amazing to see how many capable businessmen try to operate in wall street with complete disregard of all the sound principles through which they have gained success in their own undertakings. Yet every corporate security may best be viewed, in the first instance, as an ownership interest in, or a claim against, a specific business enterprise".

Emanating from the above is the conclusion that value investing can never be a passive endeavour. It requires full application of a participant's analytical technical capacities in investment decisions and that fundamentals analysis cannot be avoided in value investing.

According to Klarman (1991), value investing has three central elements, which are: i) value investing is a bottom-up strategy that consists in identifying specific investment

opportunities that are below their intrinsic value, that is, undervalued assets; ii) value investing looks at the absolute performance as opposed to relative performance orientation; iii) value investing tendency in risk-aversion with emphasis on both risk and return (Greenwald et al., 2020; Choi and Sias, 2012). These three set the scene for value investors in a bottom-up approach. Were it to take on a top-down approach, exact forecasting of a lot of variables would be required from investors which would then be a frustrating endeavour. It is now understood that value investing works when the Graham-Buffet approach is implemented (Atnott et al., 2021; Hou et al., 2017; Siddiquee, 2017). As a summary of value investing, the following have been put forth as the key tenets constituting value investing (Siddiquee, 2017):

i. Investment, speculation, and gambling are clearly distinguished and separated,
ii. Investment in marketable securities should always be approached and understood as akin to buying part ownership in a tangible working business,
iii. A portfolio of investments is made up of a choice of good quality firms out of a rigorous analysis of earnings power and financial sustainability of firms,
iv. An investor only buys stocks of firms when their trading price is reasonably lower than the intrinsic value,
v. The businesses' operational quality and the paid price relative to the intrinsic value determines its risk, and
vi. The returns to the investor are significantly influenced by the psychology of the investor. Success therefore calls for emotional control thereby ignoring market volatilities and the mob decisions.

Following from the research study problem statement and taking cognizance of the fact that the question of value stocks' performing better than growth stocks has been empirically studied mainly in developed countries' stock markets with a significant number concluding that value stocks did outperform growth stocks, this dissertation examined the situation of value investing in a developing country, Kenya, with the research questions being:

i. Would a value stocks investment portfolio yield better returns than a growth stocks portfolio on the Nairobi Securities exchange? This formed the empirical research 1.
ii. How would a framework of value investing be constructed in an investment basket to ensure optimum investment returns? This formed the work of empirical research 2.

Evidence from African Stock Markets

It has recently been argued that, defying the EMH assumptions, African stock markets are bullish and have created strong interest from private investors and these markets' integration into world markets is continuing and expanding (Kelikume et al., 2020). The number of active stock exchanges in Africa is now more than thirty (30), all at different levels of advancement in terms of market size, listing form numbers, volumes traded, information and capital access as well as standardization and liquidity (Ehiedu and Obi, 2022). Added to the above disparities, the presence of information asymmetries, the agent-principal challenges, the legal environments issues and weak financial sector development, their impact on the EMH's relevance and investing in African stock markets is still an area undergoing research (Nyamute et al., 2015).

EMH studies in the African context remain inconclusive with results being more often mixed. Several studies on the Nigerian Stock Exchange lent support to the EMH, at least in its

weak axiom, for example, Ayaba (2020), and Osmond (2016) while others found market efficiency, for example, Akinde et al. (2019), Ogunlusi and Obademi, (2021). The strong form of the EMH supporting results were reported in Aremu et al. (2018), and Kelikume et al.(2020).

Kelikume et al.(2020) studied the weak form of market efficiency on African markets, applying a wavelet unit-root analysis model and found institutional constraints to have undesirable effects on the EMH and hence on the African stock markets investment activities. The conclusion was that past stock prices were relevant in the prediction of future stock market returns in Africa and thus the EMH propositions do not hold in the 15 sample markets of study.

Ehiedu and Obi (2022) used an all-share index to study the EMH together with its financial crisis effects over a period running 5years' daily data and found that monthly price series were not depictive of a random walk phenomenon while the annual price data did depict a random walk, thus implying indeterminate EMH results on the African stock markets, led by the Nigerian stock exchange. The results led to their recommendation of loosening of riles on the African exchanges including entry restrictions, financial statements release procedural bureaucracies, AGM notice requirements that are mostly onerous, and press release restrictions.

Yousuf and Makina (2022) checked how behavioural risk factors related to the stock, market, since behavioural theories have identified gaps in the EMH, on the Johannesburg Securities exchange. Their quantile regressions showed the adaptive market hypothesis to be applicable on the South African stock market. This implied that historical market returns significantly predicted future returns without following a random walk in an all-share index and

therefore returns predictability moves with market condition variations. This implied that business confidence negatively correlated with returns as returns depicted time lags in incorporation of sentiment in prices. Consumer confidence on the other hand, related positively with returns. The conclusion is thus that both fundamental and behavioural factors influence investor actions.

The Jallow et al.(2022) studied financial ratios' effects on stock prices patterns' prediction on the NSE's listed firms' stocks by use of valuation and profitability ratios in measuring firm values. The price multiples of price-to earnings (P/E), Price-to-Cashflows (P/CF), Price-t—Sales growth (P/S), Price-t—Book Value (P/B), Return on Equity (ROE) and Dividend-Yield (DY) ratios formed the explanatory variables with stock prices being the independent variable. All the independent variables were found to significantly drive stock prices with the P/E, P/CF, P/B and ROE correlating the highest with stock prices. Akinde et al. (2019) suggested that news constituted the practical application of growth and value portfolios in the construction of winner portfolios in times of bearish markets. Stock price falling periods were associated with investor apathy, probably out of historical experiences with market crashes. Akinde et al.(2019) review of the Nigerian stock exchange is step towards narrowing this gap more so with their unbalanced time series analysis using price to earnings growth to categorise stocks into value and growth portfolios. Their study' conclusions were that investor myopia and panic from constant bad news reactions, such as from price falls, lead to un-conversion of worthy opportunities, as in, taking advantage of cheap stocks going for below their intrinsic values in bear markets. The opportunities for higher future returns and capital gains as thus permanently not taken advantage of. They established that value portfolios outperformed growth portfolios in the stock returns' proxies of earnings per share,

capital gains and return on assets. They proposed portfolio rotation given the positive correlations found in earnings per share and capital gains.

Akinde et al. (2018) examination of the effects of behavioural psychological factors on portfolio building strategies on the Nigerian market found existence of cognitive psychological and mental biases toward growth stocks against value stocks irrespective of the market fundamentals characteristics and recommended a reconsideration of occurrences and fundamentals performance in portfolio choice. Similar observation was made in Munetsi et al. (2020) from the review of herding behaviour on the Johannesburg Stock Exchange in periods of crisis, which was absent, in their review, in periods of calm (non-crisis periods).

There's apparent scanty empirical research on the Kenyan stock market around the topic of portfolio selection strategies. (Kiluta and Zipporah, 2022). Despite the recent shift in the developed and emerging markets empirical research towards analyses of the Growth vs. Value investing style but very little effort has gone into investigating the performance of these two with a view to establishing the better of the two, return-wise (Kinyua, 2022, Kimani et al., 2022).

Nyamute et al. (2015) investigated the relevance of individual investment style on their selected portfolio performance on the Nairobi Securities Exchange and found statistical significance in the relationship such that the investment style chosen had an impact on the portfolio performance of the investor and growth styles were found to negatively affect portfolio performance while passive investment styles were associated with favourable portfolio returns.

Maqsood et al. (2017) uncovered evidence of risk premiums on the NSE, using a GARCH modelling technique, and thus observed sticky volatility.

Taking a behavioural finance approach, Cherono et al. (2019) examined what they called, prevalent investor and agents under/overreactions to news, as a behaviour that has continued to pose challenges to the EMH. Their review of the extent to which the Kenyan Stock market's reaction was impacted by investor behaviour found herd behvaiour not to significantly affect the stock market reaction while loss aversion, mental accounting and overconfidence did. Ng'ang'a (2019) found herding behaviour among investors towards a buy and hold strategy, that is, value investing.

Mugenda (2022) observed that investor sentiment and return volatilities characterised emerging markets and suggested that investor sentiment's influence on asset prices lacked deep enough explanation and thus attempted to fill the gap by using the Fama-French 5-factor model and the result indicated profitability risk factors to be a significant driver of stock returns on the Kenyan market, implying that low returns were associated with high profitability risk exposure. This result aligned with Hodnett (2014) where it was observed that equity investments generated higher future returns in higher than historical average value risk premiums. Here, value risk premiums were equated to the excess returns of value stocks over the growth ones where the P/B multiple was the benchmark for relative valuations) (Kinyua, 2022, Kimani et al., 2022).

Because the study investigated the better performance of value stocks relative to growth stocks in the active trading class of investing styles, and hence the value portfolios' superiority,

as measured by their returns, numerical data was solely used and thus the quantitative method of research was applied in the study (Gren and Zhang, 2017; Gray and Carlisle, 2013; Saunders et al., 2009). Hypotheses were formed from existing investment finance theories as developed below.

Hypothesis development

The related hypotheses were then developed as follows.

Hypotheses building: Empirical research 1

The literature has extensively examined the performance of value stocks compared to growth stocks in various geographical and economic settings. Previous studies have shown that value stocks tend to exhibit higher returns than growth stocks over long investment horizons, spanning 3-5 years (Audu et al., 2022; Almagtome, 2020; Anadu et al., 2020). This phenomenon has been observed in both bullish and bearish market conditions (Boehmer et al., 2021). However, limited research exists on the performance of value stocks compared to growth stocks specifically in bear markets (Bofinger et al., 2022; Ayako et al., 2015).

The existing scholarly literature has put forth different explanations for the higher returns associated with value stocks. Some researchers argue that the observed higher returns are a result of a risk compensation premium for investors due to the less-than-stellar performance and distress attributes of value stocks (Graham and Dodd, 1934; Fama and French, 2017; Gagliolo et al., 2020; de Souza et al., 2018). Others challenge this rational view and propose that investor biases, extrapolation, and overreaction errors play a more significant role in explaining the higher returns of value stocks (Huang et al., 2022; Huni and Sibindi, 2020). These scholars further argue that the higher returns can be attributed to the risk associated with distressed firms, which inherently have higher risk profiles (Hutabarat, 2022; Iglesias et al., 2021). De Bondt and Thaler (1985) observed

that growth portfolios tend to have significantly larger betas than value stocks, a finding supported by other studies such as Israel et al. (2020) and Kesseler et al. (2020). Building on the arguments in the literature, this study aims to examine the outperformance of value stocks compared to growth stocks in the context of the Kenyan stock market.

Multiples-based portfolio classifications have also been subject to academic investigation regarding their performance. While some studies argue that price-to-earnings (P/E) ratios generate superior returns compared to price-to-book (P/B) ratios (Athanassakos, 2009), others contend the opposite (Li, 2022; Akinde et al., 2019). Additionally, the book-to-market (B/M) ratio has been advocated as a more reliable metric for consistent and higher returns (Jin, 2022; Kimani et al., 2022; Ng'ang'a, 2019). The use of the book-to-price (B/P) ratio is supported by the argument that book values exhibit a degree of stability and forecastability, providing investors with certainty about the firm's fundamentals (Davis and Lee, 2008; Luo et al., 2021; Yohn, 2020).

In this study, we adopt the P/B ratio as the basis for classifying portfolios into value and growth stocks. The hypothesis tested is whether value stocks, proxied by low Price/Book ratios, outperform growth stocks, proxied by high Price/Book ratios as set out in chapter one.

Hypotheses building: Empirical research 2

Evaluating the success of an investment approach based on the original methodologies that were originally applied to advanced markets such as the US and UK and now being evaluated on an emerging market such as Kenya is akin to carrying out a robustness test in the manner demonstrated in, for instance, Naknok (2022), Kumsta (2015) and Duong et al. (2014). This requirement was met by stating the first hypothesis as follows.

Hypothesis 2.1: The F_Score approach to investing together with its variants can identify stocks that will win in the future in the Kenyan stock market.

After completing the robustness tests, the analysis turned to checking the investment approach's efficiency in the Piotroski (2000) original manner. Chapter 3's section 3.4.2 empirical research 2 showed that the F_Score composite measures were binary and hence a considerable likelihood of leaving out important financial statement information. Illustratively, a firm that has recently issued additional shares might receive a negative assessment and thus assigned a zero value on this specific measure, even though intuitively motivated by the fact that share issues lead to earnings dilution but without applying any grading. Thus, the size of the additional share capital issued is not weighted in the assignment of the binary values of 1 or 0 but all firms raising additional capital are assigned the value of 0. Such scenarios, if applied to the other variables could lead to a firm being identified as unworthy of investing in, at the worst. However, this should not pose problems in a long only portfolio because of the wide range of alternative high-ranking F_Score firms. It is the shorting of a stock that is unduly negatively rated that has adverse effects on the portfolio's overall performance (Soon et al., 2018;Hens and Rieger, 2016; Kumsta, 2015).

This all-or-nothing investment approach is appealing but is potentially sub-optimal and hence lends itself to possible improvements. Nevertheless, one needs to balance the high-return potential with the requisite additional resources of time and effort in implementation of the alternatives. This led to further analyses covering aspects that explore the practicality of improving the original method.

In the first aspect, the financial information from financial statements was graded in finer details to improve the simple binary measurements by applying a ranking system. Here, the alternative measures are relative and not absolute as was in the original F_Score. So, in the F_Score approach, firms are assigned a single defined score ranging from 0 to 9 no matter the peer firms' number in the particular year. In the alternative method with ranking/grading, the alternative score is driven by how the other firms included in the sample set performed. In the second aspect, the ability of each of the Fi-rank to make forecasts was measured and hence the assumption was made that both past and future accuracies are correct. The next hypothesis was then stated as below.

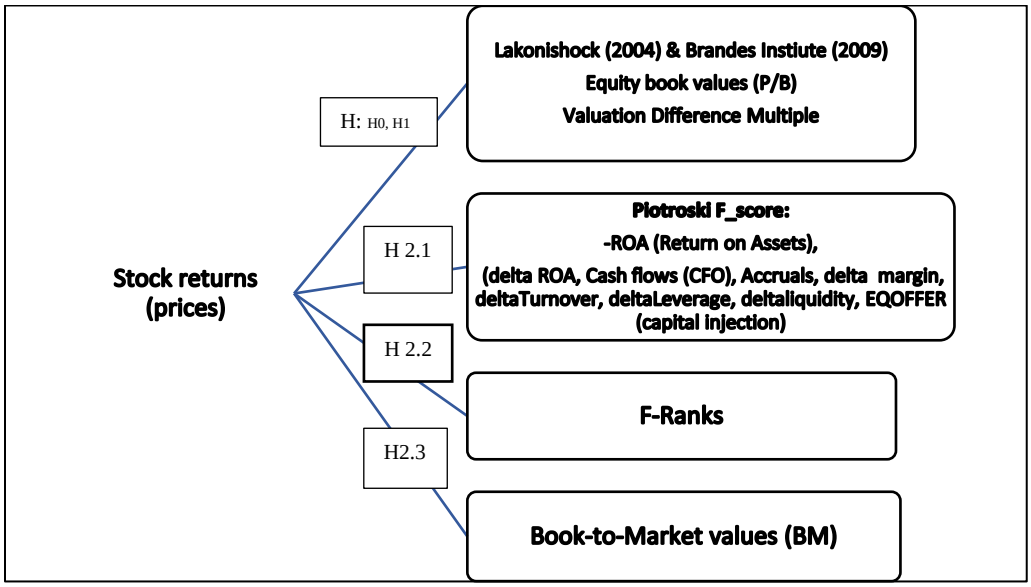
Hypothesis 2.2: Combining the alternative F_Score components produces better performance relative to the original F_Score investment strategy in the Kenyan stock market.

A key variation from the Piotroski's (2000) approach was the inclusion of all the listed firms on the NSE and not just the high B/M firms where it was then justified on the grounds that too few firms (less than 50% of the sample) provided positive returns in the original study. The current study sought to improve the F_Score's binary characteristics that might have driven the above scenario as part of the preceding hypothesis, similar to Soon et al. (2018) and Kumsta (2015). Including all NSE listed firms here was justified on two fronts; first, on the practical considerations that the overall number of NSE listed firms is comparatively much lower and thus further lowering the quantity of data by leaving out all low B/M firms could result in having too low a sample size that could produce inconclusive results. Second, using the whole available data set aids in proving the original strategy's robustness (Zhou et al., 2022; Ho et al., 2022; Kumsta, 2015). A finding that the strategy works nullifies the need for investors to carryout additional work of classifying stocks based on their B/M ratios as a first step before application. The hypothesis here was then stated as:

Hypothesis 2.3: The F_Score strategy of investment with the related alternatives is able to identify winner and loser stocks no matter their linkage to any particular book-to-market ratio class.

The conceptual framework following from these hypotheses is presented below with the variables relationships extensively discussed in chapter three's methodology sections:

Figure 2.1: Conceptual framework



Source: Study own construction

Under Empirical research 1, Book value is defined as the shareholders' interest in a firm and is derived from the firm's balance sheet by subtracting the total liabilities value from the total assets value (Toit, 2012). It represents the net assets of the firm. Book Value per Share (BVPS) is calculated by dividing the book value by the number of issued and paid-up ordinary shares (Dias et al., 2020). The Price-to-Book (P/B) ratio is derived formulaically as: P/B ratio = ((P/S) / B) / S, where P represents the market price of the share, B represents the book value of the share, and S represents the number of shares traded on the listed share's market.

To examine the relationship between a stock's relative P/B ratio and its performance, the study calculates the Valuation Difference Multiple (VDM) on a monthly basis. The VDM is obtained by dividing the median P/B ratio of the growth portfolio (Quartile 1) by the median P/B ratio of the value portfolio (Quartile 4) in each month (Sari, 2022). The study then compares the VDM with the monthly annualized excess return, which is calculated as the return of the value portfolio minus the return of the growth portfolio. The examination of consistency involves dividing the quartile 1 (Q1) to quartile 4 (Q4) VDMs into quartiles to assess returns consistency across different valuation difference ranges. Mean annualized excess return and median annualized excess return are calculated to evaluate consistency (Moreira and Muir, 2017).

The study applied the revised Chan and Lalonishok (2004) methodology to the Kenyan stock market to examine the relationship between valuation differences and the performance of value and growth stocks (Almagtonne et al., 2020; Chinco et al., 2019; Ghosh, 2019; Kondor, 2019). Firms were categorized into value and growth portfolios based on their price-to-book value (P/B) and book-to-market (B/M) ratios. The valuation difference multiple was used as a proxy for standardized valuation disparities (Gaglio and Cardullo, 2020; Toit and Krige, 2014; Toit, 2012). The study aimed to verify the outperformance of value stocks over growth stocks and examine the relationship between valuation differences and subsequent returns (Cornell, 2021; Asness et al., 2020). The analysis thus involved computing P/B ratios for NASI constituent stocks, ranking them, and creating portfolios based on quartiles. The portfolio returns were tracked over a five-year period, and equal weighting was applied within each portfolio (Hutabarat, 2022; Toit and Krige, 2014). The returns were annualized for comparability (Iglesias et al., 2021; Toit and Krige, 2014).

In Empirical research 2, variations of the Piotroski (2000) procedure were employed to construct benchmark portfolios for comparing measurement period-end returns (Ho et al., 2022; Hyde, 2018; Kumsta, 2015). The approach involved subtracting an index's annual return, the NASI, from the equity return of each firm (Hyde, 2018). Market-adjusted returns were calculated for firms with all nine F-Score components, and the returns were weighted within each quintile or tercile (Lehto, 2021; Wichlinski and Rajaram, 2019; Cheffins et al., 2013).

Five portfolios were constructed annually based on F-Scores, and equal weighting was used for portfolio construction (Lewellen, 2010). An alternative measure was introduced to address the shortcomings of the binary F-Score, and it incorporated ranking and standardization to improve accuracy in representing a firm's financial strength (Naknok, 2022; Hyde, 2018; Mohanram et al., 2018). The F-rank method allowed for a more nuanced evaluation, considering the extent to which a firm exceeded thresholds across F-components (Kumsta, 2015). Flexible cutoff points were used for portfolio allocation based on F-ranks (Safdar et al., 2022). The analysis extended beyond internal firm characteristics by including the book-to-market (BM) ratio, and firms were classified into BM terciles to create two-way portfolios (Piotroski, 2000). This expansion resulted in a more refined differentiation in portfolios and provided insights into the relationship between investment performance and BM terciles (Piotroski, 2000).

The study utilized the F-Score methodology developed by Piotroski (2000) to construct portfolios based on a firm's aggregate accounting information variables. Firms with low F-Scores were grouped as low fundamentals firms, while those with high F-Scores were grouped as high

fundamentals firms (Hyde, 2018; Yan and Zheng, 2017). The performance of high F-Score portfolios was compared to other portfolios, including high book-to-market (BM) portfolios (Ho et al., 2022; Hyde, 2018; Kumsta, 2015; Djogbenou et al., 2015). The F-Score comprised three fundamental financial health indicators: profit, gearing or leverage, and efficiency of operations (Piotroski, 2000). Each component was assigned a binary value based on the previous year's trend, and the F-Score was derived by summing up these values. Higher F-Score stocks were expected to exhibit superior one-year returns (Ho et al., 2022; Hyde, 2018).

In summary, value investing traces its origins to the Graham and Dodd (1934) masterpiece as the intellectual bedrock whose philosophy is buying undervalued assets being sold below their intrinsic values determined from an analysis of financial data. The intrinsic value differs from market value since market value is subject to manipulation and/or psychological biases. In the current study, the selection of value and growth stocks measurement variables was predicated on the description of these investment styles. The variables of analysis were derived ensuring they captured the elements described above as established in the literature.

Theoretical framework

This section discussed the common theories in modern finance, setting the foundation for the need of the study topic. It set out the basic assumptions and reasons for the existence of the two schools of thought while laying out recent developments. This was important as the research topic’s focus was on financial assets investment and not any forms of investment like government infrastructural investments. The broad theories were briefly described and then linked to the

research topic of value investing and why it was considered a superior investment style to the extent that it predominantly produced higher returns compared to other investment styles.

In his Nobel Prize lecture, Fama (2013, p.1) described the empirical work on capital markets that were efficient and the development and proving of asset pricing models as the '*two pillars or the Siamese twins of asset pricing'*, thus implying the incompleteness of discussing one without referring to the other. The beginning of stock return studies in the 1960s was then anchored on the primary problem of whether prices of securities reflected all the information that was available and Fama (1965) called it 'the efficient market hypothesis' but it came with the challenge of testability. As Fama (2013, p. 1) described it, it is impossible to test "whether the market does what it is supposed to do unless we specify what it is supposed to do" ……. meaning that a model of valuing assets is required, and the said model needs to delineate the attributes of the logically expected returns under conditions of equilibrium in the market. The arising efficiency tests are essentially tests of realization of the expected returns' characteristics implied by the market equilibrium assumed model. One therefore needs a market equilibrium model, that is, an 'asset pricing model', specifying the characteristics of the rational equilibrium expected returns (Fama and French, 2020; Koijen and Yogo, 2015). Test failure still does not explicitly say whether the failure came from a bad model specification or a market that is inefficient not incorporating some information in the asset prices. This problem is what was termed as the joint hypothesis problem in Fama (2013) and Fama (1976).

It therefore follows that those tests of market efficiency are of necessity always jointly done with a market equilibrium model and tests of market equilibrium models are always done jointly

with market efficiency as well (Fama et al., 2020). The common models for pricing assets like the capital asset pricing model (CAPM), investment CAPM (the ICAPM), the consumption CAPM and the arbitrage pricing model (APM) implicitly or explicitly assume the availability of cost-free information to all market participants for portfolio choice decisions, a strong form of market efficiency, and hence, testing these asset valuation models is jointly testing whether markets exhibit efficiency (Atmaningrum et al., 2021; Moosa, 2013).

The behavioural finance literature is mostly a critique of market efficiency on the basis of the reported findings from psychology based on human behaviour. The other basis of the behavioural critique of market efficiency comes from a scouring of databases of asset returns looking for anomalies and attributing these to behavioural finance (Bocher, 2022). Fama et al. (2017) stated that behavioural finance is yet to provide a full model for asset prices and returns testable and either proved or disproved for it to claim its replacement ability of the efficient markets and asset pricing models or any other. The joint hypothesis requirement and the behavioural finance arguments informed this thesis' analysis of these theoretical frameworks presented in the sections that follow.

The nature of theory

In general terms, a theory comprises the integration of a contemplation of thoughts or ideas in an abstract manner, removed from reality that then led to succinct assertions or postulations about how a certain subject of interest works (Miller, 2015). A theory can also be said to be a body of knowledge on a subject area. Contemporary scientific research refers to theory as the proven explanation of phenomena where the proof or verification has followed a defined process or

method (Locke, 2007). A theory can be differentiated from a hypothesis in that a hypothesis is a mere conjecture or supposition on how one expects something to work, and the supposition is testable through empirical means whereas a theory is a description of the occurrence of events in defined environments (Miller, 2015; Sirakaya and Woodside, 2005).

In Miller (2015) and Wacker (1998), a theory is viewed as tool of analysis that helps to understand, explain, and predict future manifestations of a given matter. The argument is made for a formal theory to be syntactic in nature and that it is only meaningful with a semantic part by applying it in each context like historical facts, for instance. Theories are expressed in natural language; however, they are formulated in such a way that their general form is equivalent to a theory expressed in the formal language (e.g.., mathematical logic). Theory expression can take several forms including algebraic equations or mathematical symbols which are expected to follow rational thinking principles (Egan, 2002; Bagozzi and Phillips, 1982).

According to Wacker (1998) there's a common notion and definition of theory hence tailors his writing to defining theory formally amenable to theory operationalization and suggesting that in academic writing a postulation is accepted as a theory only when certain requirements are met, that is, the subject variables are defined, the domain (environmental settings) within which these variables operate, the set of interactions of these variables and the set of outcomes predicted from these interactions. His paper then describes theory as contemplative thoughts in a precisely defined world setting (a domain) that logically explain how variables interact in that domain to produce outcomes. The goal of a good theory is to succinctly clarify the underlying rationale and methods

of even interactions thus forming the crucial building blocks of good theories (Flowers, 2009; Reckwitz, 2002).

A different proposition of theory is that researchers could take theory as a description of the existent relationships among units being observed or their approximations in an empirical test. The approximated units are constructs not naturally observable directly making a theory to be a 'system of constructs and variables' where these constructs' linkages are made by suppositions and variables interactions linked through hypotheses. The final objective is that theory definition answers the researcher's questions of why, what, and where (Locke, 2007; Reckwitz, 2002).

Therefore, one can say that a theory is made of all variables definitions by satisfying the questions of who and what, the domain description of the operating environment in which the theory is expected to function, the relationship building stage definition that outlines the logical order of how and why variables relate to each other and finally, the predictive phase of theory of the possible outcomes based on the obtaining conditions. The theories applicable in investing and how they relate to this research topic are discussed next.

Modern finance: theoretical models

In this section, a summary of the evolution of the traditional finance theories applied in asset pricing was given. This served to form the basis of discussing the theories directly applied to the research topic (the efficient market hypothesis and the behavioural finance theory) since they all are linked to the traditional theories and provide a solution of the limitations in the traditional theories.

Asset pricing models evolution

Modern portfolio theory (MPT), the beginning point in portfolio choice, is a theoretical framework for choosing a securities investment basket such that the expected returns are maximized (Pan, 2021; Fabozzi et al., 2012; Amenc and Sourd, 2005). It thus serves as a return maximization problem formulation anchor that is subject to a portfolio choice universe (that is, a constrained optimization problem). The portfolio returns maximization function is required to agree with the investor's expectations and considerations about the acceptable risk levels - as constraints (Kan et al., 2019; Amenc et al., 2019; Bodie et al., 2014). Quantitative methods on past data are usually applied to derive an expected portfolio return and acceptable portfolio risk levels definition and thereby derive an optimal portfolio construction method (Singh et al., 2021; Bodie et al., 2014; Rong, 2013).

The formal model regarding portfolio selection that embodies diversification principles was published in Markowitz (1952) and formed the first step in portfolio management that identifies an efficient set of portfolios: the efficient frontier of risk assets. Principally, the portfolio with the highest return is what is of interest given a risk level (Kan et al., 2019; Fabozzi et al., 2012). Formally, the frontier is the portfolio set maximizing the variance of any target expected return (Bodie, 2014; Alberg and Seckler, 2014; Rong, 2013; Tang, 2013). In this regard, the Markowitz (1959) portfolio selection and diversification model primarily concerns itself with a portfolio's asset returns' covariance and therefore aims to construct a portfolio whose assets returns are less than perfectly positively correlated, with the aim of lowering portfolio risk (as measured by variance) without giving up the return level (Kan et al., 2019; Osmond, 2016;

Pinkerton, 2015; Omisore, 2012). The distinguishing characteristic of the Markowitz diversification approach is the aim of keeping the return level as is while reducing risk by way of analysis of covariance of asset returns, and this makes the model appealing as to its effectiveness (Zakaria, 2017; Lee, 2014; Grant, 2013; Athanssakos, 2013).

The Markowitz diversification then produces efficient portfolios having the highest realizable returns at a given assumed risk level. The construction of the Markowitz efficient portfolios is dependent on the following assumptions. First, investor decisions are moved by only the two parameters of expected returns and variance. Second, that Markowitz investors are risk averse (Kan et al., 2019; Porter and Trifts, 2014; Athanssakos, 2013). Third, the Markowitz investor is a highest expected return seeker. These assumptions imply that such investors will consistently prefer a lower risk security over a higher risk one given the same level of expected return (Maier and Zhu, 2018). Fourth, the assumption of homogeneity in expectations imputes same expectations of return, variance, and covariance matrices for all Markowitz investors. Lastly, a common one period investment horizon is assumed (Kan et al., 2019; Fama, et al., 2017; Clarke, et al., 2001; Markowitz, 2008; Fama et al., 1992).

The Markowitz Portfolio theory then leads to a feasible portfolio set which an investor is able to construct given the available investable assets with the feasible set of portfolios being the collection of all feasible portfolios (Pan, 2021; Ngoasong, Korda and Paton, 2015; Fabozzi and Grant, 2001; Markowitz, 1952). A portfolio set with high-ranking expected returns of all the possible portfolios with the same level of risk is then said to be efficient and a Markowitz efficient portfolio is a mean variance efficient portfolio implying an inherent Markowitz efficient portfolio

for each level of risk (Lev and Srivastava, 2019; Fabozzi et al., 2006). The investor's preferences as observed in their utility curves regarding the risk-return trade-offs then define an optimal portfolio and is represented by the investor's utility function (Huni et al., 2020; Fabozzi et al., 2010; Grant, 2009). The portfolio's variance of the payoff as expressed in the rate of return is the closest risk proxy in the Markowitz portfolio theory. Risk is defined in two components of systematic and unsystematic risk with the former being inherently present in the capital markets and is not attributable to any specific asset and hence is undiversifiable (Dimson et al., 2016; Fabozzi and Grant, 2001). This risk emanates from general market and economic conditions. Unsystematic risk on the other hand can be diversified away as it is the portion of an asset's return variability and comes from factors internal to the asset in accordance with the Bodie et al. (2014) analysis.

Related to the modern portfolio theory is the capital market theory, which is a model applied in analysing effects of investor decisions on the prices of tradable securities. It theoretically derives a framework of what should be expected through the interplay of expected security return and risk where the investment portfolio constructed follows the modern portfolio theory (Pan, 2021; Dimson et al., 2016).

The combined modern portfolio theory and the capital market theory forms a framework that defines and measures the risk in an investment and builds the risk-return relationships in an investment portfolio and in essence therefore derives a theoretical expected relationship between risk and the expected return on a security (Pan, 2021; Bodie et al., 2014; Brealey and Myers, 2006). These relationships form what is called the asset pricing models (Damodaran, 2015; Bodie et al.,

2014; Fabozzi, et al., 2010). These models have had the revolutionary utility of enabling managers to quantitatively measure the risk and expected return in an investment portfolio (Graham et al., 2015; Fabozzi and Sergio, 2004; Chan and Lakonishok, 2004). Lee (2014) states that the resultant principle in the two theories is that portfolio management should be focused on the portfolio risk and not the individual security's risk. By implication, then, the theories posit that it is possible to select and bundle a portfolio of risky assets and end up with a portfolio whose expected return reflects its parts but with a much lower risk than the individual components (Dimson et al., 2016; Koijen et al., 2015; Subrahmanyam, 2010).

Therefore, asset pricing models are equilibrium models in that with the relevant assumptions of investor behaviour and expectations around capital markets, these models are employed to predict the theoretical equilibrium price (Ghosh et al., 2019; Gharghori et al., 2013). Therefore, an investor that is averse to risk and chooses investments on the basis of return-variance expectations parameters constructs an efficient portfolio by combining the market portfolio and the risk-free asset. A risk-asset pricing model can then be derived from the above (Fama and French, 2017; Bodie et al., 2014).

The derivative CAPM from the above models, adds two assumptions to those of the modern portfolio model: that is, first that there exists a risk-free investment where borrowing and lending takes place for any volume at the risk-free rate and, second, there's competition and no friction in capital markets (Kozak, et al., 2018; Athanassakos, 2013a). Hence, the expected/required rate of return on a single asset is a linear positive function of its index of systematic risk and is determined by beta, with higher values of beta implying higher expected returns and only an asset's beta is

responsible for the movements in its expected return (Kozak, et al., 2018; Zhang et al., 2013; Dempsey, 2013a). Here, the individual securities' expected returns lie on the security market line and not the capital market line in equilibrium due to the high degree of unsystematic risk that is retained in individual securities diversifiable out of the portfolios of securities (Yan and Zheng, 2017; Bodie et al., 2014; Degutis and Novickyte, 2014). This implies that investors can only pay a premium to avoid market risk and thus there's a parity in the expected return of two assets with the same amount of systematic risk. The long run equilibrium then requires that only efficient portfolios coincide on the capital market line and the securities market line (Gu, Kelly, and Xiu, 2018; Arnott, Beck and Kalesnik, 2016a). Therefore, beta, the systematic risk measure is essentially an index of each security's influence on the systematic risk of a properly diversified securities' portfolio (Fama et al., 2015; Fama et al., 2012; Graham et al., 2009).

An important implication in the CAPM is that each individual arrives at the same portfolio with weights on each security equating to those of the market portfolio in their effort to optimize their personal portfolios (Arnott, Beck and Kalesnik, 2016b). Investors desire to hold identical risky portfolios following the CAPM assumptions hence, the need for all investors to reach the optimal risky portfolio composition when they use the same Markowitz analysis on the same securities universe for the same time frame and inputs set (Arnott et al., 2016c). Any security adjusts, of necessity, its price to align with the market portfolio, otherwise it is excluded in the selection (Dempsey, 2013a). Accordingly, Bodie et al. (2014) and Calandro (2014) have suggested that the major implication of the CAPM empirically examined is that beta ought to be the sole market priced factor and hence measures of variability such the returns' variance or standard

deviation as well as multiples factors of price earnings ratios, dividend yield and firm size wouldn't be important as explanatory variables in stock returns (Asness, 2016; Dempsey, 2013b).

In summary, the CAPM is a predictor of the risk and expected return relationship of an investment security and plays the two vital functions of, one, providing a benchmark rate of return useful in analysing all potential investments and, two, assisting in making educated guesses concerning the expected return on securities yet to be traded in the market, for instance, an Initial Public Offering (IPO) (Singh et a., 2021; Fama et al., 2015; Athanassakos, 2013b). From an investment strategy viewpoint, the market portfolio held is based on a common stock list and includes all the relevant information about the universe of securities and therefore investor security analysis is of no value (Singh et a., 2021; Zakaria and Hashim, 2017). An investor can obtain an efficient portfolio of investments by holding the market portfolio and thus this proposes the passive investment strategy of investing in a market index as being efficient (Penman and Reggiani, 2013). The passive investment strategy proposed here would be close to the tenets of the value investing strategy only that the concept of the margin-of-safety would be lacking (Singh et a., 2021; Wichlinski and Rajaram, 2019).

The arbitrage pricing theory (APT), another model of asset pricing/valuation, predicts a security market line that links expected return and risk with three key propositions: first, the security returns are describable by a factor model, two, the existence of sufficient securities makes the diversification of idiosyncratic risk possible, and, three, that arbitrage opportunities are quickly eliminated in well-functioning security markets (Ball et al., 2019; Penman, et al., 2018; Athanassakos, 2012). This theory links a security's expected returns with a myriad of factors and

not just a single factor as in the case of a single index in the CAPM and thus the expected return under the arbitrage pricing model is a linear relationship between the return and what are referred to as H factors (Fama et al., 2017; Barroso et al., 2015; Bodie et al., 2014). However, these H factors are not specified only that the possible factors' relationship is linear. To obtain an equilibrium position then a few conditions need imposition to eliminate arbitrage profits. First, that without applying new funds (wealth) and without raising risk levels, the possibility of creating a portfolio to increase return shouldn't be there. Second, a 'money machine' should not be available in the market (Barroso et al., 2018; Gu et al., 2018). The theory derives an implication that investors require a compensation for all factors systematically affecting a security's return. This compensation is made up of totalling up the products of each factor's systematic risk and the financial market's assigned risk premium. Just as in the CAPM, accepting unsystematic risk has no compensation (Singh et a., 2021; Fama et al., 2012; Fama et al., 2010).

In comparison with the CAPM, the APT superiority lies in; first, absenting itself from many assumptions about the preferences of investors on risk and return. Jitendra et al. (2016) state that while the CAPM assumes the risk-return trade off of investors of prospective investment decisions being wholly based on expected returns and standard deviations, APT only requires that rational investor assumptions are imputed on the investor utility function such that rational choice is achievable (Frazzini and Pederson, 2014; Bodie et al., 2014). Second, APT makes no assumptions about the security returns distribution functions and, third, APT places no reliance on the true market portfolio being identified thereby making the theory amenable to empirical testing. However, the key problem in APT is the identification of factors which must then be statistically identified (Fama et al., 2015; Bodie et al., 2014; Toit, 2012).

Later, Fama et al. (1993) developed the three-factor model as an asset pricing model to expand the CAPM adding size risk and value risk factors to the CAPM's market risk factor. The model considered the reality that value and small market capitalization (small-cap) stocks regularly yield better returns compared to the whole market. The added two factors adjust for the tendency to outperform the market and thus provide a better tool for manager performance evaluation. The model's workings were an attempt to improving the measuring of market returns from their research findings that value stocks outperformed glamour stocks. They had also found small-cap stocks outperforming large-cap stocks implying that as a performance management tool, portfolios composed of a disproportionate small-cap or value stocks count would outperform the CAPM result, because the three-factor model downwardly adjusted for revealed small-cap and value stock stellar outperformance. The model's three factors are: Small Minus Big (SMB), High Minus Low (HML) and the portfolio's return less the risk-free rate of return. SMB takes care of the publicly traded firms with the small market capitalization yielding relative better returns. HML takes care of the value stocks with high book to market ratios that yield higher returns in comparison with the market (Fama et al., 2017; Campbell, et al., 2017).

In their random stocks' portfolio tests of the three-factor model, Fama et al. (2015) observed that combining size and value factors with a beta factor, 90% of a diversified stock portfolio return could be explained. This ability to explain 90% of a portfolio's return compared to the market enables investors to build a portfolio of an average expected return commensurate with portfolio risk. Expected returns are then a function of market sensitivity, size sensitivity, and value stocks sensitivity (proxied by the book to market ratio). Unpriced or unsystematic risk

accounts for any additional expected return. The three-factor model was developed to bridge the gap in modeling the relations in average returns and size and mean returns and price ratios such as B/M (Fama et al., 2015).

Fama et al. (2015) augmented the three-factor model to create the five-factor model to include more factors emanating from the Novy-Marx (2013), finding that the regression of the three-factor model was incomplete in explaining expected return because the initial model left out return variations associated with profit and investing. The five-factor model therefore added the concept that higher returns in the stock market were associated with firms that reported higher expected future earnings – a profitability factor. The fifth factor was then investment because it linked internal investment with the returns concept such that firms allocating higher fractions of their profits to growth projects experienced market declines. Therefore, the five-factor model captured size, value, profits, and investing patterns in stock average returns that yielded preferential results relative to the three-factor-model. The five-factor model had a major limitation since it did not include the small-cap stocks' low average returns which exhibit the behaviour akin to firms investing heavily in spite of their dimming profitability. The model's performance has been found to be insensitive to factors' definition hence the addition of profit potential and investing factors renders the concept of value redundant in the three-factor model (Fama et al., 2017; Fama et al., 2016). These five-factor model was derived from the dividend discount model that explains the relevance of the variables of B/M ratio, profitability, and investment to the average stock returns. Within the dividend model, the B/M ratio is an unstable expected return measure that changes in line with the size variable as well as earnings forecasts and investment plans (Guo, 2019; Campbell et al, 2017). This therefore leaves the variations in mean returns from

profitability and investment unexplained in the three-factor model (Kozak et al., 2018; Fama et al., 2015). This required examining an augmented model with profitability and investment added to the three factors of market, size, and book-to-market ratio (Shade, 2017; Rytchkov, 2014).

The typical assumption in asset valuation models is that the return distributions of assets and portfolios are the only explanatory variables in portfolio decisions. An alternative provided in the literature, for example, Fama and French (2008), Barberis et al. (2003) and Daniel et al. (1997) is that investor preferences for other attributes of assets are influential, for instance, socially responsible investing. It could be that a lot more investors derive utility out of growth stocks acquisition associated with profitable fast-growing firms and avoid value stocks-associated with low short-term profitability and growth (Bebchuk, 2021). Persistence of such preferences could continuously affect security prices and expected yields, as long as arbitrage opportunities don't ensue, as a result. This alludes to a behavioural phenomenon but not necessarily irrationality (Nareswari, et al., 2021; Novy-Marx et al., 2016).

The preceding asset pricing models form part of what is called financial economics (Cuthbertson and Nitzshe, 2014). In as much as they offer a litany of approaches to valuation of assets, they inherently are centred on similar assumptions to those of the efficient markets hypothesis (EMH). The principles of this theory are discussed next.

The efficient market hypothesis (EMH)

This section elaborated and provided a critical review of the essential theory upon which all of the preceding models of asset pricing/valuation emanate. Because these models are designed

to mimic reality in order to understand its full complexity, an understanding of the key anchoring assumptions is of critical importance. The general assumption in the EMH is the quick and smooth incorporation of information in asset prices hence eliminating the possibility of arbitrage opportunities following the high return-high risk relationship (Audu et al., 2022; Hogan, 2019; Degutis et al., 2014; Guerrien and Gun, 2011; Ball, 2009). This theory was put forth by Fama (1965) in his 'Random Walk in Stock Prices' treatise and here a market efficiency was defined to be a phenomenon where the prices paid by investors for financial securities fully reflected the fair or true information concerning the intrinsic value of the particular security or fairly approximated the issuer of the security's value (Bocher, 2022; Fama et al., 2015; Rossi, 2015; Fama, 1965). The key issue in the efficiency concept here is the information accessible by investors who trade in the market. The hypothesis states that the asset market price exhibits all the information that is known, past and current and any reasonably inferable information such as referendum outcomes (such as, for example, Brexit?). Historical information entails, for instance, previous earnings while current information would include announced events that are still forth coming, for example, shareholder general meetings (Ghosh et al., 2019; Rossi, 2015; Frazzini et al., 2014; Shiller, 2003). A capital market is considered efficient when the traded securities' prices move immediately with situational changes as the events take place. In that case, the security's future income and the related risks are credibly reflected and thus the speed of adjustments to new information is expected to be immediate in this market (Singh et a., 2021; Ball et al., 2019; Brealey et al., 2006).

The EMH importantly predicts that security prices reflect all information available to investors and that it is difficult for active investors to outperform passive investment strategies like following a market index investment strategy (Hafner, 2021; Bodie et al., 2014; Malkiel, 2011;

Shiller, 2010). The difficulty here is the task of devising measures of the intrinsic value of a security followed by the difficulty in testing directly the matching of those values with prices and hence market efficiency tests tend to focus on active investment strategies performance (Fama et al., 2020; Shefrin, 2005; Lo, 2005). The validation of this theory is informative to the investor since it points to the impossibility of outperforming the market and leaves returns to the game of chance. Rational behaviour is not of significance since responding to information produces a sufficiently large random reaction that eliminates the potential for excess profit (Huang et al., 2022; Fama, 2015; Degutis et al., 2014; Guerrien et al., 2011).

To the theory, randomness originates from investors' greed that is insatiable, continuously looking for ways to gain from information trading. Stock prices eventually carry in themselves all the available information as they are a product of the sum of these transactions. This then ensures that opportunities for arbitraging are eliminated fast enough such that abnormal profits are untenable. Out of this explanation of EMH, then EMH simply states that prices of securities traded on an open market reflect all information regarding the security (Fama and French, 1992) and thus reflect the present value of all future cash inflows and are a full reflection of the information available. Information in this regard is in three forms: a) weak form, b) semi-strong form, c) strong form.

The weak form efficiency indicates that observed traded stock returns have no meaning in the future returns' prediction hence the futility in technical analysis as a stock-price forecasting tool. This is to say that the random walk hypothesis is so inherent in the weak form efficient markets such that a security's future return outcome cannot be predicated on its past

outcomes/observations (Sanusi, 2015). The weak form efficiency has traditionally been tested using variance ratios (Fama, 2017).

For the semi-strong form to hold the prices are required to timeously incorporate new arriving information, for instance, from financial statements, and event experiments have traditionally been implemented in identifying the effect of new information arrival on asset values or stock prices. For example, Chordia et al. (2014) undertook an analysis of the movements of stock prices in a time interval of up to half an hour to comprehend the how fast stock prices adjust reach to market efficiency.

The strong form of efficiency obtains even where confidential information accessible by investors does not hold beneficial results and therefore such investors are not able to make gains from such information. The prevailing view in academic literature has been that at the minimum the semi-strong efficient financial markets are observable (Boehmer et al., 2021).

The price-value equality assumption is prominent within the asset pricing empirical literature, especially in cases of firm ex post realized returns are used to proxy its ex-ante expected returns (Beneish et al., 2013; Cochrane, 2011). In other studies, along the asset valuation research, such as Chordia et al. (2014) and Fabozzi et al. (2001), the firm's actualized returns are dissected assuming that price changes equate perfectly to changes in value (Balakrishnan et al., 2015; Athanassakos, 2013c). The same assumption is used within the accounting implied cost of capital studies when determining a market implied rate of discount using the current share prices (Yohn, 2020; Bourguignon and De Jong, 2003).

The untenability of instantaneous price adjustments having been established, the capital markets research has continued to take the price adjustments process as being a triviality and therefore the price-value equality continues to influence the research topic's selection, empirical design tests and the interpretation of the results thereof (Maier, et al., 2018; Lee, 2014), and the empirical studies in market efficiency have not tested the equivalency of price and value but the focus has, instead been on returns predictability (Penman et al., 2014; Lee, 2014). The underlying idea here is that the assumption of complete market information being incorporated in the market prices should necessarily imply the unpredictability of future returns and therefore any predictability patterns observable in future returns should be difficult to exploit when transaction costs are factored in (Jitendra et al., 2016; Penman et al., 2015).

Thus, in this version of EMH, the no arbitrage conditions, should imply the no free lunch assumption and hence market equilibrium will rarely avail free lunch opportunities. However, this hardly implies that price is right. If price and value attained equivalence continually, then returns become unforecastable in the real world. Analogously, price does not equate to intrinsic value just because returns are unforecastable (Hou et al, 2017; Dreman, 2012). In a low arbitrage cost (i.e., trading costs, holding costs, information costs) market, prices are close to the fundamentals (Bodie et al., 2014; Lee, 2014; Malkiel, 2011), for instance, share options, index futures and closed end markets all experience quite low costs of transactions and information (Damodaran, 2015). Price becomes a function of many other variables and not just the future expected dividends where costly arbitrage holds and therefore price deviates from value and thus mispricing is to be expected to be

an equilibrium happening when arbitrage costs are non-zero (Jitendra et al., 2016; Graham et al., 2009; Gregory and Michou, 2003).

The drawbacks of the efficient markets hypothesis

The EMH's vagueness, more so the definition of the phrase 'full reflection' of information was acknowledged in Fama (1970). The existence of the joint hypothesis problem implies that an empirical test of the theory must of necessity define an underlying asset pricing model. This in essence means that the rejection of the market efficiency's test null hypothesis is not the same thing as saying that markets are inefficient. The result might have come because of a deficient underlying valuation model applied in the test of the null hypothesis, making the result open to various interpretations (for example, Siddiquee, 2017). Nevertheless, the ability of the EMH to identify risk as being the sole unique attribute among the theoretical models underscores the theory's benefit given that risk definition depends on the underlying model. This is so since the expected return is taken to be driven by the risk assumed under the constraints of a given information set. There's therefore a smooth flow of the EMH from both the APT and the CAPM as formally derived in Bodie, et al. (2014) as: $\mathbb{E}(\mathcal{P}j, t+1|\,\Phi t) = [1 + \mathbb{E}(rj, t+1|\Phi t]\mathcal{P}jt$ …… 2.1

In the above equation, asset j's price one period from now corresponds to the product of that security's percentage return one period later and its price, $\mathcal{P}$, now, given the available information now (Φ). The equation is an attempt to suggest the theory's precision, though the interpretation is less precise. Markets are only considered efficient in instances of full incorporation of collectible information in the security values. The catch is what "fully reflected"

entails. In Fama (1970) it was said that markets were already efficient when investors were utilising information, a moderation of the 'full' reflection requirement, hence this could be taken to be another motivation why the EMH cannot be rejected since the information use scale seems to be of no consequence for market efficiency. Fama (1970) provided three basic prerequisites to be met for there to be an efficient market. These are: zero transaction costs, costless information, and the investors consensus on the information pricing implications.

The first prerequisite is a clear abstraction from the reality of financial markets albeit the continued decline of transaction costs over the years since Fama's (1970) treatise, possibly attributable to developments in digital markets technology leading to overheads fall. This prerequisite is taken cognizance of for noting purposes but with no further consideration in the dissertation.

Assumption two calls for a closer look. Information access costs have been decreasing just like the costs of financial transactions have been but there is another dimension that is important. In Grossman and Stiglitz (1980) a logical proof was presented about how impossible it was to have a perfect efficient financial market for the assumption to hold. The argument given then was that investors would be unpersuaded to engage in information gathering as an activity that was hardly profitable due the implicit costs involved and hence bring trading to a halt and thus market collapse. But markets would be in disequilibrium in case all investors decided not to buy information because of their belief that they are better off when they restart information purchase. Fama (1991) took up this argument in the 20 years literature review on EMH research, referring to it and reducing this assumption to the level where investors would only foot the information's

bill when the marginal payoffs outweighed the per unit additional costs. This exposition of the strict form of the assumption as untenable was technically an admission of voiding assumption one as well, leading to a shift of focus to assumption three, consequently.

The last assumption/prerequisite has had a lot of interpretable headroom. Fama (1970) did not state explicitly on the sufficiency for prices to reflect investors' consensus and what implications pricing has on information or on the tenability of all investors arriving at the same conclusion, each being uninfluenced by another. The literature leans towards the latter where investors can reach the same agreement about the value of information, for example, Clement (1999) was able to identify systematic and dynamically sticky analyst prediction variances and the research of Gleason and Lee (2003) observed that variations in the securities valuation process were co-driven by the coverage exuberance of the analyst involved and how well known s/he was (Degutis and Novikyle, 2014; Clements et al., 2004).

It was mentioned above that all the information available is expected to be put to use by investors. This information falls in three categories of i) historical, that is past stock-prices, ii) company announcements (current news as they get published), or iii) insider information known privately. Investors use this information in the exact order as delineated here. The EMH cannot be falsified because of the restrictive definition suggested for the word "information" and the catch-all term of "utilisation" as reasoned in the following paragraph (Jitendra and Ranjan, 2016).

Illustratively, investors can identify the differences in the various forms of information such as that coming from within and without a firm in a semi-strong-form efficient market

environment. Since an explicit differentiation was not stated, the way information in the semi-strong-form environment was defined in Fama (1970) left the reader with a lot of leeway for interpretation. There are also consequential outcomes of both kinds of information as far as the speed of adjustments of the asset prices is concerned since in the real world there are varied agreement levels among investors on the ways to interpret information. Issuances of profit warnings from companies (emanating from within) reflect faster in asset prices as compared to interest rate changes (emanating from without). Profit slumps are bad signs on any firm's financial wellbeing, notwithstanding its industry segment of the economy. Interest rate rises do not necessarily portend future trouble for firms, for instance, financial services firms might actually benefit tremendously from rate rises. The level, type, and tenor of corporate debt of firms also makes a difference in asset prices as Fama (1970) analysed and laid out the evidence from Waud (1970), where no significant proof was found of prices adjusting markedly following pronouncements on interest rate changes since the outside information had been expected and incorporated in asset prices ahead of the announcement. It is still debatable whether investors are always in a position to understand wholly the implications of certain types of complex information and then be able to predict the impact on the asset classes in their portfolios. Still, even where the investors don't possess this ability, the catch all term deflates this point of criticism. Suffice it to say that investors use available information to bring to fruition the EMH.

The EMH seemed to have been valid at the time (see, for instance, Ball and Brown, 1968) but its eventual criticisms come as no surprise when the unrealistic assumptions are examined. The EMH was equated to a tautology in LeRoy (1976) based on the argument that prices depend on the currently available information (represent by Φ in equation 2.1) for efficiency. But, by

definition, prices are efficient since they are taken to already have incorporated in them all information available meaning that theory is permanently correct and not capable of being rejected. Beaver (1981) attempted to reduce the EMH's ambiguities by relaxing the requirement of investors' information consensus and provided an efficient markets clarification where it sufficed for security values to exhibit characteristics of investors interpreting information in a congruent manner. This EMH's shift towards more realistic assumptions by taking cognizance of the fact of investor heterogeneity but in the process creates another question of how it is possible that the aggregate market is efficient when there are as many views as there are investors on the available information.

Ryan (1982) provided the logic behind Beaver (1981) by interpreting the Beaver assumption to be a statement to the effect that market prices were a reflection of the rational portion of investors behaviour and the irrational; (unsystematic) portion is diversified away in the process of price determination. Ryan (1982) acknowledged the insufficiency of his own logic because of the possibility of the opposite happening such that in fact it is the rational part that is diversified away. However, again Ryan (1982) provided a possible way-out in order to bypass his alternative interpretation, relying on Friedman (1953) billiard players analogy. Here, predicting the shots of an expert billiard player comes with immense difficulty since it would not be entirely unreasonable to imagine that great predictions would come from a hypothesis that the billiard player makes his shots in full knowledge and application of advanced mathematical models that would show the best motion of his projectiles. In like manner, it is tempting to hypothesise that in a range of events, firms acting individually behave as though they were applying rational methods in their expected returns maximization.

The preceding explanation is a plausible defence in favour of the EMH but there's still an ambiguity around the process of transition from irrational behaviour to the rational one as elucidated in Ryan (1982) and Schredelseker (2022). But for practical reasons, this criticism seems unjustifiable. The increased regulation and standardisation of Accounting and Financial Reporting Standards across the globe voids the need for the assumption of inefficient markets as Kothari et al. (2010) deciphered that efficient markets emanate from equilibrium theory and hence give descriptions of states where accounting principles are derivable, as an example. Inefficient markets theories would then deal with transitory pricing matters and would not prescribe a market efficiency restitution framework. Consequently, the drawbacks and unclarities inherent in the EMH do not lead to its invalidation and therefore the theory has held its position in the academic literature and in policy derivations and decision-making process.

Despite the above, the continuing academic debate and idea sharing should still be motivating to search for an improved theory. By the close of the 1970's, the substantial empirical evidence that favoured the theory was being cited by its proponents as proof that it worked, for instance Jensen (1978). In Friedman (1953), while writing about the possibilities of general falsification of a theory, it was stated that refuting theoretical hypotheses and proving them empirically at the same time was untenable and/or impossible. The EMH proponents have been found to fashion their arguments in exactly this manner (Kumsta, 2015). This implies that by making reference to the 'joint hypothesis problem', research results militating against the EMH's tenability are refutable. Based on the statement given in Friedman (1953), it is rather apparently surprising that the empirical evidence validity, for instance in Jensen (1978) would be considered

in favour of the EMH propositions but not accepted in cases that are unsupportive to the EMH (see for example, Fama and French, 2020; Fama, 1991).

However, an eclectic supply of literature has continued to be published on the anomalies not conforming to the efficiency idea in financial markets since the end of the 1970's. Amongst the first papers on this development was Banz (1981) which studied firm size dependent risk-adjusted returns and observed small firm size returns that were markedly high and against those expected from models such as the CAPM. The size effect was observed to decrease as the size of firms rose, but the conclusion was that the CAPM is prone to errors and therefore the observations were considered inconclusive (Fama and French, 2017). Basu (1983) developed the work further and observed that in addition to firm size, those firms with higher earnings' yields tended towards subsequent risk-adjusted returns that were higher and thus reintroducing the question of the validity of market efficiency assumption.

The calendar effects anomaly has also been a popular topic in academic research, and it shows that securities' returns were always either under or above a certain predicted level at given time periods of the year. For example, research has shown above average returns on Fridays and below the Monday ones (see, Kumsta, 2015; Siegel, 2002). A portion of the described anomaly featured in the presentations in the studies of Amel-Zadeh (2011), Cho et al. (2007) and Keim (1983) of one full calendar year of stock returns. Terming it the January effect, he documented higher size versus stock returns' negative correlations in January compared to the other months. The Copeland and Mayers (1982) results provided another counterargument to the market efficiency's semi-strong form as argued in the EMH where significant abnormal risk-adjusted

returns were seen in securities from the first quartile that were additional best performers (Kumsta, 2015; Shiller, 2003). To eliminate the weaknesses of the CAPM, they introduced a holding period loop so as to invent a robust benchmark to measure comparative security returns. This method suffered from the challenges of mean returns that were non-stationary while the benchmark was being created but still showed that the validity of their results to be undeterred (Siddiquee, 2017).

The Fama (1991) paper contained an update and review of research papers over 20 years on the EMH since it was first formally presented. In it, there's a recognition of the inherent ambiguous points in the EMH but the readers were left to choose whether to accept the theory as a meaningful simplification of reality or not. This review was later followed up in Kothari (2001) where a capital market's and financial statements relationship empirical analysis was presented and identified useful insights (He et al., 2017). His paper divided the literature into five broad categories: a) capital markets methodological inquiry, b) evaluating the accounting performance metrics options, c) valuation and fundamental analysis inquiry, d) market efficiency empirical tests, and e) value relevance financial disclosures in accordance with the various principles and adopted regulations around the accounting for transactions and bookkeeping as well as the economic effects of evolving standards of accounting adoption. This categorization assisted in the location of the topic of this research in the literature, which is c) and d). On this basis, the semi-strong- form of market inefficiency was hypothesized implying that some of the information in financial statements may not be incorporated in securities prices being observed and that the pricing process does not immediately anticipate imminent information (Ho, et al., 2022; Mohanram and Vyas, 2018).

The Gu (2018) and Kothari (2001) classification provided a good starting point but there's an overlap in c) and e) since, in the first place, studies test alongside the evidence disputing the EMH, the viability of trading approaches emanating from the anomaly and then, testing trading approaches on the anomalies basis are a logical result of identifying the anomalies, in the first place. Consequently, three more categories of the literature are possible: i) confirming the already discovered and uncovering of the new stock-market anomalies. Examples here include studies that look at short-term momentum and new information underreaction. The random walk hypothesis says that stock prices are devoid of memory hence no serial correlation. However, studies have found the opposite where stock prices moved in one direction numerous times leading to the random walk hypothesis not being accepted (Fama and French, 2017; MacKinlay, 1997). The same conclusions were documented in Jegadeesh and Titman (1993) where it was observed that past losers outperformed past victors over a subsequent three to twelve months' time-period (Kumsta, 2015). The inference here is that these results militated against the EMH since information seemed not to sieve through to security prices instantaneously (Fabozzi et al., 2012). The work of Jegadeesh and Titman (1993) was based on the longrun scenario findings where security market returns tended to exhibit mean reversion. There's negative serial correlation among former winner stocks and become losers in the following one to three years period (Fama, 1991; Fama and French, 1988). Later studies showed anomalies from sales growth to momentum and trading volume effects to industry-factor effects (for instance, Gao et al., 2018; Lochstoer, and Tetlock, 2017; Lee et al., 1999; Lakonishok et al., 1994).

Another overlap arises from research's focus on the practical application of the strategies of stock market dealings out of the market anomalies where the term application has a few

additional considerations that include the analysis of the related costs and payoffs, how reliable and adjustable it is to apply a given trading strategy (Naknok; 2022; Siddiquee, 2017; Lochstoer, and Tetlock, 2017; Jagadeesh et al., 2004). This research laid focus on fundamental analysis to try and forecast stock market returns as related to the fundamental variables and the accounting information-based ratios derived from the financial statements.

Yet another overlap in the Kothari (2001) classification arises from the reality that research concerns itself with the possible causes of market aberrations and attempts to answer the question about the reasons for the existence and persistence of these anomalies. This strand of literature was delved in the next part of the literature review and focussed on the mind of the investor and the resultant impact on financial markets (Lochstoer, and Tetlock, 2017; Kothari, 2010). In effect, it is an alternative to the EMH views as it zeros in on getting an understanding of the decision making process leading to the aggregate market outcome as opposed to focussing on the outcome of the aggregate market (Kumsta, 2015; Kothari, 2005).

Concerning the additional literature subcategorization, this dissertation contributed to the point of implementability/applicability mentioned above. The possible general conclusion is that the literature has not been able to dispel fully the doubts on the market efficiency validity and it is an interesting possible conclusion given the litany of evidence disfavouring the EMH as compiled by the formulator of the hypothesis. Fama (2006) documented evidence of inconsistencies over a timeframe covering from 1963 to 2004 in a CAPM asset pricing model. His key findings here were, among others, betas that exceeded expectations for growth stocks vis-à-vis value stocks thus an indication of the exact opposite of what is to be expected in a CAPM risk-reward relationship.

Fama et al. (2012) later study found a value premium presence that was negatively correlated with size across four economic regions. Curiously, the two papers of Fama et al. (2006) and Fama et al. (2012) did not make mention of the results' implications for market efficiency. Dempsey (2013a) stated his bewilderment on the fact the CAPM inefficiencies were documented with great details yet those of the EMH were totally ignored. There CAPM was looked at as a neat way of portraying the EMH through its linkage of risk to the yield to be realised in the future. This then was effectively a modelling of the process of investing under the constraint of investor rationality. But Fama et al. (1992) argued that beta, as used to size the risk involved, did not adequately explain cross-sectional expected returns variations. The consequential question was then the logical motivation for their retention of β in the three-factor model next to the market capitalisation (size) and B/M ratios. The review of the results in favour of the EMH in the other sections of the thesis demonstrated the reasoning behind the academic debate and the state it is in at present.

The attractions of the efficient market hypothesis

Tough criticisms have been put forward against the EMH since its appearance and some of the criticism has been without merit (Fama and French, 2020). A fraction of its ardent followers including its first proponent, Fama (1970), appear to have walked back from its original form, but it remains a cogent starting point for describing financial markets' behaviour. It should be recalled that the EMH was intended for equilibrium markets description and thus describes markets in an ideal situation (Fama and French, 2017). This then implies that some of the discovered and published aberrations should be expected in unideal states, that is, disequilibrium market states and therefore be considered ordinary outcomes of reality. As Graham (2005) described them, the short run scenario of markets can be equated to a mechanism of voting which in the long run

eventually turn into a weighting mechanism. This Graham analogy indicates the express acceptance of short-term market inconsistencies during the price discovery and setting processes.

The EMH adherents received a boost from Graham in Malkiel (2003) where Graham was quoted effectively stating that his belief in complex and detailed security analysis techniques in an effort to discover value premiums had waned and that the costs involved were prohibitive without the guarantee of superior returns, summing it all by expressly stating that he was then in favour of the efficient markets' thesis. The interesting bit is to be seen when one compares the practicing investor statements against the theoretical findings, where the story is contrastingly the opposite. For instance, Fama and French (2006) demonstrated the CAPM's ability in providing explanations of value premiums over a time frame covering 1926-1963 but it couldn't do the same for the periods after this.

Malkiel (2011) provided a possible explanation of this contradictory loop where it was explained that anomalies arise possibly because fundamental valuation measures perform well in proxying risk than beta. Fama and French (1993) provided direct evidence for this in the three-factor model on the basis of their previous market anomalies findings. It had also earlier on been pointed out in Malkiel (2003) that these observed patterns were not all robust but were dependent on the research sample period, illustrating this from the period beginning early 1960s-1990 which was considered unique in abnormal returns generation. These patterns would already have been taken advantage of had they been present in the past anyhow and therefore no longer in existence. Interestingly this seemingly true theoretical picture was not in congruence with results of practicing real-world investors. One successful argument is that trading strategies available to the

public face diminishing returns. This however does not have the automatic implication of efficient markets such that one is unable to generate the abnormal returns with the secretly held trading strategies (Hou et al., 2018).

An ever present and famous example given in the literature is the 1990s founded firm; Long- Term Capital Management (LTCM) that was producing near 50% net of fee returns and hence indicating the existence of abnormal returns, but eventually LTCM's returns diminished as its trading strategies were laid bare to outside investors leading to crowded trading opportunities (Kumsta 2015). The example supports the first statement in Malkiel (2003) and brings to question the second, that is, the non-existence of market anomalies. Malkiel (2003) also made a reference to the professional fund managers' apparent poor performance, considering it a clear proof of market efficiency. However, it is noteworthy that systemic risk to the level of creating global markets turmoil when it implodes cannot arise from a single firm, no matter its big size. It is perplexing that the finance literature has hitherto not given attention to such implications and thus risking scenarios of regulation that is market equilibrium focused (Hou et al., 2015).

The anti-value premium presence motivations are rather seemingly straight forward from the high return-high risk relationship. To achieve higher expected returns, a higher risk exposure must be accepted and taken (Patari and Leivo, 2017; Dimson et al., 2016). Since value stocks have been assumed to contain a relatively higher risk, the resultant premium is not regarded as a peculiar one (or alpha) but rather a risk compensation for the risk taken on in investing in an asset that is under distress, implying that higher systematic risk is the equivalent of higher returns (Griffin, and Mahajan, 2019; Barillas and Shanken, 2017). But one must ask the reason for the higher systematic

risk-higher unsystematic risk or a firm distress association then it is possible to diversify this type of risk (Griffin, and Mahajan, 2019; Toit, 2012). An insight was provided in Kumsta (2015) to aid in clearing this inconsistency arguing that value firms have common characteristics which render them weak when faced with economic cycles such as recessions and that growth firms possess robustness in them able to face such macroeconomic shocks and hence investor preferred with a lower return trade-off. The preceding logic is yet to be documented in empirical support (Griffin, and Mahajan, 2019; Dew-Becker et al, 2017).

It has been argued in the literature that the EMH invalidating evidence can simply be ignored based on the argument that such evidence results from data mining (Annott eat al, 2016c; Kothari, 2005). Kothari (2005) empirical literature review of data sets used to disprove the EMH and prove market anomalies such as value premiums and found possibilities of getting the impressions of the predictability of stock market returns because of the no-random deletions of data. When the data set truncation errors were accounted for, their research found possible results biases of up to 50% (Patari and Leivo, 2017). Malkiel (2003) shifted the blame to academic journals editors because of their tendency to prefer new results publishing to either confirmatory research results or those that are negative. These arguments have been found extremely soothing to the EMH proponents (Langa, 2016). Subrahmanyam (2010) reviewed the determinants of cross-sectional returns, arguing to be in favour of neither the EMH nor the CAPM, and disavowed the practice of continuously introducing variables to a predictive model so as to make sense of data, reasoning that such data mining procedures undermine model robustness and thus reducing the degree of reliability that can be placed on such models. This was apparently a direct rebuke of the

Fama factor models and Black (1993) viewed the three-factor model as a data mining outcome (Kumsta, 2015; Toit, 2012).

While the criticism of the publishing preference in any new area of finance should be viewed with caution and an intellectual critical mind, it isn't outrightly and wholly unwarranted. Looking at some research findings published in abstracts in leading journals behoves the question of whether this phenomenon enhances the policy makers as well as the finance discipline (Siddiquee, 2017). For instance, Kothari et al. (2010) uncovered a sunshine and stock returns correlation that was significant from tests of 26 cities. Even with their provided intuition that sunshine had the effect of investor mood uplifting, such results elicit serious questions. In the first instance, when a simple Ordinary Least Squares (OLS) estimation was applied, significant correlations were established in only four cities and on markets of mostly local importance (Kothari et al., 2005). A logit model application found a significant correlation in only one international geographical market, New York. The second question arose from the fact that some cities were left out in their study though such cities had significant importance in world stock markets and thus the purported correlation might not exist since market players from different time zones do not react to weather patterns despite the location (Craig, 2016). This appears to have found support in the result that local markets respond to sunshine levels (Kothari et al, 1997). Yes, weather might indirectly affect investor risk appetite and hence call market efficiency arguments into question as presented in Bassi et al. (2013), but it is the academic exercise itself that might provide the value add. Regulators and/or policy makers are unlikely to get any new insights of importance or relevance from such outcomes since weather is uncontrollable (Kumsta, 2015).

Malkiel's (2003) review presented an interesting conversation between two people, one of them being an economist working as a fund manager. The economist fund manager lamented that his investment of both his own money and clients' money failed to come across any market inefficiency after his pursuit of exploitable market anomalies as presented by academics using all possible ways he could conceive (Barroso et al., 2018). From the earlier presentation under this section, the EMH is not without empirical support as there is evidence arising from the cases of the general market underperformance by many fund managers (Santa-Clara, 2015). One reason for this could be possibly the failure of a proper monetary incentive scheme in the fund management sector and would be complementary to the Friedman (1990) indictment on the reckless spending of money by individuals depending on the source of the money and objectives for investing. This recklessness was observed to increase as other people's money spending was involved (Aremu et al., 2019). For active fund managers, a fee pay is received notwithstanding their performance, as a manager's fee and hence incentivises recklessness since other people's money is used not only on outside investments but on the money managers themselves (Annott et al., 2016a).

There's still no convergence in the literature on what accounts for the outperformance trend with debate torn between market efficiency and market inefficiency. Those who favour the market efficiency concept say the outperformance is due to value and small-cap stocks carrying excess risk resulting from their higher cost of capital and higher business risk (Avery et al., 2016). The market inefficiency enthusiasts claim outperformance emanates from incorrect pricing of value firms thereby producing excess longrun returns as value adjustments happen. For investors, the Fama et al. (1993) pointed out that they are better off holding out during short term volatility periods where underperformance of stocks is a common feature. Longterm Horizon investors reap the rewards when short term capital losses are reversed (Fama et al., 2015; Fama et al., 1998).

Asymmetric information theory, efficient markets, and value investing

This section begins with an examination of the asymmetric information theory fronted in the economics discipline's literature followed with a discussion on the market behaviour implications of the theory. The term asymmetric information theory often refers to the multidisciplinary research literature originating in the Akerlof-Spence-Stiglitz writings. The strand of literature that looks at the set of problems that emanate from asymmetric information theory (AIT) often used the term imperfect information (Auronen, 2003). However, in this dissertation, the two phrases are used interchangeably.

The formal theory of asymmetric information was originally put forth by Akerlof (1970, Spence (1973) and Stiglitz (1976). Akerlof's (1970) paper commonly known as the market for lemons introduced the AIT concept where the theory was illustrated by making reference to the motor-vehicle market. In this market, a buyer relied on some metric to gauge the value of any category or class of a good such that the buyer mentally visualizes/assesses the market average as opposed to the seller who is naturally in possession of more specific and detailed information on each good she is selling. This difference in the information held by the buyer vis-à-vis the seller creates an asymmetry of information and incentivises the seller to offer for sell goods whose quality is below the market average. The average market quality continuously falls as the market size shrinks. This information asymmetry causes variations in social and private returns that are mitigatable through market institutional responses such as brand names, agency contracts and experience, among others. The Akerlof model consisted of a market of cars (two new and two old/used) but with possibilities of both being of either good or bad quality (where the bad quality

ones are termed as ‘lemons’). In the purchase of cars, the probability of buying a ‘non-lemon’ is given the value q while that of ending up with a ‘lemon’ becomes 1-q and is true for both the good quality ones and the poor-quality ones. It is then the experience of owning and using the car that the buyer gets more information on the car’s quality and is then able to revise the probability of the good vs poor car events. The new probability is considered to be more accurate as compared to the initial q and thus, there has developed an owner-buyer information asymmetry, but the cars’ prices are unchanged given that potential buyers still do not have the information to tell the difference. Arkelof’s (1970) second argument was that new cars must sell higher than old ones otherwise ‘lemons’ would sell at new cars prices and a new car could be bought with the lower probability of it turning out to be a ‘lemon’. An old good car owner is tied to this position and her car’s true value cannot be obtained from the market given her car’s better than market average quality. This owner is alos unable to exchange her old good car for a new one since she would not be able to get the price of a new car for the old. Hence, the conclusion that a majority of cars traded in the market are ‘lemons’. In this scenario, the adverse selection phenomen arises as ‘lemons’ (bad qulity cars) begin to dominate the market. Using a utility theoretic model, Aekelof (1970) then laid out a framework for calculating the market-size for motor-vehicles under conditions of asymmetric information with outcome being that, in the end, no goods are traded at any price. A modification to reflect information symmetry resulted in transactions occurring and utility gains by all parties compared to the information asymmetry case.

The ideas in Arkelof (1970) were furthered by Spence (1973) in the paper on job market signalling where two market classes were assumed. One market class has few participants and thus able to establish reputation of being signallers and the second market that contains many players

that keep changing very frequently. His analysis focused on the second class where there was need to interpret signals with no benefit of prior knowledge about the individual signaller. The job market formed Spence's (1973) centre of analysis. Here, employee hiring was considered to be akin to an investment decision under uncertainty conditions. The potential employees' productivity and job performance capacity is only partially known to the employer both prior to and just after hiring and these capabilities will only be demonstrated sometime after the employee was settled in her job. Spence thus compared this hiring decision as an investment decision to a lottery. As such, an employer assigns some probabilities of winning in the lottery and also losing. The win chances are driven by observed skills and competences based on previous experience and the signals transmitted by the potential employee as well as her indices. The applicant's indices constitute such unchangeable characteristics such as sex or race while signals are the manipulatable (influenceable) attributes such as education. The applicants' resume' can then be used to assign conditional probabilities to productivity levels given a signals and indices set. These assigned probabilities are then be adjusted post-hiring when performance is observable (Häfner, 2021).

In this model, potential employees have to deal with offered wage schedules on the basis of their signals and indices. Since indices are unchangeable, the model is that of wage-optimising reduced by the inherent signalling costs and productive capacity and hence, in a job market, obtaining a qualification such as a degree certificate should be easier for better productive candidates.

With the above, Spence's model then derived a feedback mechanism in the job market, iteratively. It starts from job seekers making decisions on their signalling with a desire to maximise

net wages and the employer hiring, observing, and adjusting the job production probabilities. The employer then avails a revised set of offered wages determined by signals and indices, and the interaction repeats itself. A confirmation of employers' probabilistic beliefs through the signalling resulting from the offered wage schedule produces a signalling equilibrium. This is a stable state with sellers (employers) differentiating themselves in the market via signalling and thus lowers the buyer-seller information asymmetry. Therefore, whereas in the asymmetric information framework with no signalling, the size of the market shrunk to zero, signalling leads to equilibrium generation with a positively sized market.

The Stigltz's (1975) screening theory explored whether Spence (1973) model of employees in a job market selecting those signals they wished to transmit to choose appropriate wage schedules could be applicable in the employers' (sellers) model for screening job applicants into productivity potential categories. He noted the existence of peculiar differences in goods, individuals, brands etc and hence defined screening as the processes of identifying these peculiar qualities. The end result of the Stiglitz's screening model was that lower productivity individuals pulled down the higher productivity individuals' income while the higher productivity individuals in a firm likely lead to a rise in the lower productivity individuals' incomes and thus screening, in essence, with the costs involved served to redistribute the income in the group and thus had a negative social return. The private return however was positive to the high productivity individual that was screened. Stiglitz (1975) however still argued for screening as it served to match individuals to suitable jobs. Information asymmetry can thus be levelled between market participants through screening and thus screening was akin to signalling.

The above pioneering works were then extended by Rotschild and Stiglitz (1976) in essays on equilibrium studies in competitive insurance markets where imperfect information effects in insurance contracts were explored while introducing externalities. The next section discusses the interplay of information asymmetry, efficient markets and value investing as observed in stock prices /returns momentum.

As a recap, value investing is founded on the Graham and Dodd (1934) writing whose basic proposition was that of buying into undervalued securities that were selling at significantly below their intrinsic values. A security's intrinsic value is determined from a firm's financial statements' key variables of earnings, dividends, and asset quality. Some of the early security analysis studies such as Ou and Penman (1989), aligned with the Graham and Dodd (1934) view where firms' values were said to be gleaned from financial statements. However, it was noted that there were times when stock prices deviated from these values and very gradually reverted to the fundamental values. In this regard, analysing published financial statements could aid in the discovery of values not contained in the stocks' market prices. Thus, instead of using market prices as estimates of stock values, intrinsic values derived from financial data served as the measurement criteria to compare with market prices to identify under and/or over-priced stocks. Since market prices eventually revert to the fundamentals, investment strategies yielding abnormal returns are discoverable through comparisons of prices to these fundamentals-based values (Siddiquee, 2017; Kumsta, 2015; Ou and Penman, 1989).

Hou, Mo, Xue, and Zhang (2018, p. 2) provided an insight to the effect that an equilibrium framework such as the *"investment CAPM, provides an economic foundation for Graham and*

Dodd's (1934) Security Analysis, without mispricing". In their analysis, under such an equilibrium model, variations in expected cross-section stock returns would be driven by the changes and interactions of firms' investments, future profits and expected growth in investment. This theoretical prediction then is an affirmation of the prevalent habit in analysing investment securities without violating the efficient markets hypothesis (Hou et al., 2018). In empirical tests, a lot of variables of anomalies influence future movements in investment-to-assets in the same manner they influence future returns, but yet to be observed cross-sectional variabilities in investments are inconsistent and the influence of investment growth on portfolio choices is not very established (Hou et al., 2018). For Hou et al. (2018), it was conceivable under an investment CAPM equilibrium framework for value investing based on the assumptions of market efficiency to deviate from the expected mispricing theorized in Graham and Dodd (1934) under an investment CAPM equilibrium framework and Romer (2019) points this link to the equity premium puzzle in a consumption CAPM framework.

In the anomalies literature, where the efficient markets hypothesis holds, the value investing approach would not produce better performance than any other approach, for example in Hou et al. (2017), Rossi (2015) and Hou et al. (2015). More specifically, the price multiples of price-to-earnings (P/E) and price-to-book (P/B) ratios would not determine stocks having the likelihood of performing better or worse than others since the efficient markets theorem expects prices to incorporate all of the stock's fundamental information thereby eliminating all arbitrage opportunities. This study would, therefore, not find any significant risk adjusted returns between low P/E and P/B ratios portfolios against high P/E and P/B ratios portfolios or any other screening variables of value and growth stocks. The presence of asymmetric information implies that a

market will hardly be efficient and some of the studies on the interplay of the EMH, Stock markets and asymmetric information evidence are discussed next.

Lai and Lou (2020) examined the mechanisms of information asymmetry's impact on the stock market followed by an investigation of the information asymmetry-price momentum relationship. Information asymmetry in a stock market context means that a portion of the market participants, more so firm managers, possess more or better information about a stock/firm than others (mostly the stock investors and/or their agents). The result of such an asymmetry is what is commonly referred to as informed trading, and hence impacts the resultant stock-price effects. This Lai and Lin (2020) exploration of the information vs. stock momentum linkages with a winner-loser model found likely positive correlations between winners with embellished earnings per share forecasts and anomalous profits in subsequent stock holding periods. On the other hand, low-middle information asymmetry winners tended to maintain their good returns over future stock-holding tenures. Also, the middle information asymmetry loser had the highest abnormal profits, which they termed 'white lie effects'.

In the Jegadesh and Titman (1993) lay-out of the idea of price momentum, it was found to exist a profitable strategy that acquiring a performing winner stock and exiting a poor performing loser at the same time (within the same year) generated significant positive returns over a period of between three and twelve months of holding a stock (i.e., a growth investment strategy)/ The literature differentiates between two types of stock momentum (Lai and Lin, 2020) that encompass; relative stock momentum (in relations to other stocks) and that relating to form-specific momentum (abnormal returns). The relative-return momentum displays strong reversals

in the long term while abnormal returns momentum (firm-specific) shows persistence over many years (Liu and Wang, 2016). The explanation here is that institutions don't give attention to firm-specific abnormal returns and usually experience underreaction. The more important factor that underlies momentum profits has been suggested to be information asymmetry (Lai and Lin, 2020) which drives the different outcomes since specific abnormal returns may be due to firm internal information, which is rarely available in the market compared to that of firm relative return (Huynh et al., 2020).

Examinations of residual momentum and total return momentum have suggested that underreactions from investors are seen more openly in regard to firm specific events as opposed to market-wide events. The reason given here is that firm-specific events are known in advance by certain people with relations with the firm, but the information disseminates at a slow pace (i.e, in a gradual manner). As was argued in Krachers and Johna (1997), firm managers employ certain special programs like stock-repurchases as a means of signalling. However, the practice could lose its effect or become tantamount to falsehoods (Huang et al., 2022).

A frog-in-the pan hypothesis proposed by Da et al.(2014) found strong and enduring momentum driven by continuous information flow with no longterm reversal of the return continuation. Luo et al. (2019) argue for both momentum and reversals being driven by scepticism, as investos doubtfully evaluate the quality of other people's signals and assume that little learning about the information ever takes place in the minds of those that are early informed. Hence, underreaction and short-term momentum is the inevitable outcome. There and then, any reaction

to information that is now stale by sceptical investors results in momentum but with reversals subsequently following (Kinyua, 2022).

Cujean and Andrei (2016) envisaged stock momentums in instances of high-rate information flows and that word-of-mouth method of information dissemination enabled the condition thus the creation of short-term momentum followed by longterm reversal. In this sense, word-of-mouth communication aids in spreading rumours and produces price persistence and subsequent reversals. Other studies examined information diffusion vs. stock momentum relationships, focusing on information transmission frequency and process regarding stock momentum (for instance, Chen and Lu, 2017; Czaje et al., 2013).

Regarding how information asymmetry impacts momentum, Zhang (2006) showed that high information uncertainty stocks depicted bigger conspicuous stock momentum. The study showed proof of higher information uncertainty being responsible for the relatively higher expected returns immediately after reports of good news and, conversely, relatively lower expected returns immediately after negative reports (bad news) (Kelly et al., 2012). Chen and Zhou (2012) discussed informed trading to lay emphasis on the information asymmetry's role on stock momentum, showing the higher strengths of informed trading's effect compared to that of information uncertainty. Information asymmetry causes investors to inadequately react to stock market information at the onset and later turn out to be overreacting (Wardlaw, 2020; Hong and Stein, 1999; Daniel et al., 1998). However, it is documented that both private and public's response to information by stock returns generates both short-term anomalies and longterm momentum. Hence bringing to the fore the fact that the price momentum determinants include information

asymmetry and investors' reaction behaviour. Huang et al.(2022) found and explained fund managers control a big portion of trading volumes in a stock market and they make decisions on the assets to offer for sale, but arbitrageurs find it difficult to distinguish price pressures momentums from fundamental information due to the presence of information asymmetry.

More recently, Kelikume et al. (2020) studied the weak form of market efficiency on African stock markets, applying a wavelet unit-root analysis and found that institutional constraints affect the EMH, and thus African stock markets activities were carried out in the context of market inefficiencies. Their conclusion was that stock prices are relevant in the prediction of future stock returns in Africa and thus negating the EMH prepositions. It was argued in their study that, defying the EMH assumptions, African stock markets are bullish and have created strong interest from private investors and their integration into world markets continues to increase. The number of active stock exchanges in are now in excess of 30, all at different levels of advancement in terms of market size, listing firm numbers, volumes traded, information and capital access as well as standardisation (Ehiedu and Obi, 2022). Added to these disparities, the presence of information asymmetry, the agent-principal challenges, regulatory frameworks issues and weak financial sector development impact on the EMHs relevance and investing in African stock markets (Ehiedu and Obi, 2022). With the Kenyan stock market still developing in an imperfect information interplay, investors, regulators and other market players need to have a clear understanding of how efficient or inefficient the NSE is so as to mitigate potential crashes (Kinyua, 2022). Active investors would also be able to understand whether value investing works in this market given the market information imperfection (Kinyua, 2022). Hewamana et al. (2022) found that Asian capital markets were rampant with the problem of asymmetric information making uninformed investors'

decisions sentiment driven hence price volatilities that were irrational. Bouattour and Martinez (2019) used laboratory experiments to investigate market efficiency and demonstrated that the market efficiency level is affected by both uncertainty and information asymmetry though information asymmetry had the most significant effect. They found market efficiency to be reduced in environments with fundamental value of stocks volatility. They also found underreactions to information that go on uncorrected throughout the trading periods with prices remaining stable.

The preceding presentation constituted an overview of the origins of and the journey of modern finance, summarising the key issues in the current literature on the efficient markets debate. The introduction section mentioned Fama's (2013) lecture that there is a twin hypothesis challenge in each attempt of evaluating the efficient markets hypothesis in that it always requires an equilibrium asset pricing model. The Investment CAPM model in Hou et al. (2018) makes an important link between value investing and the efficient markets hypothesis where fundamentals analysis is applied in security selection. The investment CAPM is a neat conceptual framework for value investing since it leads to the focus on the factors influencing the returns to be expected and these include, investment size and type, revenues expected (and therefore profits), and the growth expected of the investment. The resultant above-market average returns from the fundamentals-based investment approaches mostly come from the extreme deciles or quintiles, respectively. It would therefore make sense to expect the correct approximate pricing of firms, in general. But from the section's discussion, there are still researchers who doubt the veracity of the market efficiency assumption as well as the ability of pricing approaches such as the CAPM and the factor models to fully incorporate the intricacies existing in financial markets.

Summary of modern portfolio models

The central paradigms that dominate the finance field, as seen from the preceding sections are portfolio allocation premised on risk- return trade-offs, asset pricing models on the basis of risk, contingent claims pricing, and the efficiency of information flow in markets such that arbitrage is eliminated as espoused in the EMH (Hens and Rieger, 2016; Kumsta, 2015; Gray and Carlisle, 2013; Shefrin, 2005; Shiller, 2003; Sendhil and Thaler, 2000). In all these models, the embedded economic ideas are derived from the concept of investor rationality and the inherent mathematical plausibility has brought rigor to the discipline (Kumsta, 2015; Black 2012; Subrahmanyam, 2007).

However, these models have left a number of outstanding matters such as the limited role for volume in traditional models. The diversification benefits emphasis leaves out the fact that retail investors more often than not hold only a few stocks in their portfolios and across industry and firm differences in returns anticipated are explained beyond the assumed role of risk differentials across stocks (Choi and Robertson, 2020). The new school of thought of behavioural finance has sought to bridge this gap and is discussed next.

Behavioural finance theory

The central theories in the investment finance field, some of which were discussed above, have comprised; i) creating baskets of investment portfolios in consideration of the associated returns and the relative risk; ii) asset valuation risk weighted models including factor models; iii) the efficient markets hypothesis, all anchored in the economics discipline's assumption of investor

rationality (Linnnainmaa et al., 2018; Bachmann et al., 2018; Hens and Rieger, 2016). These, however, fail to clarify the following issues i) the motivation for individual investors for trading as shown in Choi and Robertson (2020) ii) the investor performance iii) the methods of selecting portfolios, and iv) the reasons for stock-returns differences apart from the risk-based explanations (Nareswari, et al., 2021). Accordingly, active investing is helped where an understanding is provided as to the issues of; mistakes to be avoided in the investing process and the investment strategies likely to succeed in the financial markets as observed in cases of above normal returns. These form the main objectives of behavioural finance that provides explanations of financial markets outcomes outside of the rational consumer behaviour theory expectations literature (Nareswari, et al., 2021; Choi and Robertson, 2020; Samson, 2017).

As stated before, the important explanations needed in active investing include answering the questions of the mistakes to be avoided when making investment decisions and the financial markets strategies that are likely to produce supernormal returns as deciphered from the works of Atmaningrum, et al. (2021), Mukail et al. (2019) and Oladeji et al. (2018). These issues form the main goals of behavioural finance pedagogically speaking. Behavioural Finance (BF) attempts to give alternative explanations of the financial assets markets' operations and the causes of anomalies in the markets faced with EMH limitations as presented in the literature, for instance, Nareswari et al. (2021), Bachmann et al. (2018), and Fiberck et al. (2017). This loosens the rational expectations assumptions about investor choices thus accepting the limits to arbitrage and being cognizant of the effects of cognitive psychology in investor actions (Nareswari, et al., 2021; Ogunlusi and Obademi, 2021; Fiberck et al., 2017).

Arbitrage here implies that rational investors' actions cause stock prices to revert to their efficient levels with no capital and risk, hence, at an aggregate level, irrational acts are offset by the rational acts, theoretically speaking (Ogunlusi and Obademi, 2021; Samson, 2017; Santi and Zwinkels, 2017). The reality is that both capital and risk exist always, and investors keep off volatile situations when they observe their risk to be increasing. This creates a limitation for efficient asset pricing, a scenario unanticipated in the EMH (Nareswari, et al., 2021; Hou et al., 2018). Irrational investor operations result from a varied number of cognitive biases leading to distortions in the price evolution (Schredelseker, 2022; Metawa et al., 2019). Behavioural finance thus suggests that the prevalent literature has overlooked the key implication of efficient markets that expects security prices to be correct (Metawa et al., 2019; Waistell, 2016; Kumsta, 2015). This implication of the correctness of security prices is preeminent because of the reliance on prices for market economies' inefficient resource allocation. The behavioural school then argues that it is still difficult to exploit security prices even when they are wrong and hence failing to discover obvious successful trades is hardly a proof of market efficiency (Metawa et al., 2019; Fiberck et al., 2017; Lo, 2005; Shiller, 2003).

Behavioural finance does not start with the assumption of rational investor behaviour as assumed in the traditional models but assumes irrationality, a priori. Behavioural finance then plays the role of allowing for explanations of financial events based on investor behaviour that does not seem rational (Ogunlusi and Obademi, 2021; Anthony and Joseph, 2017; Miller, 2015). In corporate finance, BF links behavioural characteristics of management, for instance, confidence levels, and decision making (Metawa et al., 2019; Sarlak and Taleyi, 2017; Porter and Trifts, 2014). The premise of behavioural finance is that the behaviour of real people in decision making makes

a difference. As studies have shown, human decision making is inconsistent with the assumptions found in the efficient market hypothesis and therefore indicating that there might be opportunities for obtaining above market returns (Kahneman, 2015: Beneish et al., 2013; Black, 2012; Shefrin, 2001). Behavioural finance theory therefore suggests the presence of other reasons for holding investment assets (Yuan and Zhan, 2022; Balakrishnan et al., 2015; Black, 2012; Avgouleas, 2009). The observed price of an investment security is therefore just one among many variables that explain the investment decision of the investor. In Yuan and Zhan (2022) and Shefrin (2005), it was explained that behavioural finance then plays the role of allowing for explanations of financial events based on investor behaviour that does not seem rational.

The next section highlights the major findings in experimental research anchoring the behavioural finance theory. It is recalled that behavioural finance is founded on the irrational behaviour perspectives as established in the psychology discipline and applied to the field of economics and finance (Schredelseker, 2022). Behavioural finance provides an alternative to analysing and understanding financial markets away from the efficient markets hypothesis propositions, ideas expounded rigorously in Tversky and Kahneman (1991).

The building blocks: rational models' alternatives and cognitive biases producing the prospect theory

Decision Theory: Preamble

Samuelson and Zeckhauser (1988) asked a direct question of how individuals make decisions while justifying their question by linking it to its importance to research in the disciplines of economics, humanities, law, and other social sciences (Atmaningrum, et al., 2021). Decision-

making theories fall into two categories of normative (prospective) and positive (descriptive) aspects of decision theory. The normative category describes how decisions should be made while the positive category deals with how decisions are made in the real world (Fiberck et al., 2017). Human beings as the study subjects are required to be rational under the normative school. Being rational means that the ideal person making decisions has full information and can accurately estimate payoffs. This is a debatable expectation since human behaviour is not always consistent with established axioms of rationality and hence deviate from economic optimality expectations (Atmaningrum, et al., 2021). There's a close relationship between the two categories since optimal decision making in the normative almost always produces hypotheses that are tested against observed behaviour. The pioneering decision-making theories mostly fall in the normative group and have a few shortcomings, for example McDermott (2001) review of Tverksy and Kahneman (1974) suggested the complete abandonment of the normative theories when looking at judgement and decision-making because of their inadequate explanations of observed behaviour. This has resulted in the generation of many alternative theories in an attempt to address the identified limitations of the older theories. For instance, two alternative categorizations were provided in Slovic, Lichtenstein and Fischhoff (1988), these are i) the riskless choice theory (i.e., making decisions under uncertain conditions), and ii) the theory of risky choice (i.e., deciding under uncertain conditions) noting the origins in the Jeremy Bentham and James Stuart Mill utility maximization treatises. The next sections discuss in detail the contextual underpinnings of the decision-making theories, beginning with the expected value culminating into the Prospect theory.

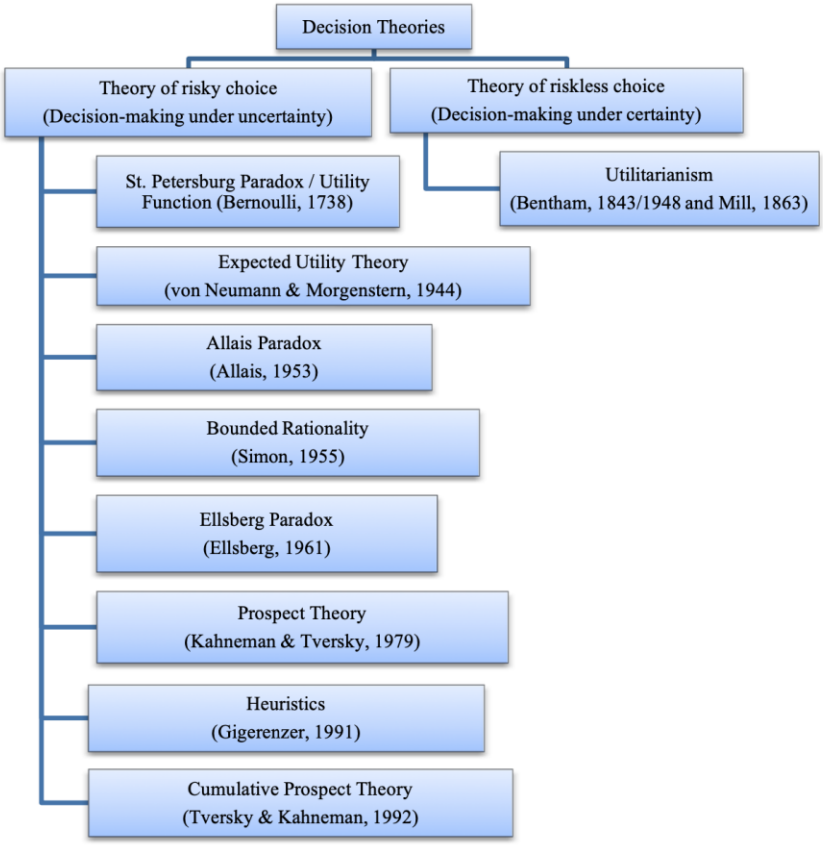
Decision Theory: The history

A historical chronology of the decision-making theories was neatly provided in Buchanan and O'Connell (2006) and goes as far back as the 6th century BC where they discussed the

Confucius statement that considerations such as benevolence, ritual, reciprocity, and filial piety ought to be the Centrepoint of decision-making. Their writing found the origin of the term 'decision-making' to Chester Barnard (see Siddiquee, 2017). They found the terminology in Barnard's (1938) '*The Functions of the Executive'* as an importation from the public administration's lexicon into the world of business. Siddiquee (2017) analysis surmises that March (1958), Simon (1955), and Henry Mintzberg (1994) were responsible for the advancement of the theory of decision-making in management environments. In a talk, Gigerenzer (2011) claimed to have traced decision-making theories history to the 1600s from Descartes and Pointcarre who had produced the premiere decision-making 'calculus' (Filz et al., 2019; Siddiquee, 2017). Gigerenzer (2011) held onto the view that the modern decision-making theories flourish because of Herbert Simon's pioneering works and the heuristics' use.

Edwards (1954) was among the first authors to comprehensively review the decision-making research of social scientists (mainly economists, statisticians, and philosophers) over the period 1954 to 1960 (Filz et al., 2019; Siddiquee, 2017). His review has since been followed by a numerous number of psychologists. The figure below, displays the hierarchical context of decision-making theories.

Figure 2.1: Decision Theory: A Chronology



Source: Siddiquee (2017, p.25)

The concept of expected value

Among the early decision-making theories under risk conditions was the concept of maximizing expected value. Following the advances made in probability theory in the 1600s particularly by Jacques Bernoulli as quoted in Siddiquee (2017) and Filz et al. (2019), there arose the definition of what could be considered the best choice as that choice which leads to the maximization of the expected value (Slovic, Lichtenstein and Fischhoff, 1988), and an outcome's expected value is the product of the payoff and its probability. The drawback of this decision-making model lies in its omission of the possibility of the differences in monetary value of a payoff held for another person as compared to when it is held by the owner of the payoff and, secondarily,

expected value maximization was found to explain a decision-maker's behavioural characteristics only partially (Filz et al., 2019). The utility theory was developed to fill this gap and is described next.

Utility theory

An illustrative experiment was given in Siddiquee (2017) to develop the utility function application to decision theory. The experiment goes like this: Say, Y is offered to play a coin flipping game where a tails up landing results in a loss and ends the game, a heads-up coin landing produces a dollar win and Y continues playing. In the second round, a coin flip that results in tails up landing ends the game, but a heads-up result wins two additional dollars. This pattern goes on such that winnings are doubled for each successive heads-up outcome and the game ends abruptly as soon as a tails-up result is observed. The question is then how one would choose to play such a game! The game has an infinite expected value, and it would be theoretically expected that no price is prohibitive in playing such a game and therefore a player can pay any price to play it. The reality, however, is that there may be no player willing to part with a thousand dollars to play this game because of the utility maximization function limits as described in the next paragraph. This irony illustrates what is dubbed, The Saint Petersburg Paradox (Siddiquee, 2017; Somer, 1954).

A mathematical function was proposed as a corrective tool of the probability based expected value where the above coin flip game was used to show the expected value limitations, a normative decision theory. The proposition was then that the expected utility was what governed people's actions and not the expected value, which is a sort of a gamble, resulting in a Bernoulli Utility function that is effectively a wealth concave function where marginal increments in utility

decreased as wealth increased (Siddiquee, 2017). This function implied a risk aversion behaviour and thus people would prefer sure wins of small amounts to a chance event requiring an upfront pay-out to play for the big potential win (a risk) that is equal to the expected value. In the coin flip game above, a player would choose the certain $,1000 over a gamble that requires a $2,000 investment or nothing based on a coin flip.

Expected Utility Theory

The big gap in Bernoulli's utility function was its failure to provide any normative based motivation for the expected utility maximization in making choices. This gap was addressed later in the revealed preferences axiom of utility theory (Bernanke et al., 2016) where it was shown that constructing a utility function for a consumer is feasible provided that all the preference axioms hold. Such a utility function would show the consumer's pursuit of her highest subjective utility. The revealed preference utility made it possible for differentiated preference orderings. Still, this expected utility model had inherent limitations in that it did not clearly distinguish the normative from the descriptive aspects. The model assumed rational choice where preference for expected utility maximizing actions would always be taken. However, the observed human behaviour does not always align to rationality and was demonstrated in the Allais Paradox (Siddiquee, 2017). This paradox emanated from the Allais (1953) hypothetical game survey where subjects routinely militated against the expected utility axioms, regardless of the subjects' expertise in probability theory. Siddiquee (2017) wrote that the von Neumann and Morgenstern's expected utility theory was developed as a classical utility theory. Its purpose was not in delving into describing the real-world environment where people make choices but instead what should be expected only if people

followed the underlying rational choice axioms. The consumer preference axioms are described next following the "consistency" expectation of an economist's analysis.

The first axiom is what is referred to as completeness where it is assumed that any two bundles of choices are comparable such that given any X bundle and Y bundle and that X contains x1, x2 combinations that are greater than the Y combinations of y1, y2 or vice versa or where the Y bundles are equal to the X bundles then the consumer is indifferent to the two bundles. Second, is the axiom of reflexivity where any bundle must be at least as good as itself, that is, the bundle (x1, x2) is greater or equal to the bundle (x1, x2). Transitivity, the third axiom, says that where the bundle (x1, x2) is greater or equal to the bundle (y1, y2) and the bundle (y1, y2) is greater or equal to the bundle (z1, z2), then the bundle (x1, x2) must be equal or greater than the bundle (z1, z2). Transitivity means that if an individual thinks that the choice of X is at least as good as choice Y and choice Y is at least as good as choice Z, then the individual would think that choice X is as good as choice Z (Siddiquee, 2017; Bernanke et al., 2016; Varian, 2010).

The first axiom does not appear absurd since the meaning of comparability of two bundles is that the individual can choose from any two bundles. The conceivable extreme situations would be the life and death ones where it would be tough to rank the options given but such choices are not economic ones and therefore not worth of attention. The reflexivity axiom is a trivial one since it goes without saying that any bundle is of course as good as an exact identical bundle, save in small children where this axiom is often not always observed (Bernanke et al., 2016; Varian, 1998). It is the transitivity assumption that is prone to challenges since it is ambiguous as to why the transitivity of preferences would be a necessary property that preferences have to follow.

Transitivity is not even intuitively logical, but it is a hypothesis of individuals' behaviour and not a purely logical statement (Mankiw, 2016). However, the important point is its reasonableness in the accurate description of people's behaviour. For instance, if an individual says that she preferred the bundle X to Y and Y to Z but then says that she preferred Z to X, then such a preference matrix would constitute a peculiar behaviour. It would be interesting to observe what happens to this individual when faced with the task of making a choice among the three bundles of X, Y and Z. Whatever bundle she chooses, there would still be a more preferred one. This therefore means that developing a theory of best choices requires preferences to satisfy the transitivity axiom, otherwise there will be always a set of bundles with no best choice (Mankiw, 2016; Bernanke et al., 2016).

Expected utility and prospects modelling of choices

Despite the Prospect Theory having its roots in the limitations of Expected Utility, it was not built by directly extending the Expected utility theory, but it instead emanated from direct observation of human behaviour when making choices and in which case the rationality assumptions and expected utility were routinely violated. These violations were later referred to us cognitive biases in psychological research (Kartini and Nahda, 2021; Siddiquee, 2017).

The Kahneman and Tversky (1974) documentation of the expected behaviour of rational investors led to the proposition of the prospect theory that could model decision making under risk robustly, giving better rationale for the anomalies in the traditional models. The disposition effect is better understood through the prospect theory. The disposition effect suggests holding of auto positions that are harmful by investors even where a rational decision would be to do the opposite, for instance, investors hold onto their losing positions and dispose of winning positions hurriedly

(Kartini and Nahda, 2021; Kumsta, 2015). The application of realized gains and losses model has a reliable predictive power of this effect (Kartini and Nahda, 2021; Barberis and Xiong, 2009), although paper gains are not amenable to this model. Evidence favouring von-Neumann-Morgenstein preference theory showed a reverse disposition effect, hence investors have the ability to interrogate their past decision and divest from loss positions, when necessary, even in the presence of affective bias (Kartini and Nahda, 2021; Miller et al., 2015; Burton et al., 2013).

Prospect Theory

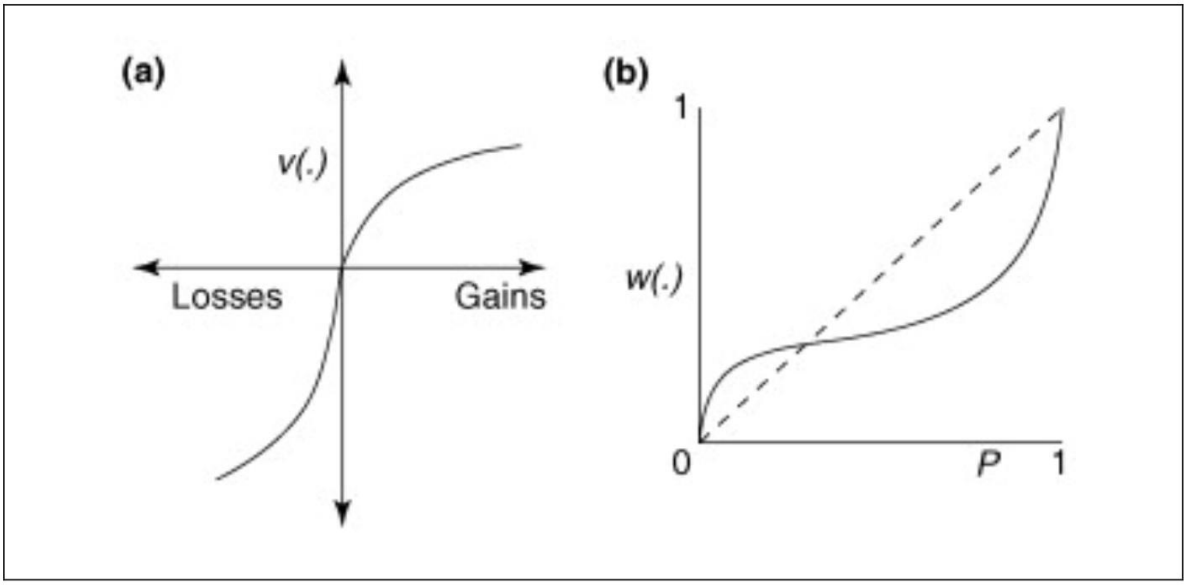
Tversky and Kahneman (1986) noted that the modern decision theory was an outcome of analysing games of chance as opposed to psychologically analysing risk and value. They further stated the theory to have been created as a normative model of an ideal environment for making decisions and not from a real-world portrayal of observed actual humans making decisions. The Prosect theory was introduced in Kahneman and Tversky (1979) as a response to the limitations of the rational human behaviour-based decision-making models and it was developed as a descriptive model that mimics real-world choice behaviour. This came out of an analysis of choices among risky prospects that showed a few anomalous effects incongruent with the fundamental assumptions of the utility theory. They later built a newer variant of the theory (the Cumulative Prospect Theory) based on cumulative decision weights (as opposed to the original Prospect theory's separable decision weights) which they extended in a few areas. The new model applied to both uncertain and risky prospects having the range of possibilities of outcomes that allow for varied weights assignment on possibilities for pay-offs.

There were later models for decision making that followed the Prospect Theory of Kahneman and Tversky (1983) and the Cumulative Prospect Theory of Tversky et al. (1992). For instance, Shefrin and Statman (2000) came up with a behavioural portfolio theory as an extension of the Prospect Theory. However, Barberis (2013) observed that no significant improvement has come out since and the Prospect Theory remained the best available theory in analysing and explaining people's risk evaluation in laboratory type experiments. Kahneman and Tversky (1982) experimental tests of Allais paradox showed consistent violations of the Expected Utility's substitution axiom, finding individuals to be prone to overestimating outcomes that were certain compared to the probable ones. Their experiments also showed that subjects exhibited risk-averseness when it came to prospects where there were gains but risk-takers in loss prospects situations.

One distinctive feature in prospect theory is its unabashed descriptive nature that does not makes any normative claims (Tversky et al., 1986). The other one is its separation of the refining and evaluating phases. At the refining phase, choices are organised and reformulated to make the evaluation and decision phases simpler (Kahneman and Tversky, 1981). The payoff matrix is formulated, and the payoffs compared to some base reference point that corresponds to the present situation of assets while still being responsive to the formulation of offered prospects as well as the decision maker's expectations. This point of reference would normally be akin to the current asset position, but it is possible for it to react to way prospects offered are formulated as well as the decision-maker's expectations (Kahneman and Tversky, 1981). The evaluation stage consists of an examination of all the edited prospects and then picking the most valuable prospect. The evaluation phase comes in two parts following each other: the value function and the weighting

function (Siddiquee, 2017) with the value function replacing the Expected Utility theory's monetary outcomes while the weighting function replaces the objective probabilities.

Figure 2.3: The Value & Weighting Functions of Prospect Theory



Source: Siddiquee (2017, p. 35)

The crucial features of the above value function encompass:

i. Its definition is in gains and value terms as a point of reference as opposed to absolute wealth or welfare terms as is done in Expected utility theory

ii. It passes through the centre of the reference point and is asymmetrical and S-shaped but can possibly tend towards linearity as gains increase

iii. It is steeper when losses are involved compared to gains circumstances

The evaluation phase's weighting function has a decision weight assigned to outcomes with no semblance to classical probability. This weighting function has two key characteristics:

i. Its operation is not consistent near the end points. The endpoints are representative of absolute certainty and impossibility at either of the extreme ends

ii. It overweights poison distribution events such as earthquakes and subjectively under weights high probability events such as road accidents (see Kahneman, 2015)

Yet, there are features common to both the Prospect and Expected Utility theory such as the assumption that the value function in Prospect theory has the same shape for all the decision subjects. It is also commonly assumed that the curve is non-linear (Bachman, 2018; McDermott, 2001).

Cumulative Prospect Theory

Tverksy and Kahneman (1992) provided an updated version of the Prosect Theory by applying weighting to the cumulative probability distribution function instead of the individual outcome's probabilities. They named this new theory the Cumulative Prospect Theory. The economics profession has maintained the joke that the Prospect Theory has hardly had any real-world effect since its emergence (Siddiquee, 2017). However, in spite of the Kahneman and Tverksy (1979) paper's limitation to financial based outcomes, it has been shown to be applicable to other attributes choices, for example public policy choices and Barberis (2013) demonstrated its potential application in macroeconomics in so far as regulatory market controls formulation is concerned.

The next section presents the cognitive biases function in decision-making. It was reiterated in Shiller (2014) that the Prosect theory describes the human behaviour that is vulnerable to the

randomness of psychological framing which consists of trivial context variations able to produce immense human reaction differences.

Cognitive biases in decision making

Kumsta (2015) and Hirshleifer et al. (2013) have documented certain biases as the causality factors of market anomalies, namely, i) information processing, ii) heuristics modelling/simplification, iii) self-deceiving, iv) emotion and control of self, v) human interactions in social settings, and vi) building alternative models to expected utility and to Bayesian updating (Haritha and Uchil, 2016; Sedaghati, 2016).

The point was made that equilibrium expectations of economics does not hold, in that, biases do not cancel out since they are innate according to the evolutionary theory (Haritha and Uchil, 2016; Sedaghati, 2016; Gregory et al., 2013; Kliger et al., 2010), implying that these biases must then be seen in stock prices. These biases come from the bounded rationality conclusions that heuristics are used by humans to simplify complex environments in order to allow for the quick decision-making needs of people. These cognitive biases are part of the biases with moods and emotional conditions adding to the potential for biases, affective biases (Haritha and Uchil, 2016; Otuteye and Siddiquee, 2016). The listed biases are now explained next.

The processing of information

This activity forms the initial stage in decision making under conditions of uncertainty. It was surmised in Tversky and Kahneman (1974) that, here, heuristics are applied to reduce complex problems to rules of thumb. While this complexity reduction by way of heuristics could be enough

for a number of situations, it is also prone to significant errors with increased task complexity. Base rate information is left out when people are faced with complex tasks and poorly make probabilistic and forecasting estimates. Superficial processing of information makes investors non-rational in the literature relating to behavioural finance. This outcome is also a result of the presence of cognitive and affective biases, simultaneously (Sedaghati, 2016; Malkiel, 2011; Lo, 2005).

The above was illustrated in Kumsta (2015) and Lowenstein (2002) where highly complex forecasting models sometimes led to tragic outcomes when human behaviour aspects were missed in these models. In the example, where the Longterm Capital Management (LTCM) collapsed, big amounts of daily trades by noise trades led to erratic movements that were not anticipated in the Longterm Capital Management firm's models. The phrase "noise trader" has been defined to broadly mean investors that either derive enjoyment from trading for that very reason-trading-or deluded in their belief that their trading is based on useful private information, even when it would make sense for them not to be trading (Sedaghati, 2016; Burton et al., 2013; Pompian, 2012).

Arbitrage thinking posits that rational investors would make quick gains from arbitrage following the theory of rational finance, but noise traders are unlikely to be dissuaded from continued market participation. As a matter of fact, such traders create their own space and side-line rational traders such that the rational traders' market dominance is eliminated making market inefficiency to persist because of the noise traders' ability to get higher returns than rational traders (Otuteye et al., 2015; Burton et al., 2013).

These noise traders make an important contribution to the financial markets, that of liquidity provision. They reduce both spikes and dips in business cycles, for in rising markets, their portfolio offloading much earlier reverse the trend. In falling markets, a too early purchase by these noise traders in their quest to get a bargain or cancelling out average losses also reverses the trend hence inducing price stability (Sedaghati, 2016; Tversky and Kahneman, 1992).

Thaler (2005) doubted the possibility of the NASDAQ stock prices as being priced reasonably at the 5,000 and 1,300 index levels within short times of five years and their compliance with the rational finance theory simultaneously, faced with the above anomalies (Durand et al., 2019). This aligned with Shiller's (1981) work finding in heightened stock price volatilities compared to the EMH predictions, concluding that volatility exceeds the justified levels by a factor of up to thirteen and is not attributable to new information arrival alone. This implies that price volatilities are explainable beyond the amount of information available and are significantly to do with the market players' processing of information in the process of making financial choices.

BF is cognizant of the anomalies in the financial markets, and it endeavours to provide plausible motivations through the study of human psychology (Otuteye et al., 2016). Hence, behavioural studies (behavioural finance and economics) add psychology and sociology concepts to the rational expectations models just as physics concepts have been incorporated into finance (Santi et al., 2017; Sedaghati, 2016).

Heuristic simplifications

This is a term referring to the heuristics considered as reducing complexity in the decision-making process as documented in Tversky et al. (1973). It postulates that humans increase or reduce their attention to certain happenings depending on the information that comes their way. Thus, future events probabilities become higher as the instances of similar events come into remembrance. Such probabilities are considered personal and haphazard with a high potential for financial market losses. The paradox here is that the availability heuristic is able to explain biases in both under and overreaction cases (Luu and Luong, 2020; Bachman et al., 2018). Tail events are investor rated depending on the coverage of these events in the media and the time passed after they have happened. Hence, recent events are over weighted probabilistically and conversely so. This is probably the case of financial/economic crises such as the 2008 credit crunch as a lot of investors ascribed very low probability to this tail event (Hogan, 2019; 2018; Craig, 2016).

Self-deception

The focus here is people's overconfidence bias. Literature finds that people attend more to extremes of available information while disregarding the sizes of sample data – as linked by the 'law of small numbers' in Tversky et al. (1971). Humans' have the tendency of underestimating the size of the sample when carrying out an evaluation of a task – attributing similar weights to both small and large samples, resulting in the *"gamblers' fallacy"* with people expecting a different result after a repeated outcome of misfortune because the time of fortune must now arrive (Luu and Luong, 2020; He et al., 2019). This phenomenon has been linked to analysts who sometimes get to a star status when they have previously made the right prediction a few times (Luu and Luong, 2020; Barberis, 2013; Barber and Odean, 2000). These results led to Barber et

al., (2001) discovery of gender specific variations in trading showing an obtrusive male overconfidence as compared to women. They found systematic and significant losses in Taiwanese retail traders resulting from excessive ordering. The result was different for institutional investors, where positive results came out of hyper trading, suggesting the possibility of partial gain in succumbing to emotion in private investors (He et al., 2019).

Risk and uncertainty

Early on, Ellsberg (1961) had found a preference of individuals for known to unknown risks, thus avoidance of uncertainty was prevalent, even when the probability distributions of returns were the same (Siddiquee, 2017). The uncertainty-return relationship studies show positive correlations of high uncertainty and high excess returns implying that mispricing from averseness to uncertainty might benefit investors not averse to uncertainty and those imputing a probability distribution to the potential result because of their past exposure to such events (Luu and Luong, 2020; Burton et al, 2013).

Social interactions

Herding behaviour studies have shown conformity in stock buys amongst households (Rahayu, et al., 2021; Zheng and Chiang, 2017; Arisanti and Asri, 2018), especially in the U.S. households where it was found that within a certain radius and sample households, an increase in a household's stock purchase was mostly after the neighbours had made similar stock purchases. These findings have been attributed to 'word-of-mouth' conversations among neighbours in the more 'social' cantons with free interactions (Arisanti and Asri, 2018; Miller et al., 2015, Pompian, 2011). The same observation was made in Chinese markets with personal investor orders in a

brokerage branch showing a word-of-mouth influence in purchase orders (Luu and Luong, 2020; Ng and Wu, 2010). Hence, the pricing variations might be the result of this social interactions phenomenon, with speculation dominating liquidity reasons but the legal restrictions usually leave persistent arbitrage opportunities (Luu and Luong, 2020).

Conclusion

The financial economics models, to a large extend, were driven by inadequate assumptions about how humans make decisions and thus fell short in their attempts to explain the actual human behaviour. This is more so in the normative types of decision-making models. The Expected Utility (EU) theory prevailed over the others in choice in environments of risk until the emergence of the Prospect theory. The EU theory is anchored in the assumption that rational humans follow the theory's axioms, but this overriding expectation has been found to be flouted in several choice problems and in a systematic manner (Siddiquee, 2017; Kahneman and Tversky, 1979; Thaler, 1980, 1981). The preceding literature survey section looked at the rational behaviour thought and expounded on the Prospect theory's justification as an alternative model under conditions of risk. The major cognitive biases were presented, finding that extensive research has been conducted in understanding these biases. However, the area of debiasing in decision-making appears to have lagged. This indicates that the future direction of decision-making research can gain a lot from making use of Prospect theory across disciplines. For instance, it was mentioned above that Kahneman and Tverksy (1979) fronted the idea of the theory's application in policy choices, Shefrin and Statman (2000) showed its application in the development of their behavioural portfolio theory and Barberis (2013) enthusiastically outlines its possible application in

formulating regulatory controls in markets and a macroeconomics level. The next section links behavioural finance to the findings in the MPT and EMH models (Pan, 2021).

Anomalies literature and behavioural finance

In financial economics terms, an anomaly obtains when any of the asset pricing models fail to be observed in the real world and such anomalies have been the order of the day in empirical research (Bird et al., 2017; Linnainmaa et al., 2017). The behavioural school critique of the anomalies school (MPT and EMH models) is that there's limited space for arbitraging actions by arbitrageurs and hence arbitrage actions will be insufficient to equate prices to their intrinsic values. It cannot be argued against the fact that when prices are right, that is equal to the intrinsic value, then the easy profit opportunities are unavailable (Bird et al., 2017; Gray and Carlisle, 2013; Barberis et al., 2005). However, with limits on arbitrage activities the absence of profit opportunities does not imply efficient markets presence. Since most tests in the EMH focus on the existence of arbitrage opportunities, as reflected in money manager performance, the failure of these managers to systematically perform better than passive investment strategies does not necessarily imply that markets are efficient as in, for instance, Hou et al. (2018), Bird et al. (2017). Lev et al. (2019) and Kuiper (2017) stated that the concern for investors was the existence of profit opportunities. The behavioural school's arguments about anomalies in the efficient markets failed to provide guidance on possibilities and methods of exploiting such irrationalities. Investors still want to know whether there's money to be made from the price anomalies, a point that behavioural finance is yet to settle and/or address.

Traditional finance objects to behavioural finance by suggesting that behavioural models of theory seem to be ad hoc build to present and decipher specific stylized facts (Soleymani et al., 2018; Lee, 2014). This suggestion has been rebuffed by the assertion that behavioural models are derived from people's behaviour in their natural settings based on broad experimental data and hence explain evidence more rigorously than the traditional models.

A significant critique of the behavioural finance theory is its apparent unstructured form where it appears to allow almost any anomaly to be explained away by some combination of irrational behaviour forms picked from an inexhaustive 'laundry list of behavioural biases' and therefore creates opportunities to reverse engineer a behavioural explanation for any anomaly. Hence, a consistent or unified behavioural theory able to explain a range of behavioural anomalies is needed (Kartini and Nahda, 2021; Agyemang and Ansong, 2016; Neely, 2015; Gray et al., 2013).

Another, criticism of behavioural finance from the traditional models is centred around the claim of data mining in empirical work (Zahera et al., 2018; Norvy-Max and Velikov, 2016; Agyemang and Ansong, 2016). The response here has been the fact that empirical work will mostly get evidence confirmation out-of-sample in time periods and cross section terms across jurisdictions.

Yet, another challenge posed to behavioural finance is the claim that it does not present a unified theory as compared to what expected utility maximization using rational beliefs does (Fama and French, 2020; Zahera et al., 2018; Clubb and Wu, 2014; Kliger and Kudryavstev, 2010).

In this vein, however, traditional risk-based models have not fared well when empirical data is analysed (Chaudhry and Sam, 2018).

Therefore, there seems to be a motivation to build on the same models which are consistent with evidence as opposed to models reliant on rational economics with limited empirical support (Agyemang and Ansong, 2016; Jitendra et al., 2016; Alquraan et al., 2016). It has been said that a normative theory whose only intuitive basis is rational utility maximization cannot pass the superiority test against the behavioural alternatives just because it analyses how people ought not to behave (Kok, et al., 2018; Agyemang and Ansong, 2016; Alquraan et al., 2016). When people behave differently from the rational utility model, the approach is faced with insurmountable limitations in explaining financial phenomena. (Kok et al., 2018; Alquraan et al., 2016). The next review turns to how behavioural finance relates with value investing.

Behavioural finance and value investing

Siddiquee (2017:58) has shown that there have been times when value investors have had bad years, arguing that '*value investing works because it doesn't work in all instances all of the times*', otherwise it would attract all investors and thereby eliminate opportunities for higher returns (Zahera et al., 2018). The analysis of Craig (2016) showed evidence of investment managers outperforming the market index over long periods, but no single manager beat the market in every year with underperformance periods persisting for several years, back-to-back (Chaudhry and Sam, 2018). The Euclidean Technologies (2015) investor report for its third quarter vividly showed value investing falling short a number of times specifically identifying six periods since

the 1940s where glamour stocks beat value stocks on the basis of a five-year compounded trail (Chaudhry and Sam, 2018; Penmann et al., 2018; Alberg and Seckler, 2014).

The key observation was that value investing better results argument works over long periods but is prone to periods of underperformance. This intermittent underperformance combined with short run volatilities in the market made the value approach to investing hard to stay with since certainty ranked higher in a lot of investors' minds (Chaudhry and Sam, 2018; Hou et al., 2018; Sloan et al., 2013; Subrahmanyam, 2010). Value investing is thus a long-haul game requiring patience as has been implied in Browne (2000) that sticking to it in periods of economic and financial crises such as the 1998- 2000 period called for an extremely high level of conviction as to its effectiveness (Tidmore and Hon, 2022). During such times, a value investor was ridiculed and derided as one who was devoid of the capacity to adapt and respond to changing environments and new paradigms.

The important reflection issues here are how realistic it is for investors to hold tight for ten-year periods of bad results and the concomitants of such underperforming periods to a fund manager's continued employability (Fama et al., 2020; Chaudhry and Sam, 2018). Some behavioural finance-based thinking might explain these. To Siddiquee (2017), value investing, and behavioural finance were tightly joined together, and the vital understanding of value premium existence is because of its inherent behavioural components.

Investors' confidence and faith in market efficiency implies revisions of security prices that might stray away from the intrinsic value. The dispersions increase as a result of cognitive

biases with possibilities of persistence over lengthy periods. There are many behavioural inhibitions to value investing. For instance, Montier (2009:36), identifies '*loss aversion, present bias, herding, availability and overconfidence'* among the hurdles which need conquering in order to convert value premium opportunities into realizable profits (Arisanti and Asri, 2018; Patari and Leivo, 2017; Zheng and Chiang, 2017).

The cognitive bias literature suggests loss aversion to be an impediment to the practice of value investing (Rahayu, et al., 2021; Kumsta, 2015). Loss aversion is the phenomenon characterizing strong loss avoidance by people and therefore tend to warm to gains acquisition since losses are inordinately magnified compared to the corresponding risks in people's minds (Siddiquee, 2017, Kahneman et al., 1979). As put forth in Kahneman et al. (1979) writing on decision making under conditions of uncertainty, an underweighting of outcomes considered as mere possibilities compared to outcomes with certainty of occurrences is the prevalent predisposition found in humans (Balakrishnan et al., 2015). This predisposition contributes to averseness to risk in selecting choices with guaranteed positive payoffs and to risk-tolerance where sure losses are present. A consistent successful strategy is preferred by investors, but it is non-existent and will be unrealistic to be expected to exist since investment is naturally probability based and uncertainty is what makes investment to be investment (Siddiquee, 2017; Black, 2012).

Value investing entails buying investment assets that are undervalued or buying in a contracting market situation. However, cognitive biases prevent investors from exploiting, fully, these undervalued stocks. The presence of a heuristic, for instance, makes it difficult for investing in a declining market since no appetite exists in such a situation for undervalued basket case stocks.

Glamour stocks in this situation become ‘salient and variable’ thereby crowding out consideration of value stocks (Siddiquee, 2017; Tversky et al., 1973). Immediately after a market crisis (e.g., the dotcom bust, the financial crunch of 2007/2008), the investment community overweights the possibility of a repeat in the near future based on the most recent experience and hence avoids market participation (Hogan, 2019; Bernanke, 2018; Montier, 2011; Fabozzi, 2010). This appears to be counterintuitive since undervalued stocks are most likely to be found just after a market crunch. But investors could only take this advantage if they were able to go against the crowd.

This dissertation examined the assumptions from the behavioural school to identify any undervaluation risks and opportunities. Specifically, the dissertation sought to apply some behavioural finance assumptions’ in explaining the existence, if any, of undervalued stocks (low P/E and low P/B ratios) and where the fundamentals-based investment approach was confirmed to work and thus implying that eliminating biases in investment decisions mean better results, and thus the matching of market stock prices to the stocks’ intrinsic values of their firms. The risks present in the value and growth investing styles are examined next.

Risks in value and growth investing

Two factors cause risk exposures to a value investor. First, as outlined in Christopherson and Williams (1997) the timing of value stock purchases is critically important to take advantage of possible price rises, the purchase timing is vitally important. Second, mispricing of value stocks could be due to valid fundamental reasons and thus eliminating the possibilities of price rises. The growth investor’s motive for investing is the future earnings prospects which come with the key risk of less than expected earnings growth being realised in the future. The ongoing debate that

emerged from the two studies of Lakonishok et al. (1994) and Fama et al. (1992) has been about the superior average gains of value stocks over the long investment horizons and the probable features of value stocks to which these higher returns are attributable (Kumsta, 2015; Toit, 2012).

The above resulted in a litany of publications that attempted to elaborate on the causes of the higher value stocks returns. Petrova (2015) and Petkova et al. (2005) researched the relative risks associated with value and growth stocks with the aim of determining any possible presence of a difference in the risk magnitudes in value versus growth investing. Their investigation also looked at the possibility of the greater mean returns from value stocks as attributable to a larger risk devoid of diversification potential following Fama et al. (1992). The Petrova (2015) and Petkova et al. (2005) findings coincided with those in Fama and French's (1992), countering the Lakonishok et al. (1994) arguments. For Petkova and Zhang (2005), style came along with additional risk sources arguing that time varying risk was a plausible explanation of extra value investing returns in that there was a positive covariance in value betas as contrasted with the negative growth beta covariance (Petrova, 2015). The results from the subtraction of growth from value betas tended to move in tandem with the market expected risk premium. They interpreted the first finding as too minute to be the cause of the the size of the mean returns of the value stocks within the workings of the CAPM despite the results' consistency with past findings.

There appears to be a convergence of opinions on the value stocks outperformance anomaly over longer time investment periods but the views on the presence of higher inherent risk leading to higher value stocks returns vis-à-vis their growth counterparts remain divergent. Davis et al. (2000) documented the divergent views as they related to the explanations of value stocks' tendency to dwarf the growth ones. They interpreted the results in four ways as (i) the MacKinlay

(1995) and Black (1993) conclusion that the value effect was unrepeatable in different samples and was thus sample specific due to its observance being a random event, (ii) the value premium was considered to be a compensation to reward the investor in the framework of risk and return, consistent with the multifactor Intertemporal Capital Asset Pricing Model (ICAPM) of Merton (1973) as well as the Ross (1976) APT. The Fama et al. (1992) propositions follow the same explanation in the fashion of this risk versus return approach, (iii) the value phenomenon emanates from the non-rational behaviour of investors creating overreactions to firm performance (Guo, 2019; De Bondt et al., 1987) and (iv) the value premium comes from stocks with similar underlying features such as same industry stocks (Campbell et al., 2017; Harvey, et al., 2016; Daniel and Titman, 1997).

The empirical research gleanings indicate investor actions that do not comply with rational expectations when forecasting future earnings and the growth of firms to have a bearing on the value premium existence. Since the present value estimation is an expectations exercise, Kahneman and Tversky (1982) suggested that there was an investor overweighting bias for data recency (Patari and Leivo, 2017). It was observed in Lakonishok et al. (1994) and De Bondt et al. (1987) that investor extrapolation of the overreaction to information and events that are most current (Samson, 2017). According to Santi, et al. (2017, the existence of a random walk in annual corporate earnings patterns was the conclusion in Ball and Watts (1972). The tendencies of mean reversion were documented in Bauman and Miller (1997) in the earnings per share (EPS) growth patterns in an extended period (Sari and Indriani, 2022; Sarlak and Taleyi, 2017; Norvy-Max and Velikov, 2016). There were observations of a mean-reversion tendency in the value - growth strategies over 1937 to 2008 period comparison in Schade (2017)and Malkiel and Jun (2009).

Bauman and Miller (1997) thus developed the argument that there was a habit of analysts to be buoyant with expectations of growth stocks' earnings per share (EPS) vis-à-vis the value stocks ones and fail to consider their mean reverting phenomenon (Sari and Indriani, 2022; Nugroho, 2017). This argument found support in Wahal (2018) and Waistell (2016).

Theoretical framework summary

From the review of the literature in the preceding sections, the correct approach to describing financial markets debate is still unsettled. It seems the two schools' varied approaches excite the academic discussion thereby assisting the promotion and unpacking of the financial markets' behavioural complexity. In Lo (2004) the basis of the debate was in the fundamental points of parting of each school variance, since BF is rooted in Psychology while the EMH is anchored in traditional economics theories of rational consumer behaviour (Toit and Krige, 2014; Burton et al., 2013). Hence, behavioural finance and the efficient markets hypothesis are effectively equivalent conference to the financial literature that seeks to make sense of financial markets operations.

The one price attainment through the supply and demand interplay is the agreement point of the two schools. The differentiating factor is the EMH assumption that this price is always the true price or efficient price in that it reflects all information about the asset while the behavioural finance school contends for the presence of investor irrationality hence the efficient price is mostly unattainable. Hence, EMH could be seen as an equilibrium model while BF represents a disequilibrium model. The two models could thus be viewed as complementing each other to form a holistic theory that is useful for financial markets description (Fama and French, 2017).

The important explanations needed in active investing include answering the questions of the mistakes to be avoided when making investment decisions and the financial markets strategies that are likely to produce supernormal returns (Atmaningrum, et al., 2021; Hogan, 2019; Calandro, 2014). These issues form the main goals of behavioural finance as an alternative to the EMH and aid in understanding why value investing produces superior returns.

Empirical literature review

This section reviewed the research literature related to stock returns and value investing. The overarching question was whether the value investing style outperformed the market consistently and therefore was a superior investment style and is amenable to investor implementation in a systematic manner following specific criteria. A confirmation of this style's superior performance implies that markets are inefficient and hence the EMH is not accepted. The section began with a retrospective analysis of value investing before reviewing the anomalous stock returns evidence in panel data studies of average returns in stocks followed by an analysis of possible explanations for these anomalies and ended with a review of the value investing empirical studies

Value investing in retrospect

Here, the seminal research papers in value investing approaches to stock selection were synthesized and summarized starting with the earliest research papers considered canonical in value investing empirical work. The import here was to illustrate the existing strength of the body of knowledge supporting value investing's success.

The pioneering research

The canonical papers comprise the first studies of value investing that had over 10-year data sets and received immense attention from the research community. The earliest papers in this regard described value in a single dimension. Among these were Lakonishok et al. (1994), Fama et al. (1992), Rosenberg, et al. (1985), Basu (1977), and Basu (1983). The Basu (1977) paper considered the common stocks' P/E ratio relationships and came out with the finding that the low P/E ratio portfolios produced six percent higher annual returns compared to the portfolios from high P/E ratios. Basu's stocks were ranked by their E/P ratios, the inverse of P/E, and then divided in five portfolios with the same weighting and ranked again every January with a quarterly rebalancing. The quarterly rebalancing ensured that new information had been reached by investors. The use of E/P ratio for ranking purposes was justified on the basis of the avoidance of situations where earnings were near zero or below zero. Rosenberg et al. (1985) evaluated stock performance using book-to-market (B/M) approach. Their approach created a month-to-month 'hedge portfolio' with the same buy-sell positions while controlling for factors such as size, E/P, turnovers, and sectoral class. This buy high B/M stocks and sell low B/M stocks, hedge portfolio strategy produced higher than market mean portfolio returns. The Fama et al. (1992) study documented the comparative success of value characteristics-based approaches to explain the average stock returns vis-à-vis those of the market. Their portfolio consisted of size, market capitalization and B/M ratio criteria of equal weighting but found insignificant differences in stock returns from either high or low basis. Basu (1983) looked at the association between high return-high earnings yield relation with small market capitalization (size effects) with the results failing to establish a clear size class relationship. The evaluation of the performance of a number of value

strategies from the B/M, CF/P), E/P, growth in sales and other multi-dimensional value measures given in Lakonishok et al. (1994) found significant return differences in value - growth stocks with those from value stocks being in excess of the growth ones. Fama et al. (1993) factor models confirmed existence of high average returns on portfolios applying different value measures and conjectured that this could be traced to their added factors to the CAPM but could not settle on the reason for the high returns.

These early studies of variations in stock average returns all established a trend where portfolios selected based on certain value measures generally outperformed the portfolios selected on any other criteria. However, the underlying reasons for these differences in stock returns were not conclusive thus the motivation for the continued research in this area. The subsequent studies became more cross-section in nature taking on an international approach (Siddiquee, 2017; Toit and Krige, 2014).

Average cross-section stock returns reviews

The first consideration here is the asset risk pricing and other characteristic pricing evidence. The evidence here appears weak to support the argument of the criticality of systematic risk in asset valuation with other characteristics seeming more critical in panel data studies of expected asset returns (Ball et al., 2019). The earliest studies suggested positive correlations in security betas and expected returns thus aligning with the asset pricing models like CAPM (Bali et al., 2014; Basu, 1977; Black et al., 1972; Fama, 1972; Fama, 1970). However, recent studies found only insignificant return-market beta relations indicating that other characteristics were

more significant in determining the industry-wide spread of expected stock returns (for example, Graham et al., 2016; Fama et al., 2015; Fama et al., 2012).

At an international test level, Ball et al. (2019) found the relation between betas and local market indexes to be insignificant. Consumption based CAPM tests found inconclusive results as well (Santi et al., 2017; Graham, et al., 2016). In Waistell (2016), only a modest positive conditional beta vis-à-vis expected returns relation was found to hold in with the expansion of the market to incorporate the human resources element. The results on studies where other variables beyond risk have been incorporated were more compelling, for example, Fama et al. (2015) showed that a three-factor model based on size and B/M dynamics explained average returns, suggesting an existent compensation mechanism for distress risk by these characteristics.

However, in Wichlinski and Rajaram (2019), when size and B/M variables were controlled for, returns did not show strong relations to betas computed on the basis of the Fama-French factors. Tang et al (2013) argued that the book-to-market effect arose because of the overreaction to the part of the B/M ratio that had no linkage to accounting fundamentals and therefore this portion that is unrelated to fundamentals has no returns forecasting impact (Pätäri, et al., 2018; Graham et al., 2015). This then puts into question the distress risk proposition based upon fundamentals.

Balakrishnan et al. (2015) found a result that book-to- market and size-based investments yield reward-to-risk ratios were three times higher than those from passive investment in the market appear to be high to the level where it became inconsistent with a rational arbitrage pricing

model (Jin, 2022). Hence, representative investor's Euler equations and a high Sharpe ratio would suggest marginal utilities that highly vary across states (Romer, 2019; Dimson et al., 2016; Varian, 2016) meaning a negative covariance between marginal utility and the low - high B/M stocks' returns. For this to hold, security returns would have to be really high in boom times (because of the low marginal utility and conversely so), a proposition not found to hold in Toit and Krige (2014) and Lakonishok et al (2004).

Cronqvista (2015) found better returns from value stocks compared to glamour stocks (as determined by high value fundamentals ratios like B/M values. Interestingly, a negative stock yield and observed volume relation was explained to be driven by volume generation by optimistic trading, with this optimism being reversed in periods therefter and because of short-sales constraints, there was inadequate reflection of pessimism in stock prices (Graham et al., 2016; Asness et al., 2014). Sarlak et al. (2017), Avery et al. (2016), and Chordia et al. (2014) showed that there were generally large deviations of realized stock returns from what analysts forecasted to earn. This obtained possibly because while dispersions demonstrated undue bullishness and bearishness, the latter was not factored into stock values due to constraints in short selling. Therefore, the future returns deviations from forecast expectations could hold because of the high inherent optimism in high subsequent stock prices movements. A related argument was given in Novy-Marx et al. (2016), Barroso, et al. (2015), and Clubb et al. (2014) showing that the low breadth of high ownership in a stock was an indication of the binding consequence of short selling constraints and hence, very high prices of these stocks' relative to their fundamentals. It was therefore suggested that prices should reverse much more in breadth reducing stocks.

A strand of empirical research has attempted to identify the type of stocks with intense mispricing. For instance, Novy-Marx (2014) and Sloan et al. (2013) defined several macro-level investor-sentiment measures at the macro level and included share turnover, the closed-end fund discount and first day IPO (Initial Public Offering) returns (Siganos, et al., 2017). They found that stocks with constrained arbitrage, for example, small and with high volatility, showed the highest reversals in subsequent months where there was high investor sentiment, a result that goes against expectations in that constrained arbitrage was supposed to mute price movements. However, this result, on the other hand, appeared to point to a market efficiency result with almost immediate price corrections. Penman and Zhang (2015) within cross-sectional regressions showed that high information uncertainty stocks (for instance, small with low analyst following) were more often mispriced in return predictability from book to market and momentum terms. This mispricing was found to be greatest in stocks with lower institutional ownership (Siganos, et al., 2017; Penman et al., 2016; Asness et al., 2013; Norvy-Max, 2014). The institutional ownership was an indicator for the extent to which short selling constraints held since short selling would be easier and cheaper for institutions. Interestingly, Linnainmaa et al. (2017) and Bali et al. (2016), used data over the whole of the 20th century and showed the accounting-based return anomalies (including investment) to be a result of data snooping such that out of sample reviews nearly eliminated the anomalies (Pätäri, et al., 2018; Siganos, et al., 2017).

Thus, the empirical evidence was more compelling in the argument that non-risk related attributes were better predictors of stock yields than the risk-based characteristics. Markets could still not be concluded to be either efficient or inefficient given the continued anomalous returns.

This resulted in continuing theoretical attempts to shed more light on the cross-section of returns variability.

Stock returns anomalies review

Several attempts to explain the observed patterns of yields of stocks have recently arisen. In the relevance of value literature, such as Fama et al. (2016) and Lee (2014), the share price of a firm was deemed to be the normative benchmark for fundamental value and the metrics from the accounting side's value relevance was accepted where they were able to explain cross-sectional stock prices and the related observed returns (Woo et al., 2020; Pätäri, et al., 2018). Additionally, behavioural anomalies arguments appeared to dominate the contemporary efforts to explain the anomalies in stock returns. For instance, Ball et al. (2019) and Hou, et al. (2018) proposed overconfidence and self-attribution as the key explainers of the stock returns patterns, stating that traders' overconfidence in private signals led to overreactions hence to occurrences of book to market effects and long run reversals. They further asserted that self-attribution (where investors ascribed to their competence and skills when bets came out successfully and attributed less successful ones to bad luck or some other external events) served to maintain overconfidence and hence kept the price momentum (Woo et al., 2020; Norvy-Max and Velikov, 2016). Maury (2015) suggested that investors tended to make objects classification on the basis of heuristics, and thus potentially led to the rise of mutual funds that were fashioned along the style investment approach hence making assets within a style have co-movements bigger than those from without. This argument was given in Piotroski (2012) where the S&P 500 betas of stocks were found to rise when these stocks were included in the index implying at least those investors tended to consider stocks in S&P as one category, and thus the co-movement of stock prices in an index. To Hogan

(2019), price reversals to the fundamentals were a result of agents' Bayesian updating, in the longrun equilibrium adjustment. The related study in Black (2012) modelled self-attribution bias in a time varying environmental context where learning opportunities were included and found the bias to be present and severe thus implying learning rigidities. Thus, it is possible for an agent even with opportunities to learn from experience to continue believing in her self-imputed ability, even when the results showed the contrary (Israel, et al., 2020).

Risk-based explanations of observed variations in stock returns also feature significantly outside the behavioural based explanations. For instance, the analysis of Sistonen (2014) found that risk metrics in the form of systematic risk or total stock volatility were not significant panels of equity return results and hence the key drivers of expected returns would be past returns, volumes traded and accounting ratios such as returns on equity and price-earnings ratios, similar to the Harvey et al. (2015) result (Pätäri, et al., 2018). This was close to an explanation along the value investing line of firm fundamentals being responsible for differences in stock returns. Frazzini et al. (2014) suggested that the slowness of news diffusing to agents creates momentum. Agents feedback to news gradually ending up with much more stocks than was necessary when reversed, these positions caused another momentum (Woo et al., 2020; Chinco et al., 2019; Chen et al., 2014), thus indicating an efficient market operation outcome. The studies of Hou et al. (2018), Dimson et al. (2016), and Coqueret (2015) in models uncertainty-embedded model parameters such as the security means and rational Bayesian learning to unpack the observed trends in stock returns, appeared to rely on the specific nature of historical uncertainty together with its resolution thereof to get explanations of overseas underreactions. For instance, when agents expected structural changes in means that then were unrealized, there was an overreaction

emanating from overweighting recent data for instance in Penman et al. (2018) and Dew-Becker et al. (2017). But, where agents had no certainty in structural changes, while in fact they had, there was an underreaction that was likely to follow. Yet again, Soleyman et al. (2018) provided another model with agents applying over simplified stock evaluation models when truer models existed. For instance, an agent believing in a certain model made persistent prediction errors, avoiding adjusting to pertinent information signals that then created momentum. In the same vein, another agent using a different model saw a sequence of positive earnings arising, drastically adjusted his thinking and model after noticing a break in the sequence and thus creating large price reversals.

There are thus competing explanations of stock return anomalies with some suggestions of data snooping as a significant cause of these anomalies as elucidated in Linnainmaa et al. (2017), Hou et al. (2015) and Vayanos and Woolley (2013), which would imply that asset pricing models still held sway in the portfolio choice decision. The risk-based and behavioural based explanations for the anomalies still continue to dominate the literature with no settlement yet as to the real course of these anomalies.

Value investing return reviews

The subject of value investing was dealt with comprehensively in a recent PhD Thesis by Siddiquee (2017) in which it was stated that both the academic and research literature were still not conclusive as to why this approach was effective. In the academic literature, the value investing approach's effectiveness is thought of as being an anomalous outcome hence labelled as a statistical anomaly (Siddiquee, 2017). This approach's performance behaviour's persistence for more than four decades motivated Siddiquee's thesis for an in-depth study. In the thesis, value

investing's higher yields through selecting stocks that were being sold below their intrinsic value had not been fully analysed in a body of theory and Benjamin Graham's full works remained disparate and not formally condensed in a framework of theory. He therefore addressed two gaps of: Condensing Benjamin Graham's writings to the investment community and inferring from the concepts in behavioural finance and investment practice of value investing through empirical analysis attempted to put together a "formal theory of value investing".

The psychology of decision making as applied predominantly in the investment decision making field formed the main focus of his research and asked how people make decisions and how improvements could be introduced in that decision making process, focused on the area of common stocks investment (Israel, et al., 2020). He therefore suggested that the only remaining purpose of study was why it worked. However, this claim was disputable as Fama et al. (2020) still produced results that were inconclusive about the effectiveness of value investing and the debate is likely to continue. According to Siddiquee (2017), the value investing process suffered from a lack of an established underlying theory that explained why it worked and its consistent better returns compared to other styles in investing. A lot of investors claimed to be value investors when in fact they simply applied a dip strategy where they bought what was down and not necessarily cheap (Israel, et al., 2020). This might have been because of either the long period value investing has existed, or its past superlative performance trend, or since it was associated with successful operators like Warren Buffett, or even greater, to gain wide acceptance in the investment community by asserting the 'me too' syndrome, that is, "we are also value investors" and therefore such operators were not observing the Graham-Buffett Value Investing pattern but, at best, they practiced the academic pattern of value investing or other derivative versions of value investing.

Siddiquee (2017) set out to empirically examine the how a value investing heuristic focusing on ways of making better decisions given the costly reality of errors would turn out. Behavioural finance's major concern is the minimization of cognitive biases influence in investment decisions. He distinguished two systems of cognitive biases as: i) system 1 that comes with speed, intuition, and emotion. System 1 operated in auto-pilot mode, quickly, effortlessly and with very little sense of voluntarily exercising control ii) system 2 that comes with slowness, deliberateness, and logic. System 2 attended to mental effort activities, including complicated calculations and its operations were affiliated subjectiveness in experiences of agency, making choices, and focus. Because of the predisposition of system 1 to errors, the question was how to shift people to system 2 thought processes and thus eliminate particular biases that have been observed in making choices. Siddiquee (2017) suggested replacing intuition with formal analytical reviews/processes. His first empirical test objective was to determine the length of a mechanism of value investing that is built to neutralize system 1 behaviour and refocus the investment decision making elements to system 2 could dwarf the alternative investment approaches. His previous work constructed a simple heuristic that helped make value investing decisions based on a number of financial fundamentals such as profitability, stability, bankruptcy vulnerability, and margin of safety. His empirical test involved applying the heuristic to the U.S markets hypothesizing that the heuristic-based portfolio contained the attributes that a value portfolio would have. The heuristic was then taken to be a reliable set of value investing choice criteria. The result demonstrated that a portfolio of value stocks selected using that heuristic performed favourably relative to other investing mechanisms. His result under this test showed that a heuristic-based portfolio was superior to the others. Because the heuristic's main objective was the downside minimization, it

was a potential tool that was applicable to value investing decision making and could be adopted by any investor using published data (Israel, et al., 2020).

Siddiquee (2017) additional empirical test involved the topic time horizon perception in relation to stock portfolio performance. Here, the thesis was that value investors were different form others who followed different investing styles in their consideration of the element of time horizon with value investing adopting a long-term view and practice. But it was argued that longterm investment went against the human norm. He therefore explored how and why there were variations in the two groups and the effect of long-term returns. He tested the hypotheses that value investors' longterm view of investments informed their classification of financial assets regarding risk, hence disregard short-term volatilities with the investment goal of raising (or protecting) purchasing power (capital preservation). The 90-day treasury bill did not meet the risk-free-asset criteria for a value investor. This implied that the inflation challenge made asset allocation to treasury bills counterintuitive. Hence, with the long-term view perspective of value investors, while disregarding short-term volatilities, asset allocation to tradable shares (more volatile) yielded better returns at no additional risk compared to investing in treasury bills money not immediately needed for use in the short run. It can be said that where the holding period exceeds five years, a tradable shares portfolio was no more volatile than the treasury securities portfolio.

The second empirical test investigated the value investors versus others' time horizon perceptive differences as related with asset classification and the resultant portfolio performance. To accomplish this goal, he dealt with the research question of the degree of conservation of purchasing power is present in the T-bill , as a risk-free-asset, over extended periods as an inflation

hedge relative to longer-term treasury bonds and equity stocks (a risky asset). This in essence was an evaluation of the long-term performance of the ordinary share indices relative to the treasury/municipal bills and government long-term bonds. His implementation mechanism was through investing a US-dollar unit each in the share index, 90-day T-bill and longterm treasury bonds at the start of the test period, and then computed the related returns over the length of the investment period. This mechanism intended to show the uselessness of volatility a measure of risk in stocks particularly over a longterm period. The result here was that in short run asset holding periods, a T-bill was safe as reflected in its consistent positive returns. This was not the case over longrun periods of five years and more with stocks outperforming T-bills widely due mainly to the fact that T-Bill returns were unable to compensate for the inflationary losses.

Bratland et al. (2014) stated that people's personal situation improvements exhibited in their quest to maximize their benefits formed the core driving force in their investment decisions. This was echoed in the finance literature where buying stocks was motivated by capital gains making as the objective function with risk minimization as the constraint and thus the investors directed resources (money and effort) towards this goal. In their analysis, they assumed that investments were predominantly done on official exchanges/stock markets which were assumed to be efficient markets as per the efficient market hypothesis workings in Fama (1970) where a market security's price reflected all the information and the asset value of the underlying. The EMH is well researched with a number of criticisms arising therefrom. For instance, Grossman and Stiglitz (1980) argued against the possibility of attaining complete information and the very fact of active investors working to beat the market indicated the presence of market imperfection.

The Bratland et al. (2014) thesis considered value investing as a popular method that investors used for profit making in a stock market with the goal of discovering undervalued assets expected to yield higher gains in due course as the correct value was realized. They defined undervalued assets as those with low multiples (P/E and P/B) ratios (and thus value stocks) with growth stocks exhibiting the opposite (high multiples) as discussed in Holthausen and Zmijewski, (2020), Deb (2012) and Arnold (2008). They cited evidence of the support of value stocks outperformance over growth stocks in the works of Basu (1983, 1977, 1975). They reviewed Fama et al. (1992) proposition of market efficiency theory explaining that value stocks performed better due to their higher riskiness and found a controverting view in Lakonishok's study where the risk in value stocks was comparatively lower, even with their higher performance. Their purpose was to investigate which of the investment portfolios of value or growth stocks generated better comparative returns on the listed firms in the Stockholm Stock Exchange over the period 2005-2013 and since the financial crisis period fell within the study period, they examined how the crisis impacted stock returns during the crisis years (Grosse, 2017). They applied the EMH, Behavioural Finance and Portfolio theory and posited that if the EMH held, then the value versus growth investment portfolio performance should not be different. With behavioural finance, they tested the presence of undervaluation in low P/E, P/B stocks or if stock prices in the market tracked their firms' intrinsic values (Grosse, 2017; Shiller, 2010).

With portfolio theory, where it held, then finding undervalued stocks returning high risk adjusted gains militated against the theory along with the set levels of risk to reward that underpinned portfolio theory. In their tests of the EMH, BF and the results from P/E and P/B testing they found that in an efficient market in the strand of Fama (1970), the intrinsic values of

the stocks matched perfectly with the stock price showing the impossibility of making positive and consistent risk-adjusted returns and thus portfolio composition and selection was of no use since any portfolio cannot beat the market, when adjusted to risk and that, the presence of variations within the portfolio as in the case of low P/E portfolios returning superior performance to high P/E portfolios were untenable when the risk adjustment conditions were obtained and persistent.

However, in the BF theory, irrational behaviour ensured a mismatch between the stock's intrinsic value and its price hence portfolio risk adjusted returns over a longterm period might be return inconsistent in low P/E relative to high P/E portfolio performance. Their analysis failed to find value premium in value stocks with growth portfolios being better by more than sixty percent of the time and value portfolios were better choices less than half of the time. Growth portfolios were even better when returns were adjusted for risk (Patari and Leivo, 2017). This result did not militate against the EMH and hence when risk was accounted for, portfolio composition was not a meaningful exercise. Under behavioural finance, this result was conveniently explained by irrationality of investor behaviour. This variation in results of pure returns and risk adjusted returns was indicative of higher risk in value portfolios selected on P/B basis hence a less preferable portfolio when adjusted for risk. The same conclusion would apply to value portfolios selected on a low P/E basis which gave higher returns before risk adjustment but underperformed the growth portfolio after risk adjustment.

Their results under the crisis years showed negative returns and value portfolios performing slightly better after the bounce back indicating that the value stock's volatility (measure by beta) could be a little higher given their stronger reaction market shifts. Risk adjusted returns were better

for growth portfolios. The combined outcome of the study showed that growth portfolios outperformed the value stocks for the majority of the years, albeit not significant (i.e., value and growth portfolio returns were nearly the same). It can therefore be speculated that unstable economic periods make it difficult to earn a value premium because of rising growth stocks' volatility, a topic warranting more research.

Prior to the financial crisis of the 2008/2009 period, markets had gotten used to stable growth with investors calling the period as the 'Great Moderation' with less volatility in the business cycles (Hogan, 2019; Bernanke, 2018; Yan et al., 2017). This view abruptly changed at the end of 2008 when the crisis that started in September climaxed in folding of Lehman Brothers and the US Treasury's stimulus package assistance to AIG and Merrill Lynch. The crisis spread quickly worldwide and more so to Europe and Asia where the impact hit the nerve of the financial markets (Bernanke, 2018; Wahal, 2018). These events buttressed the belief that investments for price gains (growth investing) were vulnerable and even devastating when market business fundamentals are disturbed.

Aremu et al. (2019) sampled stocks screened by price to earnings growth (PEG) ratio to check the growth versus value stocks performance so as to ascertain which one yielded higher returns. They examined stock market data of the West African Stock Market of Nigeria and the annual published reports or all the industries over a period of 26 years noting that the presence of bear markets reduced stock prices. They therefore sought to elucidate on the use of modern growth and value portfolio investment strategies to create a portfolio that took advantage of bear market periods when prices of stocks were often falling and during which investor apathy was prevalent.

In such a market period, stocks would be cheap hence the opportune time for identifying and buying cheap undervalued stocks (selling below their intrinsic values) in the hope of future capital gains and dividend receipts. Their study confirmed the existence of value premiums in value stocks in the Nigerian setting with the important note of the innovation in their screening of variables.

One of the latest research, Fama et al. (2020) defined value premiums as value portfolio returns in excess of market portfolio returns and found value premiums presence in their current study to be lower in the latter half of the study sample period lasting more than 50 years. They also noted the existence of high volatilities in the monthly premiums, and they were therefore uncategorical about whether expected premiums were even in both halves of the study period; suggesting that where the investor expectations were such that value stocks carried a higher risk compared to glamour stocks on some multifactor dimension, any discovery of value premium would spell its end.

Research has documented the value effect, that is, the predisposition of value stocks (lower than fundamentals priced stocks) to produce returns much higher than those of glamour stocks (high priced stocks relative to their intrinsic value) (Lee, 2014). The predominant selection criteria of value stocks in these studies include book-to-price ratios, for instance, in Ball et al. (2019), Fama et al. (2016), and Bachmann et al. (2015), earnings to price ratios as in Basu, (1977), cashflow-to-price ratios as in Lakonishock et al. (1994) and Kok et al. (2018) as well as sales-to-enterprise value ratio. The common result in these studies was that value effect's strength varied over time and across stocks, but value stocks broadly tended to outperform glamour stocks (Guo, 2019; Hou et al., 2015). One missing item in the studies was the lack of consensus on the exact

reasons/explanation for this finding. To a number of them, value stocks were usually under-priced and therefore bound to yield their true value in the future (Djogbenou et al., 2015). On the other hand, there are those that suggest that the cheapness of value stocks had a reason and that the common value measures were indicators of some sort of inherent risk. For instance, Fama et al. (1992) suggested the apparent vulnerability of low price-to- book firms to distress risk while Zhang et al. (2013) posited the presence of trapped in value stocks firms and thus often susceptible to economic turmoil.

While the earnings persistence, for instance, how accounting-based indicators were able to forecast future returns has been a favourite research topic, the quality side has not received much attention, a view expressed in Pätäri, et al. (2018), Ngoason et al. (2015) and Wang and Xu (2015). The outstanding task is to identify the type of a business an investor would pay more for when the market multiple was held constant. When a quality firm was defined as that deserving a higher multiple, valuation theory provided the solution to the question above such that quality firms were those with higher present values of future residual incomes (Gargano and Rossi, 2018; Nugroho, 2017).

A researcher's job then would be to look at those characteristics or metrics of performance that are good proxies for future residual income present values. The key constituents of a firm's present value of future residual income would ordinarily be later years' profitability and growth since these primarily drive the firm's future return on equity, margin of safety measures and the expected dividend pay-outs rates (Goto and Xu, 2015; Toit and Krige, 2015). Here, firms considered safer would be imputed with a lower cost of capital and therefore a higher discounted

value of future income with expected cashflows being held constant (Guo, 2018; Otuteye et al., 2015). Same profitability and rates of growth but with more capital payback to investors means a higher expected present value of residual income (Green et al., 2017; Santi et al., 2017). It suffices to say that stable, secure, earnings rich firms with strong growth indications, unwavering cashflows, lower risk and higher dividend pay-outs will of necessity give higher future returns.

Style Investing in the context of the EMH

Style investing, underpinned on the belief that abnormal returns are achievable without added risk, has been undergoing academic debate for a long time. The risk-return studies have traditionally applied the CAPM of Sharpe (1964), Lintner (1965) and Black (1972), also known as SLB models, to analyse the investment theory. Certain restrictions arose within these models, for instance, Banz (1981) questioned the tenability of explaining average returns without considering size effects. His size effects research found a significant impact of a stock's market capitalisation in cross-section average returns variations. Banz (1981) findings brought into focus the SLB models shortcomings as the risk-return measures, paving the way for increased research on SLB model defined beta including other potential factors that influenced average returns in a time series.

Rosenberg, Reid and Lanstein (1985) and Stattman (1980) investigated the BTME firm ratios against their average stock returns and observed positive correlations in both variables. The US took up most of the BTME- average stock returns research interest and therefore other world markets knowledge was limited. The Chan et al. (1991) was born out of this where it identified the BTME effects on average stock returns on the Japanese financial assets market over a period

lasting 20 years. The Chan et al. (1991) study was a test of the anomalies' combinations comprising the EY (earnings yield), market capitalisation (size) effect and BTME ratio. Their study observed the presence of the value anomaly in the Japanese Stock Market with the BTM ratios and cashflow ratios having the highest influence on the differences in average stock returns, and thus confirming the early works of Rosenberg et al. (1985) and Stattman (1980). The two financial markets of the US and Japan were the dominant ones at the time of the research above.

The evidence coming from these studies rejected beta to be the only measure of risk and return. This strained the credibility of beta with many investment players starting to look for alternative factors that could explain average stock returns vis-à-vis risk. This strain on beta's credibility together with the burgeoning interest in the value stocks performance notion ignited the Fama et al. (1992) study of market beta, market capitalisation, earnings per share, leverage, and BTME joint roles in the average stock returns across three stock exchanges in the US. They found a pre-1963 beta- average returns relationship that was missing in the period 1963 to 1990 (Sari and Indriani, 2022). The Fama and French (1992) study's conclusion was that the SLB models' prediction of a positive average stock return and market betas relationship was not present in the modern investment climate. The other variables were observed to contain a significant association with stock returns and thus could explain the variations in cross-section average stock returns. Size was found to correlate negatively with average stock returns while BTM positively related with average stock returns. They argued for the size effect's prime importance with the BTM explaining a big part of average returns variations (Fama and French, 1992). These findings were in congruence with those of Rosenberg et al. (1985), Banz (1981) and Stattman (1980).

The beta insignificance finding was repeated in the emerging market studies of Rahmani, et al. (2006) on the Tehran Stock Exchange and the Johannesburg Securities Exchange (JSE) studies of Toit and Krige (2014) and Van Rensburg and Robertson (2003). Fama et al. (1992) created a three-factor model, a model combining the value, the market capitalisation, and the momentum effects, from the other tested variables to explain the average cross-section returns in a more rigorous manner. Their finding was that the value effect (as measured by BTM) dominated the explanations of the average cross-section returns in a consistent manner over their study period with a positive relationship in the two variables that was significant (Green. 2017). This indicated that the likelihood of higher BTM ratios resulting in higher average stock returns implying a finding of a value strategy that generated superior results in the period of their research. This finding pointed to the confirmation that markets can be beaten, on a risk adjusted basis, using style investing, an event that has been perceived in the literature as going against the tenets of the EMH.

The Fama et al. (1992) result failed to reject the EMH in totality but instead innovated a model construction process that culminated into an alternative model usable together with the EMH. Their masterpiece piece of work altered the longstanding approach to value and growth investing and the risk-return relationship associations as derived from the SLB model.

While previously the evaluation of average returns approach was from the CAPM standpoint that dictated an investor compensation for assuming added risk, Fama and French (1992) saw beta to be insufficient as the single variable to explain average cross-section stock returns and therefore the added variables served a far bigger and important role in providing explanations of average stick returns. Their conclusion was that value stocks tended to outdo

growth stocks due to risk since the former carried higher inherent risks as compared to growth stocks. This conclusion starkly contrasted with Lakonishok et al. (1994), where the belief was that the value stocks superior performance arose because they were "contrarian to naive strategies followed by other investors" thus not considering increased risk to be of any value in explaining the value stocks' better results.

The Fama - Lakonishok variables and findings looked anomalous to markets. Market anomalies showed risk-return relationships that are inconsistent with the potential to make markets to operate in an inefficient manner. Such anomalies call for close observation within the EMH so as to uncover emergent opportunities or risks that may follow. Value and growth investing topics have received a more than proportionate interest in market anomalies research (Siddiquee, 2017). These anomalies have been understood to arise from investors' assumptions that future superior returns are possible given the historical observations, contrary to the EMH's postulation that past information is no predictor of future returns. Investors in the Style approaches do not subscribe to the EMH because of their belief in incorrect pricing of securities and growth investors see the possibilities of predicting earnings from historical fundamentals (Pätäri, et al., 2018; Black and McMillan, 2004). Lakonishok et al. (1994) view, while rejecting the EMH, was that the incorrect pricing of securities intuition was tenable and due to irrational investor behaviour, one could consistently outperform the market.

The existence of a value premium

Value premium is the risk-adjusted return of a security and is usually more or bigger than the growth security's, which Romer (2019) referred to as the equity premium puzzle. Empirical

evidence exists showing that value securities outshine the growth ones in a consistent manner over long investment time horizons (Fama et al., 2020; Fama et al., 1998) as already argued out before. Fama et al. (1992) showed the presence of a value premium in the U.S. market over the time span of 30 years. An extension of their study backwards to 1926 was still able to identify a value premium in the prior period's average returns (Davis, Fama and French, 2000).

Value premium has been shown to exist outside the U.S. market too. The Fama et al. (1998) study uncovered the existence of a value premium in the European, Australian, and Far East markets. Chan et al. (2004) endorsed a number of motivations of the superlative outcomes of value stocks, also providing newer results along profit lines in the value investing approach in a larger sample set data outside the U.S. Markets. Other studies with short sample periods showed the pervasiveness of value premiums (Hutabarat, 2022; Oladeji et al., 2018; Moy, 2014). Athanassakos (2009) study on the Canadian market found a consistent string of value premiums over the period 1985-2005, in both bull and bear markets and was not muted in none of the economic cycles periods. Otuteye et al. (2013) value investing heuristic analysis of the Canadian exchange found value portfolios outperforming both the market portfolio and other constructed portfolios that were not value based. Beyond the low P/E, P/B, or P/CF ratios constructed portfolios, there is evidence of value investing style based on the postulations of Graham outperforming other styles over long periods (Graham et al., 2013; Gregory et al., 2013). Graham et al. (2009) performance research over a 51-year period demonstrated a consistent 15% or higher annual returns better performance of a value approach. In Buffett (1984) performance of nine investment funds considered to be successful and thought to be managed along the value investing approach was tracked and analysed

and found that seven out of nine of these funds produced long term returns two digits above the market average (Hutabarat, 2022).

While the outperformance of the value over growth stocks has been observed, the reasons why value stocks were superior in return terms are yet to reach a consensus. As an example, Fama et al. (2017) saw this performance in terms of higher risk levels inherent in value stocks by reason of their vulnerability to financial distresses (Lev, Baruch and Srivastava, 2020). Waistell (2016) considered value stocks to be riskier as they tended to be under distress quite often, coupled with high financial gearing ratios and unpredictability of their future revenue genaration ability. It therefore appears that the explanations of value premium on the basis of risk have their roots in the notion that things that perform better over a long period must have a risk premium, since academia believes firmly in the positive relationship between risk and return. In Kuiper (2017), it was said that chances of growth remained the sources of high betas since growth options have normally been of most value during boom periods with implicit leverage, thus increasing beta and hence containing a significant amount of systematic risk. Zhang et al. (2013) considered growth stocks as the high-risk ones compared to value stocks by reason of growth stocks leverage on existing assets. Rong (2013) made an argument that growth stocks' high prices lacked incorporation of the stock's fundamentals but reflected investors' heightened exuberance about the future of companies invested in. Israel and Moskowitz (2013) saw value portfolios to be of low betas regardless of the sorting metrics (whether P/E or P/B).

Other studies put forward explanations that were contrary to the above, for instance, in Peters and Taylor (2017) and Lakonishok et al. (1994) the position was that cognitive biases as

well as agency costs influenced the value portfolios superiority. McLean and Pontiff (2016) pointed to the investor expectational errors as the reason for value portfolios superior returns. Chan et al. (2004) and Jacobs and Levy (2014) showed the closeness of both value and growth betas, hence ruling out systemic risk as the reason of the existence of the value premium. Miller et al. (2015) implied that no other reason could be given for value premium save the behavioural thesis. He ruled out the rational-asset-pricing hypothesis and the new paradigm thesis. For Siddiquee (2017), explaining value premium by pointing to higher risk of value stocks appeared tenable only in the narrow definition of value as low P/CF or low P/E or low P/B ratios. Penman et al. (2015) have affirmed that the asset pricing research literature has been asserting the consistency of value investing link to positive supernormal returns and thus showing that firms that traded at lower pricing multiples, with statements of financial position that exhibited strength, foreseeable sustainable cashflows, increasing profitability, muted volatility, low betas, and distress risks that were comparatively lower had returned higher sustained future returns (Stambaugh et al., 2016; Athanassakos, 2013c). An important question arising is whether price equated to value (Penman et al., 2016; Hirshleifer, et al., 2004). Lee (2014) has given an elaborate synthesis on this question. The synthesis began from reviewing the efficient markets hypothesis' original proposition of asset market prices containing all the available information.

The first applications of the EMH in accounting took cognizance of the fact that prices' adjustment speed and accuracy to new information was dynamic and not a mere instance (Hutabarat, 2022; Cronqvista et al., 2015). In this vein, the EMH's strong form claim of price being right has gained currency with its application in the equity markets asserting the stock's price forecast optimality of the present value of the future expected dividends. This view of the price of

a stock being equated to the present value of future dividend pay-outs now explicitly appears in the valuation literature as a primary assumption (Lev, Baruch and Srivastava, 2020; Stambaugh et al., 2016; Lee, 2014). These explanations seem to be invalid since poorly performing stocks from earnings, cash flow or sales growth perspective fail to meet the criteria applied by true value investors and hence would fall outside the class of what can be called value portfolios. Accordingly, stocks selected solely on the price multiples fail the thorough analysis requirement in Graham and Dodd (1934), yet again keeping the debate on value premiums existence intuition open. The next section dissects the Lakonishok et al. (1994) study in more detail.

The Lakonishok et al. (1994) research was an extension of prior value-growth phenomenon works and provided further value effect existence evidence. Their study was based on all the constituent firms in the the USA over the 30-year time period. The data set of their study included only the highest 50% of stocks and thus constrained by market capitalisation (size) and this constraint was motivated by the need to ensure a research sample that reflected the correct institutional investor investable universe. They then used four criteria to test the value-growth phenomenon and thus ranked stocks on the basis of (BTME) ratio, CF/P, E/P, and sales growth ratios (GS). This ranking of stocks on this criterion was then followed by stock grouping based on the relative ranking resulting in ten portfolios, each year. The highest ratio stocks from the relative measures of relative BTME, CF/P, E/P and GS ratio went into the decile ten portfolios and the ratios decreased with each consecutive decile and decile 1 formed the lowest ratio stack of stocks. Here, then growth portfolios were in decile 1 and the highest ratio stocks, decile 10, represented the value portfolios. Their portfolio construction was then followed by a tracking of aggregate performance of the ten portfolios on an annualised 5-year period. Therefore, ten new portfolios

were constructed each year, starting from quarter 1 (April 30), recording their decile-by-decile returns for the subsequent 5-year time period. They had twenty-two sets of deciles in each of the criteria metrics at the end of their portfolio construction process. They then evaluated the value-growth investment strategies over 1-year, 3-year and 5-year term periods of investment horizons.

The Lakonishok et al. (1994) results showed a value stocks' outperformance of their growth counterparts over the period covering 1968 to 1989, with the value effect being significant over longer periods of investment. Their analysis was subsequently averaged over the 22 decile sets so that the value-growth portfolios relative performance could be compared against each other. The comparisons of these averaged outcomes revealed a research period's wide margin average returns better outcome of value stocks over the growth ones. The researchers then saw the reason for the value effect's presence as being the investors' excessive optimism of glamour stocks and excessive pessimism of value stocks as they formed their future growth forecasts from historical growth observations (Lakonishok et al., 1994) and thus the authors did not think of higher risk as a driver of the value effect but rather irrational investor behaviour as the more plausible cause (Lev, Baruch and Srivastava, 2020).

Following the early studies of Lakonishok et al. (1994) and Fama et al. (1992), the study by The Brandes Institute (2008, 2009) on advanced financial markets (the US and non-US), using the Lakonishok et al. (1994) approach as the base aiming to determine the profitability potential of investing in value stocks together with the related optimal timing advanced the discussion. To eliminate the possible randomness in the Lakonishok et al. (1994) findings, the research in the Brandes Institute (2009) expanded its sample and methodology by (i) extending the study period

to mid 2008 for reasons of including the recency of market trends into the analytical model and thus the study sample period ran from 1968 – 2008, (ii) as opposed to the Lakonishok et al. (1994)'s stocks only on the NASDAQ and S&P, The Brandes Institute (2009) extension covered all the stocks of US domiciled firms listed on at least one US exchange. The early studies had come under some criticism on their stock selection sampling method that depended on market capitalisation and thus included a whole lot of stocks that were not viable investment vehicles (Toit, 2012) and thus it was debatable whether that sample truly represented the investable universe available to investors (The Brandes Institute, 2009). The Brandes Institute (2009) thus made another extension, (iii) exclusion of the smallest half of the firms according to their relative market capitalization, (iv) having eliminated the micro-capitalisation (Micro-Caps) stocks, the balance of the firms in their sample were segmented into a Large-Cap and Small-Cap segment. In the residual firms, the highest 30% were put into the Large-Caps relative to their market capitalisations and the balance 70% classed in the Small-Cap basket. The aim of all this was to determine the existence of a value-growth relationship across differing market segments on a consistent basis.

The Brandes Institute (2009), after making the above extensions and applying the Lakonishok et al. (1994) methodology, observed a persistent value premium, both in the aggregate and individual market basis, for the developed financial markets. This was in accordance with the earlier findings and hence the value premium was established not to be a result of randomness. The Brandes Institute (2009) further observed variations, across data sets, in the value stocks' degree of outperformance. However, the value premium showed some consistencies in all the valuation multiples, across the time series, across regions, and across market sizes (capitalisations)

as the value effect was consistent among the Large-Cap and Small-Cap segments (Holthausen and Zmijewski, 2020).

The Brandes Institute (2009) extended the research further with a concentration on the relative valuation variability of P/B ratios in value vs. growth stocks aspects within the US equity market, and the possible existence of a significant relationship of a valuation difference multiple and the value vs. growth stocks results showing in later periods. The valuation difference multiple (as a measure of dispersion as opposed to measures of central tendency) measures the disparity/uniformity in valuations at the market extreme ends. The higher the valuation difference multiple, the higher the disparity. In a value vs. growth stocks perspective, a higher ratio would imply more expensive growth stocks compared to the value ones. Uncertainties and/or market confidence shocks in security prices could potentially result in greater relative valuation disparities. To determine the existence of a valuation disparities-subsequent performance relationship, their study tracked each portfolio's performance over 5-year periods following the portfolio inception. After recording each portfolio's 5-year annualised returns, the annualised excess returns were computed and compared to the valuation difference multiple. The Brandes Institute (2009) observed a pattern of the value stocks outperformance tracking rising levels of the valuation difference multiple.

Timing in style investing

On whatever basis style investing is applied, that is, whether it is firm size, the class of asset or any other metric, the concept needs to be thoroughly understood by the investor since active investors believe in market outperformance by employing timing and style changes in a

dynamic time and business cycle varying environment. Timing and style choice have equal weighting in the investor's decision function.

In Kao and Shumaker (1999), an investors market beating probability was observed to increase with the efficiency and timing of the implementation of the style (Toit, 2012). The return and style investing studies were previously carried out on long investment horizons whereas the Kao and Shumaker (1999) equity style timing and investment returns study was based on shorter time horizons covering the period 1979 - 1997. The potential value-added sources in their study were size, style and market strategies where the size effect was dubbed small-cap vs large-cap investing, style was considered within the value vis-à-vis growth investing styles while market strategy compared equities against other asset groups. They controlled for benefits receivable from tactical asset allocations to estimate the value addition extent out of timing strategies by simulating the following: (i) large capitalisation (large-cap) value vs growth and small capitalisation (small-cap) value and growth asset allocation was carried out in the style timing class for the size effect control purposes; (ii) for purposes of isolating value vs growth effects, they used the same method in (i) above and large-cap value vs small-cap value and large-cap growth vs small-cap growth were applied to control for the style effect (Israel, et al., 2020; Toit and Krige, 2014).

The Kao and Shumaker (1999) study improved performance being contributed to by superior timing of the strategies. Asset class and size-based timing strategies allowed investors ample chances for market outsmarting as compared to a value versus growth investing strategy. Their study found significance in these findings in the modern investment paradigm and thus emphasized the usefulness of the style investing and timing approaches (Toit and Krige, 2014).

Their study applied the Fama et al. (1992) three-factor models to dissect the returns achievable through timing strategies over a 30-year period, evaluating the returns on a 5-year moving average periods, adding it to the 3-factor model and found fluctuations in possible returns from the style allocations over the period, devoid of significant trends. Market and size opportunities from tactical allocations were intermittent and disappeared over time. In the final analysis, they concluded that of critical importance is the proper anticipation and timing of cycles and the resultant asset allocation for any investor hoping to outsmart the market (Toit and Krige, 2014), a conclusion repeated in Otuteye et al. (2016).

In a style investing based study on the South African market, Langa (2016) uncovered evidence of the value effect on the whole size spectrum concluding that style timing improved investor returns, and thus correctly timing cycle turn points and forecasting relative performance of the various investment styles was beneficial. Thus, for instance, premature stock buys create exposures to periods of underperformance, implying that the cyclical nature of investment styles require optimizing purchases timing, sales, and style changes, probably an art rather than a purely scientific exercise (Israel, et al., 2020).

Conclusion

Despite value investing having shown strong performance over the years, momentum seemed to shift away from it and towards growth investing from around 2007 (Fama and French, 2020; Toit and Krige, 2014; Toit, 2012). Langa (2016) noted that the growth stocks underperformance ceased in the year 2007, and on a 5-year rolling basis from a South African context. This shift in the value stocks fortunes is yet to be fully explained. The clarity available for

this turnaround phenomenon is that it was observed in a period of high and rising interest rates, difficult market conditions, and a credit crunch (the global financial crisis) when stock prices went crashing resulting in a global recession.

The seminal Fama and French (1992) paper uncovered the primary drivers of cross-sectional stock yield outcomes to be a firm's market capitalisation and the B/M ratio and thus ended the beta dominance (Chou, et al., 2004) but Fama et al. (1992) considered the market capitalisation and B/M factors that were distressed not contained in the CAPM. Schwert (2002) showed the tendency of market anomalies to vanish following the publishing of academic papers about the same anomalies and if this held then the Fama and French (1992) results would not be significant beyond their publishing date (1992). This prediction motivated the research by Chou et al. (2004) that analysed the panel data of stock returns that were to be expected, 10-years after the Fama and French (1992) work. Their 1963 – 2001 data set research sought to determine the continuity of the Fama-French anomalies beyond 1992 and found evidence of survival of both the size and the BTM effects beyond the 1992 period.

The influential Lakonishok et al. (1994) work opened up opportunities for future study when it changed the value-growth anomaly dynamics, culminating in new thinking as market participants put in effort to comprehend and profit from the value premium phenomenon. Many studies followed their ground-breaking research applying their methodological approach. The ensuing criticism saw their findings as being sample specific and a result of randomness, a game of chance. However, the follow up study by Fama et al. (1998) reaffirmed the value premium as a global reality.

The Lakonishok et al. (1994) paper was acknowledged by The Brandes Institute (2009) as seminal entry in the value-glamour canonical literature while corroborating the Lakonishok et al. (1994)'s methodological approach as well as the results. Consensus has thus been that Lakonishok et al. (1994) arguments remain applicable to the present era of investment decisions (Fama et al., 2020).

Under conditions of market efficiency, high valuation disparities in value-growth stocks would portend higher growth stocks outperformance relative to the value stocks. Nevertheless, such an outcome's support is missing from historical literature.

The Brandes Institute (2009) article reaffirmed the existence of a value phenomenon arguing that instances of greater valuation disparities in value vs. growth stocks was likely indicative future value stock outperformance. Similar conclusions were found in Guo (2019), Langa (2016), and Toit (2012).

The preceding conclusions from findings appear to indicate the identifiableness of valuation multiples, or valuation disparities' significant relationship with subsequent relative stock performance. Historical evidence indicated that unusual high value - growth stocks dispersion was a pointer to future better yield associated with value stocks.

The re-emergence of the growth stocks post the most recent global financial meltdown resurrected the value-growth investing debate and with a new centre of focus in the other

speculative causal variables of the value premium phenomenon. This obviously was indicative of the uncertainty that still existed around the topic of style investing. With the overwhelming evidence found in support of value stocks pre-eminence in long investment horizons, a one viewpoint on the determinants of the value premium is untenable given the existing contradictory research works. The critically important need is how to correctly position a portfolio in expectation of market changes. It is therefore recommendable to check for the existence of a value premium and its drivers in the Kenyan market.

Knowledge gap

This chapter reviewed the theoretical underpinnings of value investing which can be grouped in two categories of a noise trader framework that helps to understand the value premium framework and an accounting-based valuation framework that reconciles the existing empirical findings (Lockwood et al., 2022; Guo, 2018; Hou et al., 2018; Lee, 2014), for instance. It was established that historical accounting data played a crucial role while conducting security analysis and it is used prevalently in fundamental investing. Keen fundamental analysis is important in deriving performance indicators that play a role in predicting firm profitability and growth (Ho, et al., 2022; Wahal, 2018; Wang and Xu, 2017). The firm risk profile and dividend pay-out likelihood are also obtainable from fundamental analysis. Accounting information is therefore a key aid in evaluating both the future cashflows and the riskiness of the future pay-outs (Ho, et al., 2022; Mohanram and Vyas, 2018; Yan and Zheng, 2017). These variables are important in the present value evaluation of the future expansion opportunities of a firm. The Graham and Dodd (1934) framework of buying quality firms below their intrinsic values and security analysis using accounting information appears to be validated in a majority of the studies and as put in Safdar et

al. (2022) and Lee (2014), this style promises an edge in one's investment choices and could move markets towards efficiency.

Two key facts were evident in the literature survey: first, real value investing factors in the bargain price and quality elements and has a linkage with higher future returns on securities, and second, value investing is a style actively exploited by professional investors (for instance Warren Buffet's Berkshire Hathaway) (Ho, et al., 2022; Waistell, 2016; Lee, 2014; Buffett, 2010; Buffett, 2008). The issue is the continuity of this value effect into the future. Some of the important questions to ask here are: why hasn't arbitrage eliminated fully these effects? Why are there some players who still buy expensive low-quality stocks? The literature has provided a set of explanations for the continued existence of these value effects which can be viewed in three categories: (i) risk-based reasons, (ii) preference-based reasons, and (iii) behavioural-based explanations (Gou, 2019; Hou et al., 2017; Lee, 2014).

The risk-based explanations face the challenge that well measured value stocks are actually more secure compared to growth stocks. The standard academic approach to value investing focused on the cheapness of a security (as identified by its market multiples) (Hou et al., 2018; Lee, 2014). However, cheap stocks are valued in this manner because the full basket of cheap stocks contains a sizable number of low-quality firms, disproportionately (Hou et al., 2015; Lee, 2014). With quality measures incorporated, value investing would not take on additional risk on average (Lee, 2014). Survey results have shown that stocks with stable cashflows, lower financial distress, lower beta and lower volatilities are associated with higher future realized returns. Risk based explanations therefore fail to reconcile with these findings (Barroso et al., 2018). The

preference-based explanations provide that some investors hold stocks beyond the mean-variance trade off given in the standard asset valuation approaches (Lee 2014; Fama, 2013) and for instance prefer lottery-like payoffs. The preference-based explanations are difficult to differentiate from behavioural explanations empirically (Zhang, 2015) but where investors innately prefer lottery like stocks, the value effect has shown persistence into the future (Lee, 2014). The behavioural based explanations for the value effects were seen to be entrenched in human cognitive behaviour.

The literature review extracted a few unsettled issues. For instance, that economic and financial sector crisis events promote the belief that investments for price gains (growth investing) is vulnerable and even devastating when market business fundamentals are disturbed but no consensus has obtained on the economic intrusiveness of this result (Ball et al., 2019). While the earnings persistence, for instance, how accounting-based indicators are able to forecast future returns has been a favourite research topic, the quality side has lagged behind (Chinco et al., 2019). The outstanding task is to identify the type of a firm an investor would be willing to pay more for when the market multiple is held constant (Avery et al., 2016). When a quality firm is defined as that deserving a higher multiple, valuation theory provides the answer to the question above such that quality firms are those with higher present values of future residual incomes (Chordia, 2014; Lee, 2014). The job remaining then is identifying those characteristics or metrics of performance that are good proxies for future present values of residual income (Green et al., 2017). Key among them would be future profitability and growth since these primarily drive the firm's future return on equity, margin of safety measures and the expected dividend pay-out rates (Guo, 2018; Harvey et al., 2016). These variables have received little empirical attention to date and this thesis

contributes to the gap by incorporating robust composite measures of quality from accounting information.

The literature provided implications that the ruling ideas of traditional models (for instance, Fama et al., 2020; Chinco et al., 2019; Green et al., 2017; He et al., 2017) do not fully explain: i) the issues of the rationale for individual investors trading, their performance, their portfolio choice methods and why returns vary across stocks for reasons apart from risk; ii) the rational decisions of corporate managers still fail to produce expected results in mergers and acquisitions hence providing a puzzle still to be studied and explained since these produced still anomalous outcomes; and iii) the behavioural school's arguments about anomalies in the efficient markets fail to provide guidance on possibilities and methods of exploiting these irrationalities and investors still want to know whether there's money to be made from the price anomalies - a point that behavioural finance is yet to settle. These gaps lead to the following begging questions, which this study attempted to address through a robust methodological research design; i) Is value investing a better strategy than growth investing in all environments, even when crises are a reality? ii) Does behavioural finance do a better job of explaining the empirical results? Are there more robust metrics for selecting value stocks beyond the price multiples dominating empirical studies?

This thesis was conceived with the inherent premise of securities markets having inefficiencies and hence the value investing approach being proposed as having the ability of performing above passive investment methods hence its superior proposition. The thesis was a build-up on other studies in advanced markets and applying them to Kenya. The thesis combined

both the price multiples and fundamental analyses measures of value stocks with behavioural biases measures to contribute to the generation of additional knowledge in the field while drawing on other disciplines to suggest different explanations of value premiums and clarify and/or augment the existing ones.

Literature review summary

The chapter provided a summary of the relevant finance theories pertaining to portfolio investment as well as the evolution of these theories focusing on the two main schools of thought constituting the pillars of contemporary financial literature. The EMH is anchored in the expectation of rational behaviour of investors and leads to the conclusion that markets have access to perfect information about the prices of assets traded in the market and thus no arbitrage opportunities exist. This then implies that no investment approach is better than another and returns on assets cannot be better than what the market provides. On the other hand, the behavioural finance school makes an assumption that rational behaviour was absent in investor actions and therefore investors apply heuristics in investment decisions potentially creating biases or anomalies in the market and hence the mispricing of assets. These created possibilities of investment approaches that beat the market.

The empirical review then found the following summary of the empirical studies. The anomalies literature looks at strategies that have the potential to produce superior risk-adjusted returns, for instance, investing in momentum stocks or in value as opposed to glamour stocks (Zhou et al., 2022; Akinde et al., 2019; Kuiper, 2017; Kahneman, 2015). Other studies, for instance, Tidmore et al. (2022), Fama et al. (2017), Langa (2016) and Kliger et al. (2010),

examined real investment results investing whether professional money managers were able to produce higher than market results, but the results have been inconclusive. These studies then proposed several strategies which would have been responsible for superior results (Takaishi, 2022; Lev et al., 2019; Jurado et al., 2015), along the anomalies literature explanations.

Some economics literature interprets the anomalies literature as being consistent with several 'irrationalities' that are imputed to individuals in situations of complicated decisions (Maier, 2018; Otuteye et al., 2014). These irrationalities are broadly classified in two categories; i) improper information processing and therefore wrong probability distributions inferring about expected rates of return; and ii) often inconsistent or suboptimal decisions are made even when a probability distribution of returns is presented (Wichlinski, 2019; Kondor and Vayanos, 2019). The mere fact of the presence of irrational investors does not make capital markets inefficient since if such irrationalities were to affect prices, then highly alert arbitrageurs converting arbitrage opportunities would be expected to move prices back to equilibrium (Ng'ang'a, 2019; Otuteye et al., 2016). Therefore, the dominating ideas of traditional models play only limited roles in understanding issues of the rationale for individual investors trading, their performance, their portfolio choice methods and why returns vary across stocks for reasons beyond risk (Bernanke et al., 2018).

The behavioural school critique is that there's limited space for arbitrage by arbitrageurs and hence such arbitrage actions will be insufficient to equate prices to their intrinsic values. It cannot be argued against the fact that when prices are right, that is equal to the intrinsic value, then the easy profit opportunities are unavailable (Guo, 2019; Petrova, 2015). However, with limits on

arbitrage activities the absence of profit opportunities does not imply efficient markets presence. The corporate finance literature has provided evidence of the failure of mergers and acquisitions as well as capital structure decisions confirming that managers behave rationally as expected from the theories hence providing a puzzle still to be studied and explained (Shah et al., 2019; Zakaria et al., 2017; Tang et al., 2013). Since most tests in the EMH focus on the existence of arbitrage opportunities, as reflected in money manager performance, the failure of these managers to systematically perform better than passive investment strategies do not necessarily imply that markets are efficient (Israel, et al., 2020; Zakaria et al., 2017).

In the Linnainmaa et al. (2017) analysis, traditional finance objects to behavioural finance by suggesting that theoretical behavioural models seem to be ad hoc designed to explain specific stylized facts. This suggestion has been rebuffed by the assertion that behavioural models are derived from people's behaviour in their natural settings based on broad experimental data and hence explain evidence more rigorously than the traditional models (Nareswari et al., 2021; Loughran and McDonald, 2016). The behavioural school's arguments about anomalies in the efficient markets fail to provide guidance on possibilities and methods of exploiting these irrationalities (Mugenda et al., 2022; Moreira and Muir, 2017) and investors still want to know whether there's money to be made from the price anomalies, a position which even behavioural finance has not resolved.

Behavioural finance has also been challenged by the traditional models in that it appears to be susceptible to data mining in empirical work. The response here has been the fact that empirical work will mostly get evidence confirmation out-of-sample in time periods and cross

section terms across jurisdictions (Munetsi et al., 2022; Atmaningrum et al., 2021). Additionally, behavioural finance is accused of not presenting a unified theory as compared to what expected utility maximization using rational beliefs does. In this vein, however, traditional risk-based models have not fared well when empirical data is analysed (Cherono et al., 2019; Nugroho, 2017).

Still, a significant critique of the behavioural finance theory is its apparent unstructured form where it appears to allow almost any anomaly to be explained away by some combination of irrational behaviour forms picked from a 'laundry list of behavioural biases' and therefore creates opportunities to reverse engineer a behavioural explanation for any anomaly (Kartini and Nahda, 2021; Maier et al., 2018; Subrahmanyam, 2007). Hence, a consistent or unified behavioural theory able to explain a range of behavioural anomalies is yet to be formed/constructed.

The literature review also found a claim that a normative theory whose only intuitive basis is rational utility maximization cannot pass the superiority test against the behavioural alternatives just because it analyses how people ought not to behave. When people behave differently from the rational utility model, the approach is faced with insurmountable limitations in explaining financial phenomena (Bofinger et al., 2022; Arnott et al., 2021).

Hewamana et al. (2022) and Hutabarat (2022), noted that the said anomalies are not consistent in their effort to support one type of irrationality against another, for instance, there's some documentation of longterm corrections, that is, consistent with overreaction, while other reports document longterm continuation of abnormal returns, that is, consistent with underreaction.

The irony is that the behavioural school's insights appear to have been embraced in the EMH's propositions of passive investment, through indexes, portfolio strategies in order to avoid behavioural inefficiencies. Hitherto, it appears only very few investors can consistently beat passive strategies, and this may hold true whether the involved investors are behavioural or rational (Bachmann et al., 2018). Therefore, there seems to be a motivation to build on the same models which are consistent with evidence as opposed to models reliant on rational economics with limited empirical support (Jallow et al., 2022).

There, therefore, remain questions on whether the anomalies are reflections of risk premiums absence in the simple risk-return models or merely reflect data mining (Hou et al., 2017). The apparent failure of active investment strategies adopted by money managers in turning these anomalies into better profits on actual investment portfolios adds to the doubt in the anomalies' reality (Kimani et al., 2022; Li, 2022).

CHAPTER 3: RESEARCH METHOD

Introduction

The stated research problem in this thesis was to uncover evidence of whether the value investing approach was superior to growth investing in the Kenyan investment environment. This research problem was expected to generate new knowledge to the investment finance literature by addressing the key problems of value and growth style definitions, measurement, selection, and investment returns.

The primary intention of value investing is to preserve the capital invested while yielding long-term returns on invested funds. There are at least four stages involved in the investment's lifecycle, following Modigliani (1966) namely: capital building/formation/accumulation (lifetime earnings), protection (smart investments), postponed consumption (retirement support), and distribution (donations and bequeathals) (Romer, 2019; Dornbusch et al., 2018). Investing for value ensures maintenance of purchasing power since the original funds invested are protected against inflation and other risks. The wish/desire to improve the economic conditions of people and their maximization of net worth drives the behaviour of investors (Damodaran, 2015). Evidence of the above was seen in the investment and behavioural finance literature where stock buying was motivated by profit making anticipation while minimizing potential losses. With the motivation of making a profit, investors work hard to insure against losses and return a profit on their investment (Mankiw, 2016).

The question of whether value investing is a better strategy than growth investing is still valid and hence value premiums for stocks when financial crises are a reality needed further

studying. The problem in the literature and in the practice of investment has been that the active investment styles of value and growth investing produced mixed results and hence which style consistently beats the other is still unsettled. There is also the definitional problem of what value and growth stocks are. The varied definitions give rise to variable choice challenges hence affecting the research results (Hou et al., 2018; Yan and Zheng, 2017).

Therefore, this dissertation's primary purpose of this quantitative study was to carry out an investigation to determine whether an investment basket of value stocks yielded superior returns compared to those of the growth alternative, in the active investment style class. The dissertation sought to determine the possibility of uncovering a link between returns in equities investments and the style of investment's characteristics. The relevant value phenomenon predictor variable, the valuation difference multiple, was core to this study. The study also purposed to validate a fundamentals-based investment portfolio construction methodology in the local environment, the Nairobi Securities Exchange.

The research objectives were then outlined as being: To determine which of the leading and competing active investment strategies of value and growth investing is superior; to explore how the possible framework of value investing portfolio construction can be derived to yield superior returns; to carry out an empirical test of a previous successful investment approach on the Kenyan environment; and, to extend this approach by applying forecasting principles with a view to improving the original investment strategy's results.

Because the study investigated the performance of value stocks relative to growth stocks as measured by their returns, only numerical data was used and thus the quantitative method of research was applied in the study. Hypotheses were formed from existing investment finance theories and expounded on in the theoretical framework section in the literature review.

Following from the research study problem statement and taking cognizance of the fact that the question of value stocks' performing better than growth stocks has been empirically studied mainly in developed countries' stock markets with a significant number concluding that value stocks did outperform growth stocks, this dissertation examined the situation of value investing in a developing country, Kenya, with the research questions being:

I. Would a value stocks investment portfolio yield better returns than a growth stocks portfolio on the Nairobi Securities exchange?
II. How would a framework of value investing be constructed in an investment basket to ensure optimum investment returns?

The related hypotheses then developed in chapter two were as below:

Hypotheses: Empirical research 1

H_o: A value-based portfolio's (characterized by low Price to Book ratios) returns are not lower than those of a growth portfolio (characterized by high Price to Book ratios).

H_1: A value-based portfolio's (characterized by low Price to Book ratios) returns are higher than those of a growth portfolio (characterized by high Price to Book ratios).

Hypotheses: Empirical research 2

$H_{2.1}$: The F_Score approach to investing together with its variants can identify stocks that will win in the future in the Kenyan stock market.

$H_{2.2}$: Combining the alternative F_Score components produces better performance relative to the original F_Score investment strategy in the Kenyan stock market.

$H_{2.3}$: The F_Score strategy of investment with the related alternatives is able to identify winner and loser stocks no matter their linkage to any particular book-to-market ratio class.

This chapter then sets out the theoretical assumptions and the philosophical paradigm anchoring the thesis. Under the research approach and design section, the population and sample of the research, the materials/instrumentation of research tools, the operational definition of variables, the study procedures and ethical assurances, the data collection and analysis process as well as the methods and the procedures used in finding answers to the research questions were described. It explained why the stated philosophical paradigm was selected and why it differs from the alternative philosophical paradigm(s). A brief discussion was provided on this specific paradigm's relevance as regards the finance literature. From this, the focus turned to presenting in detail, the research methods where a previous successful investment approach was identified as a significant point on which both the empirical tests and the extension approaches were based. The chapter included a description of the Kenyan stock market and the chapter concluded with a summary.

Research Approach and Design

Methodological position

The philosophical underpinnings of a research project need to be considered before and during the research process since it is likely to impact the researcher's treatment and definition of knowledge as well as the study of social realities (Turri, 2016; Flowers, 2009). The two key positions given in the literature, for instance Flowers (2009), which affect the view given to these issues are epistemology and ontology.

Epistemology deals with that which is taken to be the accepted body of knowledge in the subject of study (Encyclopaedia Britannica, 2020; Bryman and Bell, 2011). Here, an attempt is made to distinguish between knowledge generation and research in natural sciences verses their applicability in the humanities and/or social sciences (Benton, 2017; Bryman and Bell, 2011). Saunders et al (2009) delineated that a study that collected objective and measurable data aligned well with the natural sciences' world as opposed to a study that looked at attitudes and feelings which would thus not pass the definitions of acceptable knowledge. Epistemology concerns itself with the relationship that obtains between the researcher and the study object. The researcher's impartiality in data analysis is both expected and assumed. This then results in two divisions under epistemology: positivism and interpretivism (Talbert, 2015; Bryman and Bell, 2011).

Pernecky (2016) explained that all research pieces either emerged from or were related to a specific academic discipline's nature. Positivism applies where accepted knowledge is that which arises from empirical studies and comes from phenomena that are observed directly and therefore produce a theory that is generalizable akin to what happens in laboratory studies in the natural sciences (Benton, 2017). Positivism assumes the existence of a single reality that is amenable to objective interpretation through data analysis and the research is abstracted from the study object (Turri, 2016; Haneef, 2013). A scientific study approach involves a two-step process: i) the research aims, and ii) the methods of investigation. The research aims' interest is to understand the properties and relationships of the reality such that theories are generated, results can be forecasted, and/or existing findings are validated. Investigation methods entail the application of rigorous and systematic methods constituting verifiable theories (Pernecky, 2016). Post-positivism relaxes this

strict expectation by acknowledging that the research process influences the results but strives to follow the strict positivist approach.

Interpretivism, on the other hand, arises from social science researchers that have a contrary view of knowledge and posit that humanities science fundamentally differs from the natural sciences and hence must have another view of knowledge (Talbert, 2015; Flowers, 2009). Therefore, to the interptivists, making sense of the social world must accommodate subjective grasps of social behaviour.

This research was based on stocks and trading data from the Nairobi Securities Exchange (NSE) obtained from official sources, that is, directly from the NSE. The goal was to gain an objective view of the acquired data. The data was subjected to significance tests using standard statistical tools available. The thesis' methodological position was that of the positivist element of epistemological position.

The Ontology philosophical position describes human behaviour around their social settings with the important question of whether society emerges from the behaviour of social actors in that society or society arises without the influence of its actors (Larson et al., 2014; Bratland and Maki, 2014). Two branches arise in ontology as well: objectivism and constructionism. Objectivism takes the world and social realties as independent of the players involved. An illustration was given in Bryman et al (2011) where a corporate entity develops rules and regulations that shape employee behaviour. The objectivist in this instance would consider the corporate entity to have an existence that is independent of its employees (components) with the employees being shaped and modelled

to fit in the corporation's visions and missions that are created externally. The corporate entity is thus taken to be an object that exists as a reality.

Constructionism, on the other hand, sees social realties as having been brought about by the actors within the entity. The participants then shape and model the entity as per their wishes and desires. The shaping and moulding is done through active actions, decisions as well as indecisions. In the preceding example, the corporate entity, though with rules, is being shaped by those rules that were created in the first place by the people in it and can always be changed to fit the people inside it. Ontologically speaking, under positivism, a direct relationship between cause and effect is assumed, though the post-positivist attenuates this strictness and attaches a probability to the phenomenon's outcome and thus the researcher is alive to the potential for multiple realities depending on the research process adopted (Creswell, 2013).

Methodology consists in the process and procedures involved in the research (Pernecky, 2016; James, 2014). Generally, the (post)positivist research procedures will mirror those of the natural sciences with the aim of finding relationships between variables to forecast the future.

The thesis applied objective and unbiased data gathering and analysis methods to the study problem. Thus, the ontological position in this case is objectivism as it was hypothesized that there existed a single objective external reality which influenced the behaviour of value and growth stocks in a market. The researcher had no influence on the data available and collected. A constructivist view would have meant that the results and data were amenable to the researcher's desires. In the

subject of study here, stock portfolios data and the tests to be applied were recorded and observed independent of the researcher.

Research approach

Having considered the study's philosophical considerations, the study methodological questions were evaluated next. The research literature provides two research approaches: a deductive and an inductive approach (Ralph et al., 2014; Bryman and Bell, 2011). Baxter and Jack (20008) gave an elaborate distinction of the two approaches and suggested the approaches' ease of aligning with qualitative and quantitative research in the same order. Under the inductive approach, theory is created from the collected data and the patterns emanating therefrom. The arguments are thus developed from general views to specific theories being formulated. Where theory exists, a deductive approach is taken with a hypothesis being formulated and tested on the data gathered. Thus, the starting point is a specific theory that can then be generalized on the basis of data testing and hypothesis test outcome (Gill, 2014; Saunders et. al, 2009). In this study, the aim was to establish whether theories discussed under the theoretical framework were empirically tenable. The set-out hypotheses on the research questions were subjected to data analysis methods. This approach thus fitted in the deductive approach.

The combination of the research premises of epistemology, ontology and methodology constitute the research paradigm (Schonfeld, 2015; Denzin and Lincoln, 2005). A research paradigm constitutes the essential beliefs set to guide actions (Andrikopoulos et al., 2008; Guba, 1990) and hence every piece of a research's foundation is in choosing the appropriate methodology that aids in answering research questions to the satisfaction of the research and the users of the research

findings. The positivism and post-positivism paradigms are suited in the quantitative research approaches given their assumptions about reality being ordered and that inherent relationships are sufficiently measurable. This thesis aligned to the positivist stance and hence tested theory as a logical result of applying this research paradigm and methodological position.

According to Krauss (2005), the term methodology refers to the practices that are followed in attaining knowledge of a subject and that a researcher chooses the methodology based on his/her theoretical lens. In Krauss's analysis, underlying the discussions on quantitative versus qualitative methodology is the philosophical as opposed to methodological position. In this regard, it is the differing belief systems that have generated the quantitative-qualitative research methods debate and not the methodologies in themselves. Therefore, it can be inferred that crucial to understanding the whole perspective of the design and conduct of a study is the theoretical/philosophical assumptions or paradigm. As a result, epistemological assumptions make the distinction between the qualitative and quantitative researchers (Baxter and Jack, 2008).

The quantitative method is to be experienced more in the deductive research approach where hypotheses are made from existing theories and then tested. The method does not dwell on details but quickly moves to the generalizations from large samples such that general conclusions are suggested (Gough et al., 2015). Tools such as graphs, tables, charts, and other statistical calculations are extrapolated and applied in making inferences (Gough et al., 2015). The quantitative methodology's focus is to describe events across populations and hence enables summarizing characteristics among groups. Generalizations of results from samples are made about the populations. To do this, the method applies statistical techniques to observe patterns and make

inferences about the events of study (Ghosh, 2019). The inquirer primarily applies the positivist paradigms in developing knowledge and deriving meaning, for instance, of cause and effect, dependent and independent variables definitions, hypotheses formulations, and measurement of outcomes. Inquiry strategies in this approach involve experiments and surveys and data is collected on the basis of predetermined instruments that generate statistical data (Creswell and Creswell, 2017). Creswell (2013) and Guba (2005) indicate that recent quantitative strategies use complex experiments involving many variables and treatments and include the use of mathematical application through the formulation of structural equation models with cause-effect assumptions.

Because this study investigated the performance of value stocks as compared to growth stocks as measured by their returns, only numerical data was collected and used. Thus, the quantitative method was exclusively applied in the study. A quantitative deductive method of study was thus employed in answering the research question. The method was applied on historical stock prices and accounting information, from which returns were computed followed with a construction of value and growth stocks portfolios.

Research design

Research design explains the process and method of collecting and analysing data. It can also be viewed as the whole plan of going about answering the research questions as well as fulfilling the research objectives (Gill, 2014; Saunders et al., 2009). The research designs of the experimental design, the cross-sectional design, the longitudinal design, the case study design, and the comparative design were laid out in Bryman and Bell (2011). In this dissertation, a time series data analysis of monthly portfolio sets was carried out.

The thesis' research questions were answered by applying two empirical methods. To answer the primary hypotheses, it applied the methodology in the revised Lakonishok et al. (2004), in the manner used in The Brandes Institute (2009), to the Kenyan stock market to identify the existence of any significant relations in valuation differences and the consequential value vs. growth stocks performance. To answer the secondary research problem of how a framework of value investing could be constructed in an investment basket to ensure optimum investment returns, the research process involved identifying a causality relationship and an investment methodology with returns of value investing. This secondarily assisted in answering the literature gap on the explanations for variability of cross-sectional stock returns. Here, an empirical process, described later, following the F_Score investment strategy in Piotroski (2000) was applied and compared with later applications, for example, in Ho et al. (2022), Kumsta (2015), and Jantunen (2014). The research design was then to delve into the specific drivers of the F_Score (fundamentals Score) strategy. The collected data was used to compute the key accounting data ratios comprising the F_Score composite measure. The balance of the information was applied in the extension of previous research findings. The Piotroski (2000) paper on which the F_Score approach was based described an investment approach that is derived from a composite metric made up of nine accounting information items, which he termed F_Score (i.e., fundamentals score) and was observed to yield above normal annual stock returns. The thesis' design tested whether this strategy was applicable to the Kenyan securities environment.

Population and Sample of the Research Study

The primary focus of this study was to analyse all the stocks included in the NSE All share Index (NASI). A user-friendly database construction was thus of supreme importance to achieve

the desired results. The concerned database contained stock market data of each of the firms included in the NASI (includes the monthly closing prices, volumes traded and published accounting information) in the financial statements for the period 2011 to 2019 (the period over which the full data was available on the NSE). Each stock's P/B ratio was then calculated from this data.

The population consisted of the complete set of firms listed on the NSE in each month over the period of study (2011-2019) and were thus part of the NSE All Share Index (NASI) constituent firms. The NASI had a total of 68 ordinary shares firms and had a combined market capitalisation of KES 2.2 billion, listed on the NSE at the end of June 2020.

The Nairobi Securities Exchange (NSE) is one of the comparatively well-developed African Exchanges. Kenya is among the Sub-Saharan African countries that have report comparatively faster rates of economic growth in the recent past (NSE, 2020). It came into operations in 1954, and therefore boasts of more than six-decades of heritage in securities listings of equities and debt instruments. Its offering has a best practice benchmarked facility of asset trading for global investors wishing to gain entry to the country and Africa's economic growth opportunities (NSE, 2020).

The demutualization and self-listing of the NSE demutualized took place in 2014 and contributes to the country's economic growth through the promotion of a savings and investment culture, as well as facilitating investor access to cost-effective capital. It is regulated by the Capital Markets Authority (CMA) of Kenya. It also has full membership with the World Federation of

Exchanges (WFE). The WFE is a founder member of a number of exchange associations such as the African Securities Exchanges Association (ASEA) and the East African Securities Exchanges Association (EASEA). The NSE also has membership in the Association of Futures Market (AFM). It also has a partnership participation in the United Nations-led SSE (Sustainable Stock Exchanges) initiative. In 2014, it joined the famed FTSE Mondo Visione Exchanges Index. FTSE Mondo Visione Exchanges Index is the first world index that only focuses on listed exchanges and other trading venues (NSE, 2020). It also has an electronic trading system for listed company bonds and the Government of Kenya Treasury Bonds. This allows for digital trading of debt securities that are integrated the Central Bank of Kenya's settlement system. It has a functional Real Estate Investments Trusts (REITs) Market. In 2017, it has introduced Exchange Traded Funds (ETFs) and launched NEXT Derivatives Market thus offering Exchange Traded Derivatives (ETDs). This has enabled the NSE to trade Single Stocks and Index Futures (NSE, 2020)

Sampling methods

Firm inclusion in the sample required that the firm was listed on the stock market in Kenya. Additionally, only firms that had their corporate returns uploaded on the NSE website under the 'corporate announcements' section where their financial data is published were considered. Each firm's market value of equity (MVE), Book-to-Market (B/M) ratio at each reporting period end were calculated. Firms were ranked to identify B/M quintile and size tercile cut-offs. The preceding period's B/M distribution was used to classify the firms into B/M quintiles. In the same manner a firm's size grouping (small, medium, or large) was identified from the preceding period's market capitalizations distribution. The highest B/M quintiles firms with enough accounting fundamental information on the financial statement data were retained to derive the various requisite

performance metrics. The process above yielded the ultimate sample of the high B/M firms over the study period. Therefrom, all the requisite data for computing the F_Score were tabulated. The F_Score derivation was then from the published financial statements of the firms' data downloaded from the NSE from the period 2011-2019.

The study focused on the NSE All Share Index (NASI) as it is the true representative of the investable stocks' universe accessible by all investors and serves as a market-wide performance indicator (Kimani et al., 2022; NSE, 2020). The NASI's design is geared towards representing the performance of all companies, and thus availing to investors a complete and comparative set of indices, measuring the performance of the major sectoral segments of the Kenyan market (NSE, 2020). It acts as a measure of the Kenyan economy with the understanding that the NSE listed companies were good representatives of their relevant sectors. The index's key aim is the provision of accurate and concise information regarding the how listed stocks have performed on the market such that the general market trends can be understood and appreciated. The eligibility requirement for inclusion in the NASI calculations was that the stock was listed under the Main Investments Market Segment (MIMS) or the Alternative Investment Market Segments (AIMS) of the stock exchange. Other considerations that applied were that all classes of ordinary shares in issue were eligible for inclusion in the NASI, as long as they conformed to all other eligibility rules, free float, and liquidity. Firms with a full listing on the main board of the NSE are eligible for inclusion in the NASI.

The survivorship bias problem was accounted for by initially including all delisted stocks for analytical purposes. Delisted stocks' values were only abandoned after the date of their delisting.

Stocks with insufficient data availability were eliminated from the dataset, borrowing from the approach taken in Ho et al. (2022) and Kumsta (2015).

Materials/Instrumentation of Research Tools

Empirical research 1

The literature has established evidence that value stocks return superior performance over long investment horizons. The study therefore primarily applied the revised Chan and Lalonishok (2004) methodology, in the manner used in The Brandes Institute (2009), to the Kenyan stock market to identify the existence of any significant relations in valuation differences and the consequential performance of value vs. growth stocks. This methodology has recently been applied in a number of studies owing to its utility in fund management applications such as the works of Almagtonne et al. (2020), Chinco et al. (2019), Ghosh (2019), and Kondor (2019).

The selected firms were segmented into value and growth portfolios on the basis of their relative price-to-book value (P/B) and Book- to- Market (B/M) ratios. This segmentation was followed by calculating the relative differences in valuation between the value and growth stocks. The various stocks portfolio performance was then tracked over the study data period. The valuation difference multiple served as a standardized valuation disparities proxy as in Gaglio and Cardullo (2020), Toit and Krige (2014) and Toit (2012).

After calculating the valuation difference multiple, serving as a standardized valuation disparities proxy and the subsequent five-year performance determined, an attempt was made to uncover the possible relationships in the past value cycles phenomena and the valuation difference

multiple that were useful in making predictions of the future better outcomes of value stocks following Lee et al. (2020).

There were therefore two sub-hypotheses to be tested. Starting from the general acceptance that value stocks outperform growth stocks (Cornell, 2021; Asness et al., 2020), the first part of this thesis's objectives was to verify this acceptance. The next objective was to check for the existence of any significant relationships between valuation differences and the ensuing returns delivery of value and growth stocks, a 'la The Brandes Institute (2009). Following from the foregoing, the first null hypothesis was that there was no significant difference between the returns of a value and growth stocks portfolios:

$H_1: Rt_V - Rt_G = 0$ …….. 3.4.1

and:

H_1 is the 1st null hypothesis

Rt_V represents the returns from the value stocks portfolio

Rt_G represents the returns from the growth stocks portfolio

Where H_1, fails the test, then it was accepted that superior returns are possible through active portfolio value investing, as the outperformance of value stocks over the growth stocks is thereby confirmed. The first alternative hypothesis indicates that there is indeed a difference between the returns of a value portfolio and those of a growth portfolio:

$H_{A1}: Rt_V - Rt_G \neq 0$ ……3.4.2

The second hypothesis tested whether there was an identifiable significant relationship of the relative valuation disparities, and the consequent average portfolio returns of value and growth stocks. The second null hypothesis then was of a no valuation difference multiple (unexplained variable) and successive relative value stock outperformance (the explained variable) relationship:

$H_{A21}: b_1 = 0$ …….. 3.4.3

$H_{A22}: b_1 \neq 0$ ……..3.4.4

where:

$y = a + b_1x + \varepsilon$, ……. 3.4.5 and $\varepsilon \sim N(0, \sigma_2)$. This equation was extensively discussed under the regression analysis section 3.7.5.2. H_{A22} says that there is a valuation difference multiple and successive relative value stock outperformance relationship. This relative value stocks outperformance is measured by the successive five-year annualised excess return following the month of the portfolio construction. The Brandes Institute (2009) showed that positive correlation between historical higher valuation difference multiples with significant value stock outperformance in the five-year stock holding period that followed (Gârleanu and Pedersen, 2022; Toit and Krige, 2014; Toit, 2012). The above hypotheses were tested at 10% and 5% levels of significance. The relevant t-statistics and the associated p-values were applied for the above task.

Distinguishing investment styles can be facilitated through the analysis of different variables applicable in a financial market. The initial empirical process here was to compute the P/B ratios of NASI constituent stocks. The stock price applied here was that reported on the last day of each month for the period 2011 to 2019.

The relevant P/B ratios were computed followed by the ranking of all stocks forming part of the NSE All-Share Index on their relative P/B ratios basis so as to categorise stocks into quartiles of portfolios each month. Those stocks with the highest P/B ratios formed quartile 1. The P/B ratios diminished in each next quartile with the lowest P/B ratios forming quartile 4. Consequently, at each month end, four portfolios were created with quartile 1 constituting the growth portfolios (the highest one quarter of P/B ratios) and quartile 4 constituting the value portfolios (the lowest quarter of P/B ratios). The above followed a monthly recursive process with four new portfolios being constructed at each month-end. With the portfolio construction process completed, each portfolio's relative performance was then tracked over the following five-year period, as specified in The Brandes Institute (2009). The five-year subsequent returns period is the longterm stock holding period recommended in the literature with three-year periods still recommended (see, for instance, Hutabarat, 2022; Toit and Krige, 2014).

In Chan and Lakonishok (2004), an investment horizon of five-years was selected because it ensured long-term investors suited investment strategies. In Bradfield (2003), using historical data for estimation purposes over too long a period could be inappropriate and was regarded irrelevant since business risk's nature, as assumed by firms, was prone to large disruptions over such extended periods and each democratically elected political regime lasted an average of a five-year period. The market beta, a measure of inherent market risk in an underlying stock, was found to be with reasonable stability over five-year periods in Watanabe et al. (2013). Bradfield (2003) conclusion was that selecting a five-year period satisfied the large enough sample size requirement that enabled a reasonable efficient estimation and a period that was shot enough in which the

inherent beta met the stability assumptions trade-off (Lee et al., 2021; Gaglio et al., 2020; Toit and Krige, 2014).

Based on the above arguments, this study took a five-year performance period tracking to be not only suitable but relevant as well. The firm's relevant performance was determined and captured from each firm's price and dividend figures in the four newly constructed investment portfolios. Equal weighting of the stocks within the portfolio was done in order to derive the portfolio return. Price data was captured monthly whilst the dividend yields for each month were taken as the appropriate proxies of dividend pay-outs. The equity appreciations (capital gains) or diminutions (capital losses) for each month were computed. One-twelfth ($1/12^{th)}$ of each month's dividend yield was then added to compute the total return per month. The ideal situation would be to use the real dividends paid out, but this was not possible given the nature and variance of dividend pay-outs (they are paid at the end of the financial year, mostly). The approximation of the $1/12^{th}$ dividend was considered adequate for accurate capturing the dividend effect, following Toit (2012), at a portfolio level (using the accrual principle in accounting). For those stocks that either delisted or had ceased to be part of the NSE All-Share Index, equal investment of the proceeds in the portfolios' balance of stocks as of the first day of the succeeding month were assumed. The computed total returns per month were applied in the determination of the successive five-year returns of the respective portfolios.

This was a recursive process repeated each month for the whole of the research data period 2011-2019. For each new set of portfolios constructed at the end of the month, the quartile-by-quartile returns outcome was tracked over the successive five years following the construction date

with the portfolio returns over the successive five-year investment horizon being annualized to allow for comparability following Iglesias et al. (2021), and Toit and Krige (2014).

Empirical research 2

This dissertation's second empirical test methodology involved portfolio construction based on a firm's aggregate accounting information variables-based score (F_SCORE) following the Piotroski (2000) procedure. This was the pioneering modern fundamentals-based portfolio construction methodology aligned with the value investing approach (Hyde, 2018; Yan and Zheng, 2017; Hyde, 2016). Equity firms having the smallest values of fundamentals signals {where the F_SCORE was zero (0) or one (1), two (2) or 3}were grouped as low fundamentals (F_SCORE) firms and it was anticipated that these firms would yield the worst consequent stock market outcomes. In the alternative, those firms with the highest score {where F_SCORE was eight (8) or nine (9)} would portray the greatest fundamentals signals and were thus grouped as high fundamentals (F_SCORE) firms and were expected to yield superlative subsequent stock market performance because of their strong and consistent firm fundamentals. The study designed tests for examining whether the portfolio with high F_SCOREs performed better than the other portfolios derived from the high BM portfolios. In the initial test, the high and the low F_SCORE firms generated returns were compared. In the next test, the high F_SCORE firms were compared to the whole investment portfolio class of high BM firms. Using the computed t-statistic, the results were tested and augmented by applying a bootstrapping mechanism to check for the variations in the returns of these portfolios to eliminate weaknesses connected with parametric tests following Ho et al. (2022), Hyde (2018), Kumsta (2015) and Djogbenou, et al. (2015).

Piotroski (2000) stated that each F-component was an element of the set of a fundamental financial health indicator, that included i) profit (P), ii) gearing or leverage (exposure to debt), liquidity, and the funding profile (LLSF) and iii) Efficiency of operations (OE). Each F-component was assigned a binary value of either 1 or 0. This binary value assignment was dependent on the previous year's trend. For example, a firm that increased its equity capital, the variable EQ_OFF would be assigned a 0 (naught) value since this action was taken to be a negative move. In the same vein, where a firm lowered its financial gearing, the change in leverage component would be assigned a one (1) value as less debt lowers the firm payments commitments in terms of interest and augments the return on equity capital, a positive outcome for equity holders. The results were translated into a binary matrix for each firm and year then the F-component values added up giving the final F_Score composite metric. The highest (lowest) F_Score stocks were considered to portray the highest (lowest) probability of producing supernormal one-year returns, as was demonstrated in the empirical literature, for instance, Ho et al. (2022) and Hyde (2018).

Operational Definition of Variables

Empirical research 1

Book value was defined as the shareholders' interest in a firm and was derived from the firm's balance sheet as constituting the firm's net assets, that is, the total assets value less the total liabilities value. A firm's Book Value per Share (BVPS) was derived as its book value divided by the number of its issued and paid-up ordinary shares in issue as at the reporting period. The P/B ratio was derived formulaically as:

$$\frac{P}{B} ratio = \frac{\frac{P}{S}}{\frac{B}{S}} \quad \text{.....3.5.1.}$$

P stands for the ruling market price of the share, B the book value of the share and S the number of shares traded on the listed share's market. Despite the possibility of the book value being negative, the use of the book-to-market equity (BTME) ratio was suggested in Toit (2012) and later applied in Dias et al. (2020) and Penman and Zhu (2016) since it captured a more continuous relationship. In this study, it was opined that the inclusion of negative book value firms, by use of the BTME ratio would be inappropriate when comparing extreme values, for instance, where the earnings-to-price ratio is used and therefore the inclusion of firms with negative book values, through the use of the BTME ratio, could adversely affect the comparison of extreme values, following Li (2022) and Lev and Srivastava (2019). For instance, when the earnings-to-price (E/P) ratio is used (keeping in mind the possibility of negative earnings for many normal reasons out of business operating environment), stocks with negative earnings would end up being ranked within the growth spectrum. Firms could return negative earnings out of the business cycle obtaining then and thus rendering inappropriate to rank such stocks as growth. The use of the price-to-earnings (P/E) ratio puts negative earnings stocks in the value stocks basket, which can also be argued to be inappropriate. The same holds for the P/B ratio, even though the book value turns out negative less often compared to earnings (Li, 2022).

Therefore, this study took a view that that including negative book value firms potentially could obscure the desired comparison of extreme values as elucidated in Sari (2022), Moreira and Muir (2017) and Moy (2014). When book value tends to zero from either a negative or positive direction, there's a possibility of erroneous calculation results with the ranking of stocks and the constructing of portfolios being adversely affected. Infinitesimal variations in book values from just positive to just negative could cause massive jumps in the P/B ratios thus changing a stock's

top-bottom position in the P/B ratio groups hence creating inconsistencies in the stocks' P/B ratios calculation and hence portfolio sets. In the literature, the BM ratio is well established (Naknok, 2022; Fama and French, 2016; Clubb and Wu, 2014). However, there's still a controversy on its utility in ensuring continuity. This study chose to exclude all negative book value firms to avoid the said potential pitfalls.

Having determined each portfolio's annualised return, and all the relevant P/B ratios having been computed, the next important step was the determination of whether a stock's relative P/B ratio and its consequent relative performance were related. To accomplish this step, it was essential to calculate the monthly valuation difference multiple. For any given month, the multiple was derived as follows:

$$Valuation\ Difference\ Multiple\ (VDM) = \frac{\left(median\frac{P}{B} ratio\ of\ the\ \ Gowth\ Portfolio\ (Quartile\ 1)\ in\ month\ t\right)}{(median\frac{P}{B} ratio\ of\ the\ Value\ Portfolio\ (Quartile\ 4)\ in\ month\ t)} \quad \ldots\ldots\ldots\ldots\ldots\ldots 3.5.2$$

The calculated monthly multiple was compared with each successive monthly annualised excess return with the excess return. The excess portfolio return was determined by subtracting the return of the growth portfolio from the comparable return of the value portfolio. This was then followed by, after establishing the existence of the relationship or otherwise, the determination of the consistency of the relationship at various valuation difference ranges of the multiple. The consistency determination across the four quartiles valuation difference multiple was accomplished through the division of the quartile 1 (q1) to quartile 4 (q4) valuation difference multiples into quartiles. The first quartile consisted of the highest 25% of q1 to q4 valuation difference multiples with the fourth quartile made up of the lowest 25% of q1 to q4 valuation difference multiples. The returns consistency over the valuation difference multiples levels, was

gauged by calculating both the month-by-month mean annualised excess return and the median annualised excess return.

Empirical research 2

The F-component for each firm was computed as shown below.

F-component	Section	Narrative	Derivation
ROA	P	return on assets	PATt / (TASt- TASt-1)/2
DeltaROA	P	return on assets net increase	ROAt – ROAt-1
CFO	P	For cash flows from operations	CCEt / TASt-1
DeltaLIQ	L	Change in liquidity	(NQAS t -NQAS t-1)-NQASt-1
EQ	P	Equity Capital	(CEt-CEt-1)/CEt-1
DeltaGP	P	Change in profits before tax	(PBTt-PBTt-1)/ PBTt-1
ACCR	P	accruals	(NINt – CFOt) / TASt-1
DeltaLEV	L	change in leverage	LTDt / ATASt
ATURNOVER	OE	asset turnover ratio	(TSAt / TASt-1) – (TSAt-1 / TASt-2)

Where:

PAT	profits after tax
TAS	total assets
ATAS	average total assets (ATASt = (TASt + TASt-1) / 2))
CCE	cash and cash equivalents (cash and bank balances)
LTD	long-term debt
NQAS	Net Quick assets (Liquid assets less liquid liabilities
CE	Capital employed

In later studies', for example, Ho et al. (2022), Hyde, (2018) and Kumsta (2015), variation of the Piotroski (2000) procedure, when the composite score had been constructed, the next step was to define a benchmark against which to compare the measurement period-end's returns. One way of achieving this was by applying an index's annual return, for example the NASI and subtract it from equity return of each firm (Hyde, 2018). This was an obvious method because of its direct link to the tradition in investment where fund managers selected stocks from the available

securities' universe then the resultant portfolio returns were compared to the overall market return (Hyde, 2018; Piotroski, 2012). The shortcoming here was that since not all firms publish the needed data for the F_Score fund managers were constrained in their stock choices. To skirt this constraint, the market returns were calculated from data coming from only the firms with available F_Score data and thus producing a benchmark bespoke F_Score Index as implemented in later studies, for instance, Ho et al. (2022), Griffin and Mahajan (2019).

Again, the above method faced a problem emanating from firms providing partial accounting data such that a maximum F_Score of 6 or less was imaginable, hence the incomparability of stock returns across firms. This potential problem was also created from market delisting and or merging firms. Market-adjusted returns were calculated from those firms that had all nine F_Score components to allow for the above variability, implying that some of the firms in the F_Score Index could vary yearly. Each firm's market-adjusted return was the annual stock return and the benchmark return difference. The market-adjusted return was weighted equally in each of the quintiles/terciles as adapted in Lehto (2021), Wichlinski and Rajaram (2019) and Cheffins, et al (2013).

Five portfolios (following the fquintiles of 0/1, 2/3, 4/5, 6/7 and 8/9) were constructed each year for the statistical analyses to be performed. Having calculated each firm's F_Score, stocks were allocated to one of these portfolio quintiles based on their F_Score. The main deviation from Piotroski (2000) was the use of equal weighting while in Potrioski (2000) portfolios were weighted equally. However, the value weighted portfolios were also constructed and tested in the same manner for robustness check purpose. The choice of equally weighted portfolios was supported in

Lewellen (2010) where it was justified that portfolios should be built using value weighting, buttressed by three reasons. First, by the fact that the methodology in this study built on the original Piotroski (2000) F_Score strategy, it was apparent that there was comparability utility in following the original method. Second, in Kumsta (2015) and Duong, et al (2014), equally weighted decile portfolios were constructed in their cross-section research on the investor sentiment and stock returns relationship, it was argued that value weighting was open to distortions in the relevant patterns as investor sentiment had negligible influence on larger firms. In addition, inherent in this research was that stock markets were always not efficient but are rather impacted by non-rational behaviour (Mohanram et al., 2018). Third, in Jordan, Vivian, and Wohar (2014), it was found that a diversification heuristic was applied most whenever investors were confronted with asset allocation tasks, referred to as 1/n rule most common in pension plans where contributors distribute their funds evenly across asset classes (Hyde, 2018; Mohanram et al., 2018).

The Piotroski (2000) F_Score work having been replicated and tested, an alternative measure to the F_Score was implemented and tested to validate results for the reasons of, first, addressing the shortcoming of Piotroski's binary based measure which did not account for the signal sizes. Second, to take care of the potential problems in signals' equal weighting since some of the signals could have close relations with the return performance relative to other signals and thus leave out important information. This therefore implied that when weights were variable, for instance in accordance with past forecast accuracy, the trading gains could be improved. Third, practitioners needed to be provided with improved tools for filtering out securities with better return prospects. Lastly, the alternative was usable as a reciprocal check of robustness of the primary F_Score measure following Naknok (2022), Hyde (2018) and Mohanram et al.(2018).

To get the alternative measure, a process of ranking and standardization was employed following the Kumsta (2015) method and the process ensures that the F-components are commensurable. The financial data was ranked through the respective excel rank function where the same values were assigned the same ranks. The ranks were then standardised such that each F-component assumes a between 0 and 1 value through the following equation:

$$Fi, sra\text{nk} = \frac{(Fi, ra\text{nk}-1)}{(Fmax-1)} \quad \text{.....3.5.3}$$

The left side is the standardised rank that equates the F-component individual's rank less one divided by the highest (in absolute value) rank of the F-components in a given year less one. Since some firms do not report the relevant data for the F_Score calculation, the computation and ties were maintained and thus the higher the rank, the worse the F-component performance vis-à-vis peers. However, the variables that measure movements in financial gearing and seasonal equity offerings were exceptions since in these cases, higher ranks relate negatively with future stock returns because of the related interest charges on debt leading to reduced retained earnings available to equity holders as well as the higher number of shareholders that share in profits where there was new equity issuance.

Against the F_Score, the F-rank method incorporates the values differences within each F-component leading to improved accuracy in representation of a firm's financial strength. For instance, while a firm was assigned a 1 when its return on assets was positive, to what degree was this value was greater than zero, was of no consequence because of the F_Score's binary nature. If firm X was only on the margin but below the threshold of getting a score of 1 for the respective F-component consistently, it might result in a zero (0) F_Score value, whereas firm Y would

receive a value of five (5). The picture would be much different when the F-rank was applied. Where firm X just exceeded the threshold in, say 5 out of 9 Fi-ranks but significantly falls short of them in the others, the overall F-rank would be quite low. Contrastingly, firm X's F-rank would be higher as it showed a constant all F-ranks performance and therefore both the consequential portfolios and the relative outcomes would look to be different. The standardisation of each F-component's rank was followed with the aggregation of the values into the F-rank while avoiding bias for any particular method by taking both the mean and median of the Fi-ranks to make the F-rank. This procedure enhanced the moderation of outlier influence already accomplished by ranks.

Compared to the F_Score, with its absolute values, the F-rank portfolio quintiles make it necessary to have flexible cut-off points which were recomputed on each financial reporting period end basis. Illustratively, the lowest portfolio (L) would be produced from the product of the mean and median F-ranks and 30%, resulting in one cut-off point and each lower F-rank firm was allocated to this portfolio. A similar procedure would apply for the other portfolio quintiles (middle, high, lowest, and highest)(Safdar et al., 2022).

The Piotroski (2000) original F_Score crudely measured the financial health of a firm since, save for the all-or-nothing inherent characteristic, past information likely useful in forecasting stock returns was disregarded. This work extended the initial methodology using an ex-ante forecasting means that weighted the F-ranks by means of historical data. The essential thinking assumed that firm specific forecasts could have exogenous information that contributed to better prediction accuracy when combined. Recall that the nine F_Score components as summarized in Ho et al. (2022) and Hyde (2018) incorporate a firm's: a) profit potential (P), b)

gearing, liquidity state, and funding sources and c) efficiency of operations. The investment community tended to lay emphasis on the cash flow (proxying profitability) mistakenly believing the figure as less manipulatable. This effect was moderated by a combination of forecasts (Hyde, 2018; Kumsta, 2015; Rapach et al., 2010).

The book-to-market ratio inclusion: a second dimension

Hitherto, the analysis only concerned itself with internal firm characteristics dependent on the firm. Hence, the F_Score and F-rank were for constructing single-way portfolios. This one-dimensional approach was extended to include firm-independent (external) behaviours. The added extension was the book-to-market (BM) ratio, as the Piotroski (2000) initial study on the F_Score was limited to those firms with high-BM multiples. This work constructed 2-way portfolios by sub-classifying firms into BM terciles. This gave a fifteen-portfolio total set for each analysis in contrast with five in the 1-dimensional setting. The presence of a refined differentiation in portfolios was advantageous in that an investor wants to know the BM tercile in which the main investment performance mover falls under the original F_Score and the F-rank method alternative.

Study Procedures and Ethical Assurances

Study procedures

The ever-present risk in a research project is that the author's preconceptions might affect the research process and subsequently the results. The preconceptions or opinions usually arise from previous personal experience(s), value systems of beliefs as well as from educational backgrounds (Bryman and Bell, 2011). In this regard, researchers are advised to observe objectivity and independence and hence abstract from their individual biases. One way to achieve

this is through peer reviews of one's research work. Additionally, combining both qualitative and quantitative methods minimize subjectivity in the research process (Adrian et al., 2014). In this thesis, supervisor review combined with consultation of peer reviewed published literature limited the risk of biases both in the data collection process and interpretation.

Ethical Assurances

The importance of ethics in social research has been underscored in Saunders et. al (2009) as participants need to be protected from any harm that may arise from their participation in the research process. The researcher must thus first obtain consent from respondents on their willingness to participate (Hilton et al., 2019; Ioannidis et al., 2017; Chan et al., 2004). In this thesis research, this aspect did not apply as no human respondents were involved. The variables of interest were financial indicators such as stock market prices, trading stock volumes, and stock returns at an aggregated level and no individual investor was a subject of study.

As mentioned in Hilton et al. (2019), honest and accurate data are vitally important in any research process and have a more than significant impact on the validity of research outputs. There's an ever-present ethical temptation for researchers to change data to fit the outcome or also change results to fit data. This study managed the data collected in such a way that it could be independently verified, and the data analysis method deliberately stated such that the results could be verified by other interested parties. Viewed from a wider societal context, the results for this research will go a long way into making suggestions into investments decisions both to individual and institutional investors (Ioannidis et al., 2017). It was the intention to demonstrate that wealth

building investments are better achieved through investing in growth potential companies for the long run as opposed to capital gains with frequent price watching.

Data Collection and Analysis

Data collection tools and analysis

Researchers have three main sources of data and literature to pick from for their study; namely primary, secondary, and tertiary data sources (Saunders et al., 2009). Primary data applies when the data source is such that its appearance is for the very first time. This could be when a report is published for the first time, when governmental publications first appear, for instance in an economic survey, when manuscripts or memos appear as first editions. In a secondary data source, discussions of information already in the public domain are the focus. The literature and data concerned here will have been published as primary sources elsewhere. Examples include textbooks, published articles/journals/dissertations and mimeos (Saunders et al., 2009). In tertiary literature sources, tools such as indexes, encyclopaedias, bibliographies are used to combine both primary and secondary sources.

This dissertation relied on secondary sources like texts, scholarly journals as well as official published databases (the NSE). In developing the theoretical frameworks, the literature survey, and the data analysis, the study explored existing journal articles, chapters in books and data on the public stock exchange as well as other trading exchanges where investments take place. The numerical data required was obtained from The Nairobi Securities Exchange (NSE), both from the website and specifically ordered and paid for from the data management unit of the exchange. Secondary sources have the special advantage of cost effectiveness both in time and money wise.

They also provide authors with new and helpful ready interpretations but suffer from the limitations of the researcher not having familiarity with data which can be complex at times to make meaning out of (Bryman and Bell, 2011). The solution suggested here is the research having to allocate more time in data comprehension as well as ensuring the data source itself is reputable and this research invested nearly a full year of data collection, collation, and analysis.

Data reliability, replicability, and validity

Bryman et al. (2011), made a point that the above attributes of reliability, replicability and validity formed the key criteria in business related research to ensure quality and credible results generation. Reliability is achieved when the study results can be repeatable in other studies. This essentially requires that studies of the same problem should be able to come to the same conclusion(s). In this case, reliability is closely linked with the quantitative research and therefore this dissertation. As Bryman et al. (2011) explained, three factors of stability, internal reliability and inter-observer consistency define reliability. Stability in this case holds where a variable measure is stable over time or not and if the results would be the same if the study was carried out at a different point in time (Jonathan, 2015; Bratland et al., 2014). When the various indicators forming the scale or index of the research show consistencies, then internal reliability is said to exist (Jonathan, 2015). On the other hand, inter-observer consistency refers to the degree of subjectivity existing in the study. This study ensured reliability through collecting historical trend data from reputable sources as mentioned earlier. Applying strong existing theoretical frameworks neutralizes any subjectivities inherent in such a research project.

Bratland et al (2014), suggested the similarity between replication and reliability with replication being achieved where new different research is done in a similar manner and achieves the same result. Clear presentation is required to achieve the forgoing. Replication is crucial in quantitative research, a focus of this study with a clearly stated research methodology procedure as guided in Penman, et al. (2017).

In validity, the interest is in ensuring that the concept of study is actually measured by the indicator selected and therefore validity can be said to be the most important criteria in ensuring quality. Validity has four main subdivisions; validity as relates to measurement, internally related validity, externally oriented validity, and ecologically based validity (Gough et al., 2015). Measurement validity is where a proxy closely approximates the variable of interest and is correctly quantified. Internal validity is concerned with the causality relationship between study variables (the independent and dependent variables). External validity concerns the degree to which the results can be generalized whereas ecological validity relates to the applicability of results in the real world (Jonathan, 2015).

To assure measurement validity, the tools used in this study on investing variables have a strong empirical backing (that is, the estimation model with variables selection and measurement are supported by strong established theories and estimable models) (Kumsta, 2015; Piotrioski, 2012). The model results were subjected to empirical rigour. The external reliability was self-assured since the data was picked from actual investment results as published on exchanges with the results applicable to other exchanges all over the world. The ecological validity was irrelevant in this study since no humans were used as test objects.

Triangulation is a concept that goes hand in hand with the attributes of reliability, validity, and replicability. The term triangulation as used in the research literature implies that more than two methods are used in a research study with the aim of crosschecking the results obtained. The use of different estimation and data analysis methods ensures that placing reliance on one set of outcomes from one study method is reduced for the results to be plausible. Results are thus contrasted to establish/verify validity and thus avoid spurious findings. When at least three methods are used in obtaining answers to a research question, at least two methods would have a converging answer. Where all the methods produce different answers, then the research must reframe the questions or the methods or both (Olsen, 2004; Johnson and Onwuegbuzie, 2004).

The triangulation concept has its origins in ancient Greek as applied in mathematics and geometry where a ship's position during navigation is identified through measuring its distance from multiple points on the seashore. The multiple selection of points of distance taking ensures more accuracy. Triangulation was early on applied in works by Campbell and Fiske (1959) and further expanded by Webb (1966), arguing for the use of more than one instrument in variable measurement. This implies the application of triangulation was initially in quantitative research methods.

One of the major early proponents of the use of triangulation by researchers was Denzin (1970) and worked within the interpretivist paradigm. He illustrated his proposition through a hypothetical psychiatric hospital study where either a survey or participant observation methods are used independent of each other. This approach clearly leads to different questions that are

asked. In addition, researchers' personal predispositions lend more colour to the study findings. Each researcher will thus identify aspects of occurrences in the hospital with none uncovering all. Denzin (1970) therefore concluded that a full picture could only be obtained when more than one method/strategy was used.

Triangulation's serves the key purpose of enhancing the research results' credibility as well as the validity in educational and sociological research. As Cohen and Manion (1986) have stated triangulation attempts to detail or comprehensively clarify the depth and dynamics of human beings' behaviour by varying the study standpoints. Again, Altrichter et al. (1996) argue that triangulation provides extra detail and balanced views of a situation. For O'Donoghue and Punch (2003), triangulation acts as a data cross-checking mechanism to identify the regular patterns and therefore built trust in both the data and results as being valid, reliable, and replicable. In a cautionary tone, Patton (2002) identified the common misconception that triangulation's goal is to get consistency in all data sources and approaches. However, such inconsistencies should be expected due to the relative strengths and challenges of different approaches. The inconsistencies need not be viewed as weakening study evidence but rather as opportunities for uncovering deeper data meanings.

Triangulation comes in forms of: (i) Data triangulation where varied sources of information are used such that the validity of the study is increased significantly. Examples of these sources are those with vested interests in a program (e. g interviewees, other researchers, program staff, and other community members). For instance, in an afterschool program, the process of research would typically commence by identifying the vested interest groups such as the young people

involved, their parents, teachers, and administrators. This would be followed by in-depth interviews with all these groups to get insights as to their perspectives on the school program. Finally, in the analysis, stakeholder groups' feedback is compared to get both the convergent and divergent areas. According to Johnson and Onwuegbuzie (2004), this triangulation type with researchers employing different sources is the most prevalent because of its ease of implementation; (ii) Investigator triangulation: Here, an extended number of investigators are used to analyse the data in the analysis process. Usually, the research project will have an evaluation team made up of collaborative colleagues within a subject field of study with each investigator looking at the program facets with the same qualitative method (e.g., interview, observation, case study, or focus groups). Each investigator's findings are then compared with a view to building expanded understanding of the different views/interpretations of the data. Confidence in the findings is bolstered where the majority of the investigator's views agree (Olsen, 2004). (iii) Theory triangulation: This arises where alternative theories are pitted against the same body of data (Denzin, 1978) and it is the most challenging to carry out. In Denzin's (1978) analysis, theory triangulations remove the temptation for researchers of reaching theoretical conclusions, being segregative in data selection such that data biases are removed. This approach ensures researchers don't choose data that only suits their projects or develop small scale theories with little relevance beyond their study projects. The following steps are needed for a researcher to triangulate theory:

a) Generate a listing of potential propositions that could explain or have a bearing on the problem of the research
b) Identify all the possible interpretations of each proposition
c) Investigate by research on those that are tenable to the problem
d) The untenable ones are discarded

e) Research further to identify the most tenable of the remaining
f) Review the propositions, along with their theories, that both passed and failed the research test
g) Create new theoretical knowledge of the research problem
h) Notice the conflicting theories, if any.

iii) Methodological triangulation: This is a triangulation of the research methods. It involves the employment of a lot of qualitative and quantitative methods of study with a combination of both (i.e., mixed methods). For instance, surveys, focus groups, and interviews results are compared to identify any similarities in the results with validity being established where there's strong similarity. Despite its popularity, methodological triangulation has the challenges of requiring a lot of time and monetary resources (Greene and McClintock, 1985); (iv) Environmental triangulation: In this triangulation type, different locations, settings and other key environmental factors of time, day and/or season are employed during the study. Vitally important is the identification of environmental factors that have a bearing on the information gathered during the study. Continued varying of these environmental factors is important to check their impact on the study results. Validity is established when results remain consistent even when the environmental factors are varied (Greene et al., 1985).

Social science research methods contain inherent biases that are not totally eliminable. Even the sources of data themselves may inherently be biased (e.g., telephone answers are known to sometimes differ from written answer interviews from the same people). Such biases many a time give unexpected results and even without the researcher realising that the results lack validity because of the data sources. The application of at least three different methods that

compensate/eliminate biases ensure that data integrity is established. Triangulation thus has the benefit of boosting research data confidence, innovatively understanding a happening or an event, uncovering peculiarities in findings, marrying theories, and giving clearer problem statement (Thurmond, 2001). These triangulation benefits have their basis in the diversity and amount of data that is availed for studying. However, the most immediate disadvantage of triangulation in social science research is its cost of operationalisation. Multiple methodologies demand additional resource allocation of time and money. Collecting larger data in varied triangulated methods demands greater effort in making plans and organizing the available scarce resources (Thurmond, 2001).

Data acquisition

The research's necessary data was gathered from the NSE. All the NASI firms' stock prices data set was supplied by the NSE following a student subscription payment. The listed firms' accounting/published financial statement data was downloaded directly from the corporate announcements section on the NSE website. The data was then inputted in a user-friendly database (Ms Excel) for optimal analysis. The focus here was on valuation disparities and subsequent performance and therefore stocks were ranked quarterly based on full market capitalization and subsequently classified. This resulted in an appropriate sample of firms for the analysis period out of which the primary and secondary research analyses were then carried out. Besides the above-discussed data, the equities book values were extracted from the listed firms' financial statements and calculated as total assets less liabilities. The combined data formed the database for the research analyses. All the data collected were secondary in nature and available in the public's

domain and thus did not require obtaining any ethical clearance as the research had no exposure to ethical risks.

Data Analysis

Empirical research 1:Replicating and adjusting the Brandes Institute (2009) methodology

Because of the differences in the United States (US) markets and other developed markets with the ensuing constraints when compared to Kenya, adjustments were needed to be made to the methodology and sample as applied in The Brandes Institute (2009) on USA data. Emerging markets such as Kenya experience lower liquidity coupled with data constraints in comparison to the developed markets (Hou et al., 2020; Guo, 2018; Toit and Kiege, 2014; Andrikopoulos, et al., 2008).

The methodology was thus adjusted in four ways. Firstly, the US available stocks universe is very large compared to the Kenyan case. The Brandes Institute (2009) contained all stocks of US domiciled firms then removed the smallest 50% of stocks based on their market capitalisations to ensure their sample reflected the real investable universe of stocks that institutional investors could access. In the Kenyan context, corporate and high networth individual investors focus on equities within the NASI (NSE-All share index) and hence the study sample did not exclude any stocks by reason of their market capitalizations but rather to all firms in the NASI. It could be argued in either way on the possibility of institutional investors investing in all stocks composing the NASI as they look for more liquidity in the form of the NASI Index. However, since the NASI contains the most actively traded stocks and is taken as the barometer of market-wide performance, it has a sufficient liquidity and enough sample size balance requisite in conducting the research. All the constituent

NASI stocks were included in the sample and thus this most appropriately represented the real available investable universe accessible by investors on the Kenyan stock exchange market.

Secondarily, because of the low number of firms on the NASI, the sample was divided into quartiles as opposed to the The Brandes Institute's deciles for stock classification. This was important for reasonable size monthly portfolio construction based on computed P/B ratios.

Lastly, this study constructed monthly portfolios and P/B ratios for the period 2011 to 2019 while The Brandes Institute (2009) created ten portfolios yearly every 30 April for the time span 1968 to 2008.

The database comprised all constituents of the NASI, that is, stock prices, share volumes and published financial statements data from which the analysis variables were derived. Under the first, empirical test, each stock's monthly P/B ratios included in the NASI were computed from the database information where the equity's price at the end of the month was divided by its book value per share. From these results the monthly value and growth portfolios were built. With the calculated P/B ratios, the equities were ranked as per their relative P/B ratios and then categorized into four unique portfolios as: the highest 25% of the P/B ratio firms made up the growth portfolio, quartile 1, with the lowest 25% of P/B ratio firms forming the value portfolio, quartile 4.

Firm stock inclusion in the relevant respective portfolios required at least one total monthly return in the immediate period after the portfolio start date. This process was done monthly over the research period generating four new portfolios at each month end using the calculated P/B

ratios. This step was then followed by calculating the next five-year annualized return for the month end newly formed portfolio, by assigning equal weighting to each equity in the respective portfolios. For each of the months, an investment return was calculated for the respective portfolios resulting in ninety-seven (97) monthly returns over the Dce-11 to Dec-19 period. All these were combined to compute the total portfolio return for the five-year equity investment holding period. Each of the respective portfolio's annualized return was then computed. The respective monthly return performance for each equity within the related portfolio was arrived at as follows, using a buy-hold strategy:

$$HPR_t = \frac{P_t - P_{t-1} + D}{P_{t-1}} \quad \text{.....3.7.1, where:}$$

i. HPR_t is the month t's total stock return
ii. P_t is the price of the stock at the end of the month
iii. P_{t-1} is the price of the stock at the start of the month
iv. D is the $1/12^{th}$ of the annual dividend yield.

Where the equities had since stopped trading on the NASI, an equal investment of the proceeds in the residual portfolio components as at the start day of the next month was assumed. The monthly annualized return, for each portfolio set, was computed to make the returns to valuations differences comparison so as to identify existent relationships, if any. An excess return was defined to be the difference between the value portfolio return over the comparable growth portfolio return. In-between periods with positive excess returns were dubbed value cycles, and the negative ones considered indicative of growth cycles (Guo, 2019; Toit and Krige, 2014; Amel-Zadeh, 2011; Amihud, 2002). This step was then followed by calculating each month end valuation difference multiple as defined earlier and reproduced below:

$$Valuation\ Difference\ Multiple\ (VDM) = \frac{\left(median\frac{P}{B} ratio\ of\ the\ \ Gowth\ Portfolio\ (Quartile\ 1)\ in\ month\ t\right)}{(median\frac{P}{B} ratio\ of\ the\ Value\ Portfolio\ (Quartile\ 4)\ in\ month\ t)}$$

The multiple is a measure, at a point in time, of the relative disparity (or uniformity) between the highest P/B ratio stocks (growth stocks) and the lowest P/B ratio stocks (value stocks). The Brandes Institute (2009) stated that the size in valuations was indicative of the level of uncertainty or lack of confidence in the asset prices.

In sum, therefore:

Independent variable = Valuation difference multiple (V_D_M)

Dependent variable = Annualised excess return (EXCESS-APRT), the difference between the value portfolio returns and the respective growth portfolio returns.

Statistical tests of significance followed the valuation difference and subsequent performance relationship existence results, at a t-test significant level of 5%. The null hypothesis1 assumed no return differences in the value vs. growth portfolios, with the alternative expecting a higher than zero difference in the returns of the two portfolios. In the null hypothesis, the valuation difference multiple and the stock's successive performance are linearly independent with the alternative expecting otherwise a linear relationship.

Empirical research 2: Replication and extension of the F_Score methodology

In the second empirical test, the data analysis involved portfolio construction based on a firm's composite score (F_Score) following the Piotroski (2000) procedure. Those firms with the least total signals (where the F_Score is either 0 or 1) were categorized as low F_Score firms and were expected to yield the poorest consequent stock market performance. In the alternative, those

firms with the highest score (where F_Score of either 8 or 9) would have the most stable fundamental signals and were thus categorised as high F_Score firms and were expected to yield superlative subsequent stock market performance because of their strong and consistent firm fundamentals. The study designed tests for examining whether the portfolio with high F_SCORE performed better than the other portfolios derived from the high BM portfolio. The returns generated by the high and the low F_Score firms were compared in the first test. The high F_Score firms were compared to the whole portfolio set of high B/M firms in the second. The t-statistics were applied in the results tests and augmented by implementing a bootstrapping mechanism to test for the differences in portfolio returns to eliminate weaknesses connected with parametric tests (Biktimirov and Li, 2014; Toit, 2012).

Summary

In this chapter, the literature review, and the empirical results chapters where the results were presented were linked together. The respective philosophical settings were first spelt out, information on the Nairobi Securities Exchange was provided from where the research methods discussed in this chapter were applied. The chapter's focus was to provide an understanding on the important question of how the investigation was conducted in order to answer the research questions that were set out. Econometric and fundamental accounting data analysis methods were presented as the primary data analysis tools.

CHAPTER 4: FINDINGS

Introduction

This chapter provides the linkage to the research methods detailed in chapter three, showing only the most relevant results, with the key issues of the chapter being, first, the relative superior performance of value stocks over growth ones and therefore the existence of a value premium anomaly in the stock markets, and second, the test of the inter-stock market transferability of a simple investment strategy and thus return a comparable rate of success. The chapter contributed immensely to the analysis of how and whether alternative financial statements information combination methods could raise the propensity to generate higher returns from stock trading strategies.

The first analysis in the chapter (empirical research 1 section) lays out the test results of the hypothesis of whether a portfolio consisted of value stocks performed better than that made up of growth stocks. It is then followed by the detailed exposition of the results of the tests of the existence of a value stocks premium on the Nairobi Stock Exchange over the study period. The second analysis, empirical research 2 section, describes and analyses the F_Score and F-rank strategies of investment results that replicated and extended the Piotroski (2000) work. The extension of this strategy into other options available with the mixing and varying of investment techniques, represented the chapter's main contribution. This was important for both practical and theoretical reasons. The practical reasons arise from the real-world investment of funds where actual money management is involved. To a fund manager, the value of a trading strategy positively correlates with the strategy's success as applied in limitless differing stock markets as are to be found. When this obtains, fund managers have a broad spectrum of alternatives in which

to place investments. The chapter also provides the link, deductively, to the research generalisability concept as assumed in the thesis. This implies that the research carried out a test(s) for theory and thus a similarity of results was expected for Kenya as in other markets. That is to say that the efficient market hypothesis together with the behavioural finance theories needed consistent research results for one or all of these theories to be confirmed. Because this thesis assumed some form of market inefficiency (the semi-strong form), the investment strategy should be readily implementable in the Nairobi Securities Exchange (NSE), otherwise the research result would be unsupportive of either theory (Toit and Krige, 2014). The explanation emanates from the dynamism of the human behavioural factor that inherent in both schools of thought as described in Lo (2007) where it is either rational, and thus producing efficient markets or fractionally rational and thus explained by behavioural finance. Consistent results should be produced from the application of a strategy no matter one's viewpoint, but tests of different strategies may yield varying results amongst them. These variations in results make the proving of the rational or non-rational stock markets nearly impossible and hence constitutes the theoretical motivations (Fama et al., 2020; Hou, 2020; Kumsta, 2015).

The second import of the chapter was to give a spectrum of investment strategies aimed at improving the outcomes of the original F_Score method, justified by the original work's shortcomings of binary coding of accounting information signals and its equal weighting. These identified shortcomings were overcome by applying an economics literature forecasting method as applied in Rapach et al. (2010), where ranks were constructed from cross-sectional forecasting as opposed to time series forecasts. It was acknowledged that investment strategies' value addition consisted in remaining profitable over time, but the length of time remains contentious in the

literature (Li and Xu, 2022; Kumsta, 2015; Gregory et al., 2013). For example, a dividend yield's real and excess returns regression analysis was done over the period 1971 to 1987 in the Page and Palmer (1993) study with the results failing to find predictability for the pre-war periods (Li, 2022). The Gregory et al. (2013) study of the return instability prediction models found substantial instabilities in stock returns and state variables following a parliamentary break in the UK. However, these empirical findings shouldn't be of great concern in the practice of investing as periods over one hundred years would be of no consequence to an individual investor (Lockwood et al., 2022; Siddiquee, 2017; Toit and Krige, 2014).

In the first empirical test's findings part of the research (empirical research 1), significance was tested in a linear regression model with the annualised subsequent 5-year excess returns and the valuation difference multiple being the dependent/endogenous and independent/exogenous variables, respectively. In the final analysis (empirical research 2), the chapter did not limit itself to focus on the high book-to-market firms only as was the case in the Piotrioski (2000) original work. In Piotroski (2000), it was shown that yields reaching 23% p.a. in the portfolios comprising high book-to-market firms were tenable in a long-short portfolio. This study found no reason to assume the same for low book-to-market portfolios. This was important because investors are provided with an alternative set of investments to select from, potentially expanding their stock returns increase curve. Moreover, constructing a long-short portfolio of high- book-to-market (long) and low book-to-market (short) stocks may increase the probability of higher returns as compared to selecting stocks with only similar book-to-market characteristics.

Trustworthiness of Data

When describing the difference between data analysis in economics as compared to finance, Brooks (2014) affirms the commonality of tools in both financial applications and the economic counterparts. There are differences in sets of problems emphasised in the two data sets. The data in finance varies from that applied in macroeconomic studies in frequency, accuracy, and seasonality terms, among other properties.

Economics analysis is often confronted with big gaps in the availability of data at hand to test theory/hypotheses that have been formulated, a problem referred to as 'small samples problem' (Brooks, 2014). As an example, economics data requirements involve government budget deficits, population figures that are annually compiled. Any changes in the measurement methods of such quantities leaves portions of these annual records partially useful. Additional problems in application of econometric work in the field of economics involves measurement errors and data revisions. That is, the data may be estimated or measured with error and then suffer from several subsequent revisions' vintages. Illustratively, a study could derive an economic model of the effect of technological investment on Gross Domestic Product (GDP) using a set of data that has been published but shortly discover that the data has been substantially revised in a new publication.

Finance is less affected by the issues above because financial data is diverse in shapes and form and generally the prices and other forms of data recorded are those at which trades actually occurred or were quoted on an active market on screens of the providers of information. Even though there is the possibility for typological errors and changes in data measurement methods

(e.g., due to stock index re-balancing/re-basing), the measurement error and revisions problems are generally much more minimal in financial data sets (Hens and Rieger, 2016; Brooks, 2014).

In a similar fashion, a few sets of financial data have a higher observation and recording frequency compared to those applicable to macroeconomic research. For example, data on asset prices, and bond yields are available within time frequencies of a day, hour, or minute, and thus expanding the quantity of available data for financial analyses, hence financial data is the envy of macro-econometricians (Brooks, 2014)! This implies that financial data is amenable to the application of more powerful analytical techniques and thus higher confidence in the research results.

Despite these data advantages in finance, there are a few problems that are embedded in it. The associated difficulties of handling and processing the large amount of data have been dimmed by the now advanced computer power (Brooks, 2014; Baltagi, 2011). One additional problem in financial data is that the data are viewed as very ‘noisy’ because of the challenging task of separating underlying trends or patterns from random effects that are deemed irrelevant (Campbell et al., 1997). It has also been observed that financial data largely doesn’t display normal distribution characteristics despite most econometric techniques assuming normality (Brooks, 2014). There exist patterns in high frequency data that come from market operating norms including the price recording processes. These features must be considered any financial modelling process, notwithstanding that the research has no direct interest in them (Brooks, 2014; Campbell et al., 1997).

This research's necessary data was gathered from the Nairobi Stock exchange (NSE). All the NASI (NSE-All share index) firms' stock prices were supplied by the NSE following a student subscription payment. The listed firms' accounting/published financial statement data was downloaded directly from the corporate announcements section on the NSE website. The data was then input in a user-friendly database for optimal analysis. The focus here was on valuation disparities and subsequent performance and therefore stocks were ranked quarterly based on market capitalization and subsequently classified. This resulted in a stocks sample enough for the period, from which data analyses were then conducted.

Besides the described data set, book values were derived from the listed firms' financial statements and calculated as total assets values less liabilities values. The combined data formed the database for the analysis. All the data collected were secondary in nature and available in the public domain and thus did not require obtaining any ethical clearance as the research had minimal ethical risks. The data was considered reliable as it represents, the only officially collected and kept data by the exchange and is the actual data traded in an open market at the exchange. The financial statements data is the official data reported in financial statements of participating firms.

Statistical tests of significance involved transforming some variables into a logarithm, for instance, the valuation difference multiple given the non-linear relationship between equity price differences (spreads) and returns where a percentage change in spreads that are five times may not give a similar return result in subsequent instances with wider spreads of ten times. The use of a log effectively transforms the percent changes and presents a more effective annualised excess return

and valuation difference multiple that leads to higher underlying data stability (Toit, 2012). Tests of data stationarity were carried out.

Chapter 3 assumed mean-reversion, hence data stationarity under section 3.4: Instrumentation of research tools. In this chapter, an actual relevant data test of the assumed mean-reversion and stationarity was implemented so that the assumption's applicability and acceptance was determined. The Augmented Dickey-Fuller data stationarity test, that applies a unit-root test method was applied. In this test, the null hypothesis assumes there's a unit root in the data while the alternative is that variables have no unit-root. The absence of a unit-root indicates that the concerned variables are stationary in a time series. The presence of a unit-root in data implies that the variables are individually non-stationary and thus their movements are affected by their own trends and thus the differenced changes in the variables were checked to identify the presence of a linear trend over time, if any. The absence of a unit-root in the differenced variables, and hence a time series linear trend, was followed by carrying out stationarity tests on the residuals of the regression equation of Y on X through the stationarity tests. Where a unit-root was not found to be present in the regression residuals, hence stationary, the conclusion was that there was a cointegration between the dependent and independent variables (not normal but desirable as it points to the possibility that the Y and X linear relationship was not a mere coincidence but a strong one). Tests of serial correlation and heteroscedasticity presence were then conducted. Where serially correlated error terms were found, autoregressive (AR) statistical modelling methods were implemented to consider the presence of serial correlations.

Under the foregoing procedure, the expectation was that the findings would align with prior international study results (for instance, The Brandes Institute, 2009) where the common finding was that increases in valuation disparities (as measured by median price-to-book) value ratio of growth stocks), lead to the superlative performance of value stocks over an ensuing period of five years. It was expected that emerging and new markets, such as Kenya would be rife with higher return opportunities compared to the mature markets such as the USA and Europe, for instance. This should be especially the case following the recent market turmoil (global financial crisis and the Covid-19 pandemic, for example) that have led to less than stellar market growth, making investors to search for alternatives in developing markets. This creates the possibility of contrary research findings coming from new markets such as Kenya.

Reliability and validity of data

As discussed in Chapter 3, reliability, replicability, and validity are the defining criteria attributes in business and social science related research to ensure quality and credible results generation. Reliability is achieved when the same results of a study results can be obtained by other studies using the same data. This essentially requires that studies of the same problem should be able to come to the same conclusions. In this case, reliability is closely linked with the quantitative research (Bryman et al., 2011) as this study was. Bryman et al. (2011) explained that reliability is achieved when the three factors of '*stability, internal reliability and inter-observer consistency'* are achieved and assured. Stability in this case holds where the measure of a variable stays the same over the different times of observation. This implies that conducting the same study at a different time in the future should still yield the same results. (Bratland et al., 2014). When the various indicators forming the scale or index of the research show consistencies, then internal reliability is

said to exist (Bryman et al., 2011; Bratland et al., 2014). Inter-observer consistency refers to the degree of subjectivity existing in the study.

Bratland et al. (2014), suggested the similarity between replication and reliability with replication being achieved where different research would be carried out in a similar manner and achieves the same result. This requires clear presentation for it to be achieved. Replication is crucial in quantitative research, the research method of this study. In validity, the interest is in ensuring that the concept of study is actually measured by the indicator selected and therefore validity can be said to be the most important criteria in ensuring quality. Validity has four main subdivisions (i) as relates to measurement, (ii) the internal aspects of validity, (iii) the external considerations of validity, and (iii) the ecological issues in validity (Bryman et al., 2011).

Measurement validity is where a proxy variable closely approximates the variable of interest and is correctly quantified. Internal validity is concerned with the causality relationship between study variables (independent and dependent variables). External validity deals with the degree of the results generalizability whereas ecological validity relates to the applicability of results in the real world (Bryman et al., 2011; Bratland et al, 2014). The section below that describes the data that was used in this study demonstrate the satisfaction of the above attributes.

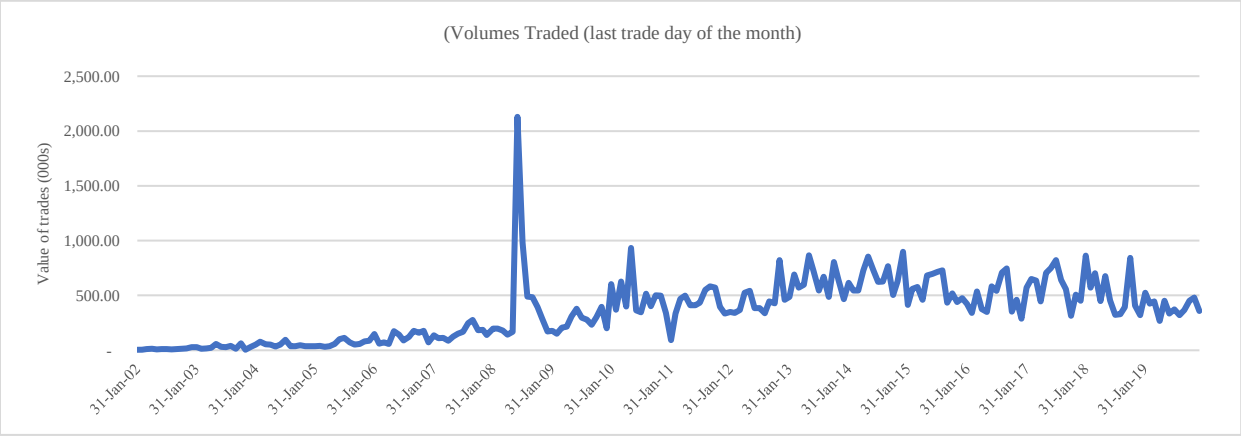
Related to the attributes above is the concept of triangulation. The term triangulation as used in research literature implies that more than two methods are used in a research work with the purpose of crosschecking the results obtained. The study applied different estimation and data analysis methods to reduce over reliance on a single set of results. Results were thus contrasted to

establish/verify validity and thus avoid spurious findings. When at least three methods are used in obtaining answers to a research question, at least two methods would have a converging answer. Where all the methods produce different answers, then the research must reframe the questions or the methods or both (Olsen, 2004; Johnson and Onwuegbuzie, 2004).

The NSE data set overview

Figure 4.1 gives a snapshot of the trading volumes trend on the Kenyan market from 2002 to 2019. The spike between 2007-2008 was the period when the largest telecom company (Safaricom) issued its shares to the public in an initial public offering and thus overshooting the traded volumes in that period. The trading volumes then remained steady for the subsequent periods.

Figure 4.1:Trade Volumes Trend on the NSE

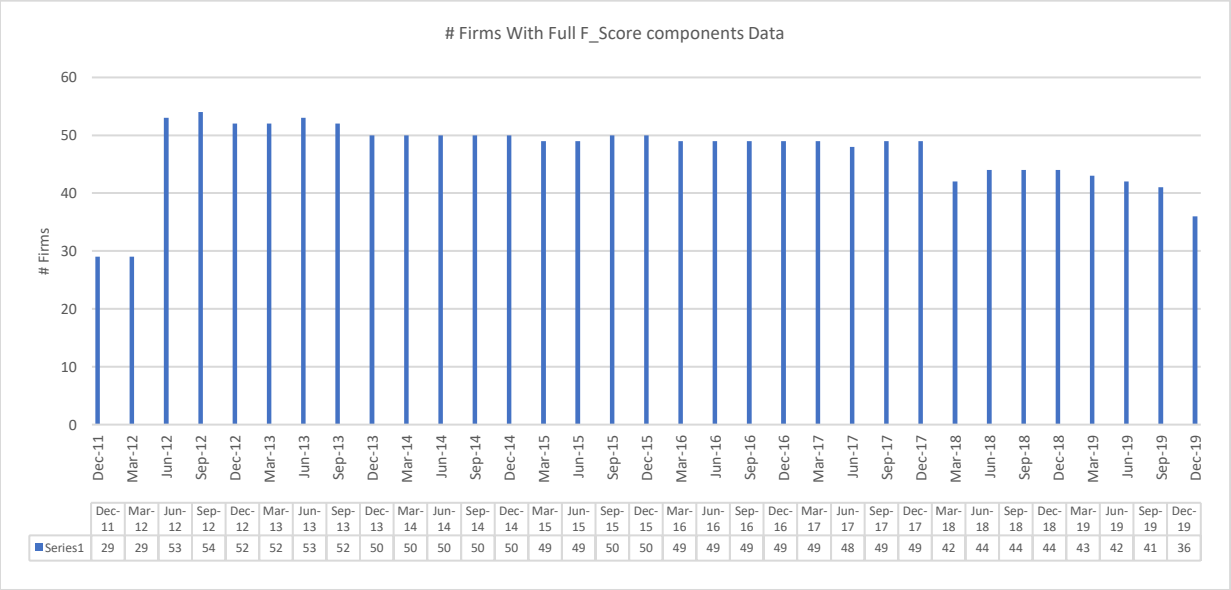


It is evident that accounting data over the study period was stable, except for the initial year of the analysis period (2011), the period when published financial statements were first stored at the NSE. This level of data availability could be attributed to the stringent data disclosure requirements imposed on listed firms by the Capital Markets Authority of Kenya (CMAK). This

led to an increase in market capitalization over the last ten years as a greater volume of shares have been traded of late (pre-COVID-19 pandemic). It is also plausible to imagine that the ease and lower cost of market access by individual investors contributed to the improvement in the data stability. This implies that there were more capital raising options for companies and thus low fundraising costs as well since there was competition between public capital sources like exchanges and financial intermediaries, especially banks (Gu et al, 2018; Adrian and Muir, 2014).

Figure 4.2 below shows the number of firms that had a complete F_Score components data. The count of firms that did not have the full data for computing the F_Score composite was ultimately less than the number of listed firms. Those firms were removed from the sample and the situation arose because of delisting and trading suspensions of firms previously listed and thus such firms did not have market data during such periods. This meant that the data analysed, at the end of it all, was from a maximum of 54 firms and a minimum of 29 firms.

Figure 4.2: Full F_Score Firms Data



Results

Empirical research 1

The first empirical test aimed to investigate the comparative performance of value-based and growth-based investment portfolios on the Nairobi Securities Exchange. Specifically, the study sought to determine whether a portfolio composed of value stocks, characterized by low Price to Book (P/B) ratios, would exhibit higher returns than a portfolio comprised of growth stocks, characterized by high P/B ratios. The research hypothesis postulated that value stocks would outperform growth stocks in terms of returns.

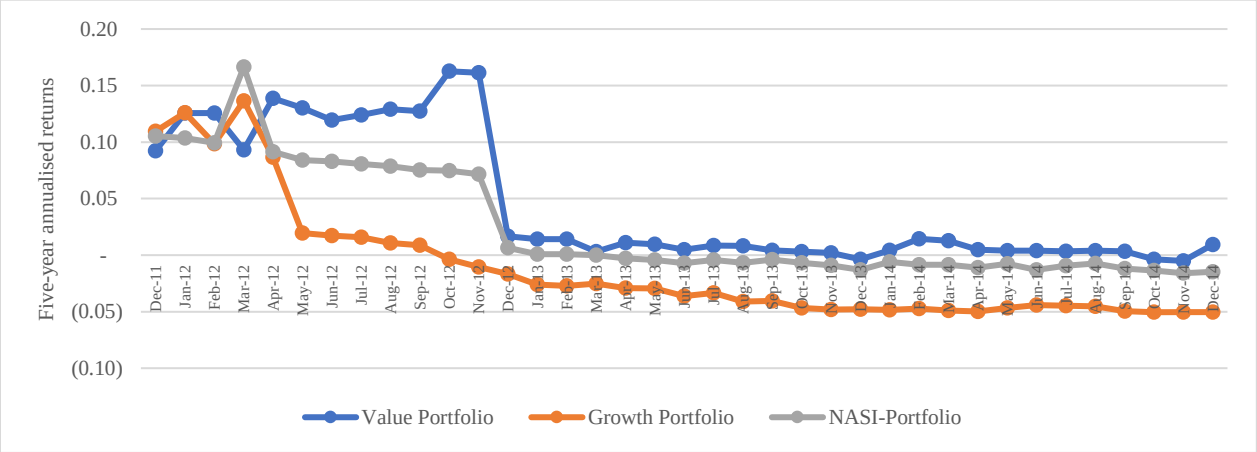
To test the hypothesis, the constructed portfolios were subjected to rigorous analysis to assess whether the returns from value stocks demonstrated superiority over the returns from growth stocks. The use of P/B ratios as a basis for portfolio segmentation was grounded in prior literature, with recent studies by Gârleanu and Pedersen (2022) and Fielding (2019) providing support for this approach. The null hypothesis (Ho) posited that there would be no significant difference in returns between the value and growth portfolios, while the alternative hypothesis (Hi) suggested that value portfolios would exhibit superior performance.

The primary objectives of the dissertation were twofold: first, to determine the relative superiority between value and growth investment strategies, and second, to explore the construction of a value investing framework that could generate superior returns. The results of the study and how they met the study objectives are discussed next.

The relative performance of the value and growth portfolios

By classifying portfolios according to their price to book (P/B) ratios, four portfolios were constructed for each and every month. Quartile1 made up the top 25% of firms based on the P/B ratios (the growth portfolio) while quartile 4 was made up of the bottom P/B ratio firms (the value portfolio). Each portfolio's return was then tracked over a subsequent five-year period, and the procedure was employed every month for the study period (2011- 2019) from the NSE data. In the initial hypothesis, the value portfolio performance relative to the growth portfolio performance was tested with a view to identifying the presence of possible anomalies of value stocks outperformance on the Nairobi Stock Exchange over the study period. Figure 4.3 0 plots the constructed value and growth portfolios' annualised returns.

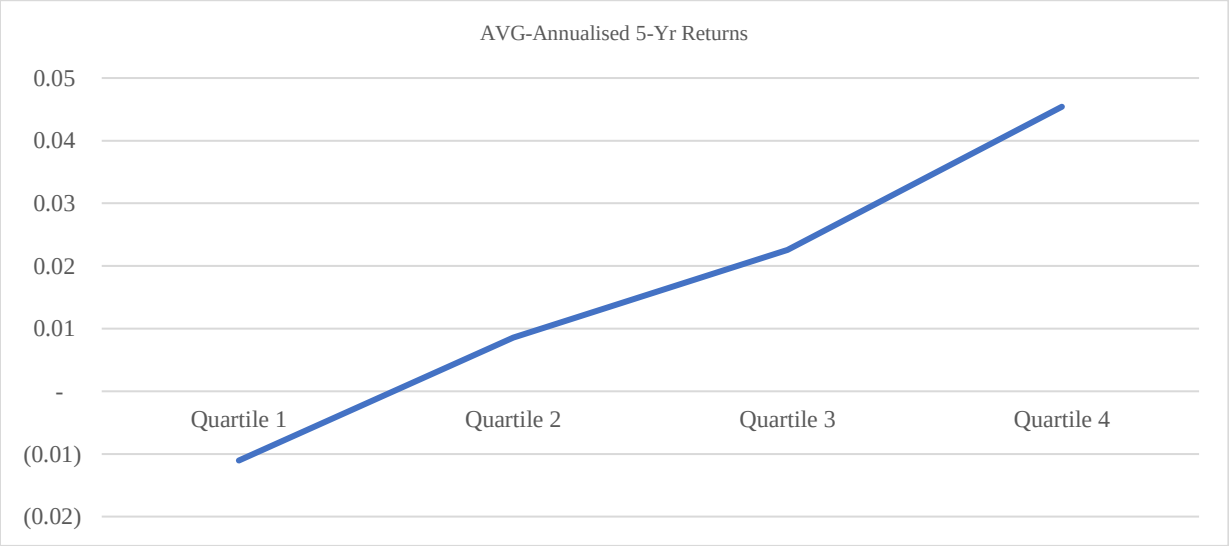
Figure 4.3: Actual Annualised Excess Returns of Value, Growth, NASI Portfolios



The figure above shows a near consistent delivery of positive returns from the value portfolio in the full study period and being tracked by the all-share index returns, while the growth portfolio's returns deteriorated more in the subsequent years and performed worse than the Nairobi All-Share Index portfolio (NASI) market portfolio. The value and growth portfolios returned highest annualised earnings of 16% (Nov-12) and 14% (Mar-12) respectively. The period from May 2012 to the end of the study period exhibited a value cycle where the value portfolios beat the growth

ones with 6% average excess return. There appeared to be an outcome of portfolios tracking each other over the period before April 2012. These outcomes above aligned with The Brandes Institute (2009), findings as well as to the later studies in Krige and Toit (2014). The current literature also indicate that value stocks perform better than growth stocks over extended investment time horizons (see, Hutabarat, 2022; Akinde et al., 2019; Garleanu et al., 2022; Crane and Crotty, 2018). An inverse linear relationship was observed between the change in the price-to book ratios in each consecutive quartile and the mean 5-year annualized return (Figure 4.4 where quartile 1 comprised the highest P/B ratio portfolios). The average portfolio returns were 13.5% and 4.5% for the value and growth portfolios respectively, over the study period, with that of the NASI being 9.4% over that period, an indication of a significant superior result of the value stocks over the thesis study investment horizon.

Figure 4.4: Quartile-Based Average Annualised Returns



The foregoing value-growth portfolios performance equated to cumulative respective return rates of 168 % and negative 41% over a 5-year investment horizon period over the analysis years. Here, it is worthwhile to recall that portfolios were selected for each month and then

subsequent 5-year returns evaluation and thus 2014 was the last year the portfolios were constructed such that the respective 5-year returns ran until December 2019.

Excess Return and Valuation Difference Multiple Results

For the purposes of further checking the relative superior performance of value stocks over the growth ones, as the predominant active investing styles, the relative difference in valuation multiples was considered so as to identify the period in which the highest margin of outperformance was observed from the historical data. This necessitated a suitable standardised ratio computation. Each portfolio's median P/B ratio was applied in determining the valuation difference multiple in the relative P/B ratios-based rankings of each month's value and growth portfolios. It had been defined that the valuation difference multiple was the ratio of median P/B ratio of the growth over that of the value portfolio. Higher valuation difference multiples would be observed where there were greater valuation dispersions in the value and growth stocks, following Toit and Krige (2014) and Toit (2012). The regression equation used the logarithm of the valuation difference multiple since the spreads-returns relationship is nonlinear (Brooks, 2014; Baltagi, 2011; Campbell, et al., 1997). In these instances, the use of the logarithm stabilises the data as it better reflects the return-spread relationship. The plots of the two variables are shown below and then followed by the tests of stationarity.

Figure 4.5: Time Series Plot for Excess Return

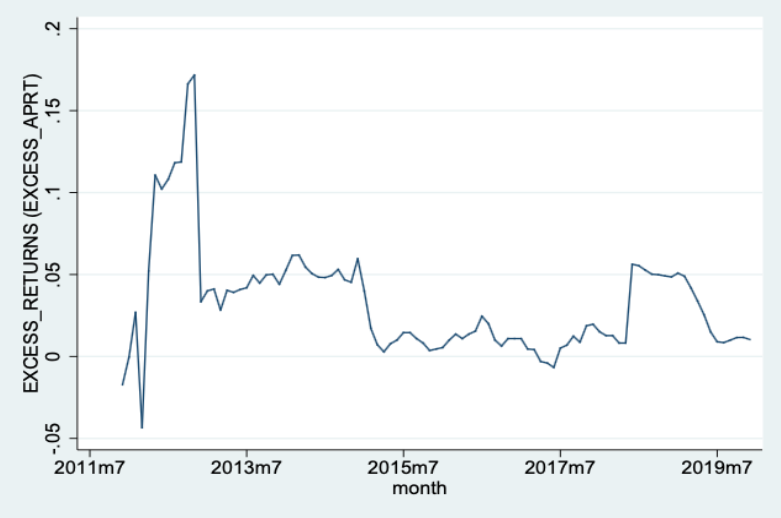
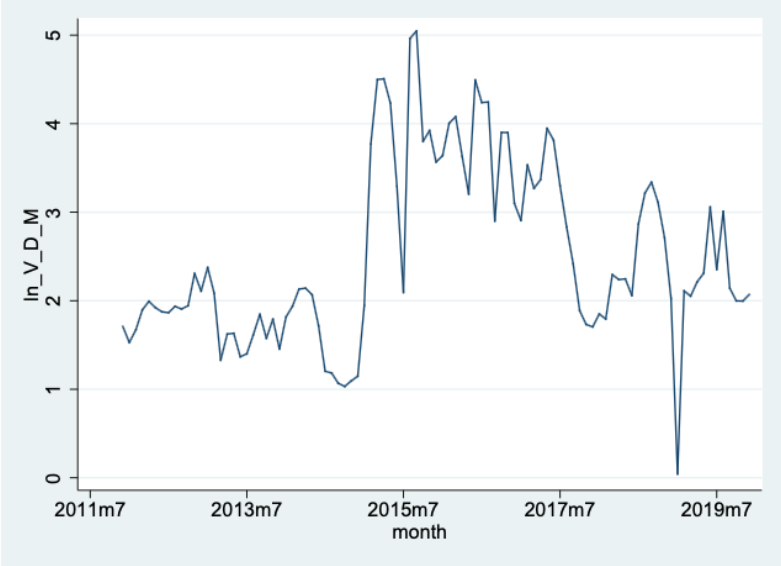


Figure 4.6: Time Series Plot for Log of Valuation Difference Multiple



Stationarity Tests

The test for stationarity of the variables was done using three tests: Augmented Dickey Fuller; Elliot, Rothenberg, and Stock test; and the Phillips–Perron.

The results of the Augmented Dickey–Fuller stationarity tests are shown in Table 4.1 for both variables, for a model with no lags and one with lags. Since there's monthly data, a minimum of 12 lags in the model with lags was included.

The model with no lags rejects the null hypothesis of non–stationarity, for both variables. In the model with lags, however, we do not reject the null hypothesis of non–stationarity for both variables; because the test statistic is algebraically larger than any of the interpolated Dickey–Fuller critical values displayed in the table. The model with lags is used and concludes that both variables are non–stationary in levels, based on the Augmented Dickey– Fuller test.

A modified Dickey–Fuller test proposed by Elliot et al. (1996) also fails to reject the null hypothesis of non–stationarity at the 1% significance level. The Phillips–Perron test (Phillips and Perron 1988), however, rejects the null hypothesis of non–stationarity. Therefore, it is concluded that the two variables are non–stationary based on the Augmented Dickey–Fuller and the modified Dickey–Fuller tests. Testing for the order of integration (see Tables 4.1 and 4.2) shows that both variables are integrated of order one, that is they are both I (1) variables.

Table 4.1: Augmented Dickey–Fuller Test for Unit Root (t Statistics in Parentheses)

	Dependent Variable: Δy_t y = Excess Return		Dependent Variable: Δy_t y = ln (Valuation Difference Multiple)	
	No Lags	With Lags	No Lags	With Lags
y_{t-1}	−0.209***	−0.078	−0.194***	−0.147
	(−3.39)	(−1.58)	(−3.20)	(−1.55)
Δy_{t-1}		0.063		−0.063
		(0.83)		(−0.46)
Δy_{t-2}		−0.050		−0.100
		(−0.66)		(−0.73)
Δy_{t-3}		0.079		−0.075
		(1.14)		(−0.54)
Δy_{t-4}		−0.074		−0.033
		(−1.09)		(−0.24)
Δy_{t-5}		0.010		−0.181
		(0.16)		(−1.36)
Δy_{t-6}		−0.027		0.086
		(−0.46)		(0.64)
Δy_{t-7}		0.050		−0.024
		(0.87)		(−0.18)
Δy_{t-8}		−0.045		−0.118
		(−0.79)		(−0.89)
Δy_{t-9}		0.073		−0.019
		(1.33)		(−0.15)
Δy_{t-10}		−0.043		0.024
		(−0.78)		(0.19)
Δy_{t-11}		0.028		0.112
		(0.54)		(0.86)
Δy_{t-12}		−0.008		−0.013
		(−0.16)		(−0.09)
Constant	0.007**	0.002	0.494***	0.388
	(2.44)	(1.05)	(2.99)	(1.51)
Number of Observations	**96**	**84**	**96**	**84**
Test Statistic	−3.394	−1.583	−3.203	−1.553
Mackinnon approximate p−value	0.0112	0.4919	0.0198	0.5071
	Interpolated Dickey-Fuller Critical Values			
1%	−3.516	−3.532	−3.516	−3.532
5%	−2.893	−2.903	−2.893	−2.903
10%	−2.582	−2.586	−2.582	−2.586

*** Statistically significant at the 1% level ** Statistically significant at the 5% level

Table 4.2: Augmented Dickey–Fuller Test for Unit Root (t Statistics in Parentheses)

	Dependent Variable: $\Delta^2 y_t$		Dependent Variable: $\Delta^2 y_t$	
	y = Excess Return		y = ln (Valuation Difference Multiple)	
	No Lags	With Lags	No Lags	With Lags
Δy_{t-1}	−1.086***	−1.327***	−1.119***	−2.667***
	(−10.54)	(−3.65)	(−10.88)	(−3.44)
$\Delta^2 y_{t-1}$		0.468		1.484**
		(1.39)		(2.00)
$\Delta^2 y_{t-2}$		0.390		1.282*
		(1.28)		(1.82)
$\Delta^2 y_{t-3}$		0.398		1.106*
		(1.49)		(1.68)
$\Delta^2 y_{t-4}$		0.303		0.968
		(1.25)		(1.59)
$\Delta^2 y_{t-5}$		0.251		0.669
		(1.22)		(1.21)
$\Delta^2 y_{t-6}$		0.187		0.679
		(1.04)		(1.36)
$\Delta^2 y_{t-7}$		0.213		0.581
		(1.33)		(1.30)
$\Delta^2 y_{t-8}$		0.141		0.369
		(1.02)		(0.96)
$\Delta^2 y_{t-9}$		0.166		0.271
		(1.43)		(0.84)
$\Delta^2 y_{t-10}$		0.113		0.223
		(1.15)		(0.86)
$\Delta^2 y_{t-11}$		0.096		0.255
		(1.34)		(1.27)
$\Delta^2 y_{t-12}$		0.077		0.196
		(1.49)		(1.42)
Constant	0.0001	−0.0006	0.006	0.004
	(0.06)	(−0.65)	(0.09)	(0.05)
Number of Observations	**95**	**83**	**95**	**83**
Test Statistic	−10.541	−3.653	−10.876	−3.444
Mackinnon approximate p−value	0.0000	0.0048	0.0000	0.0095
	Interpolated Dickey-Fuller Critical Values			
1%	−3.517	−3.534	−3.517	−3.534
5%	−2.894	−2.904	−2.894	−2.904
10%	−2.582	−2.587	−2.582	−2.587

*** Statistically significant at the 1% level ** Statistically significant at the 5% level

* Statistically significant at the 10% level

Cointegration Tests and Error Correction Model

Cointegration Tests

Having established that the two variables are I (1), the next step was to check whether they are cointegrated. This first employed the Engle–Granger cointegration test (Engle and Granger 1987). This procedure requires estimating a long– run relationship between the two I (1) variables and then check whether the residuals from this long–run relationship are stationary. Suppose the long–run relationship is given by Equation 4.1 below:

$$\text{Excess Return}_t = \beta_1 + \beta_2 \ln(\text{Valuation Difference Multiple}) + u_t. \quad (4.1)$$

, we estimate Equation 4.1 and then check whether the residuals from the estimated model, $\hat{u}_t$ are stationary.

We show the estimated model in Equation 4.2 and the stationarity test for the residuals from this model in Table 3. The critical values in the table are drawn from Table C in the *Supplementary Manual* accompanying Enders (2015). The critical values are for two variables and T = 100, which is closer to our sample size of T = 97 (97 months).

Note from Table 4.3 that we reject the null hypothesis of no cointegration based on the model with no lags and that with 11 lags. We are, however, unable to reject the null hypothesis based on the model with 12 lags. Since, however, 11 lags are very close to 12 lags, we use the results from the model with 11 lags and conclude that the two variables are cointegrated.

$$\underset{(t)}{\widehat{\text{Excess Return}}_t} = \underset{(7.74)}{0.067} - \underset{(-4.27)}{0.014} \ln(\text{Valuation Difference Multiple}); \; T = 97. \quad (4.2)$$

Table 4. 3: Engle–Granger Cointegration Test (t Statistics in Parentheses)

	Dependent Variable: Δy_t		
	No Lags	11 Lags	12 Lags
y_{t-1}	−0.284***	−0.522***	−0.256**
	(−4.08)	(−4.99)	(−2.51)
Δy_{t-1}		0.048	0.010
		(0.41)	(0.10)
Δy_{t-2}		−0.075	−0.007
		(−0.70)	(−0.08)
Δy_{t-3}		0.121	0.131
		(1.11)	(1.44)
Δy_{t-4}		0.021	0.028
		(0.22)	(0.30)
Δy_{t-5}		0.037	0.015
		(0.41)	(0.19)
Δy_{t-6}		0.003	0.036
		(0.04)	(0.49)
Δy_{t-7}		−0.050	−0.010
		(−0.56)	(−0.13)
Δy_{t-8}		−0.146*	−0.006
		(−1.79)	(−0.08)
Δy_{t-9}		0.075	0.007
		(0.91)	(0.10)
Δy_{t-10}		−0.085	−0.006
		(−1.10)	(−0.09)
Δy_{t-11}		0.046	0.030
		(0.60)	(0.46)
Δy_{t-12}			0.041
			(0.64)
Constant	0.0004	−0.003**	−0.001
	(0.19)	(−2.14)	(−1.01)
Number of Observations	**96**	**85**	**84**
Test Statistic	−4.077	−4.991	−2.510
Mackinnon approximate p−value	0.0011	0.0000	0.1130
	Critical Values; Two Variables, T = 100		
1%	−4.008	−4.008	−4.008
5%	−3.398	−3.398	−3.398
10%	−3.087	−3.087	−3.087

*** Statistically significant at the 1% level * Statistically significant at the 10% level ** Statistically significant at the 5% level

Cointegration Equation ad Error Correction Models

Since the two variables are cointegrated, Johansen rank tests (Johansen 1995) reveal the existence of a single cointegration equation. This is shown in Equation 4.3

$$\underset{(t)}{\widehat{u}_t} = \text{Excess Return} - 0.1137 + \underset{(3.84)}{0.0312} \ln(\text{Valuation Difference Multiple}) \; ; \; T = 95. \tag{4.3}$$

The cointegration equation can be alternatively written as shown in Equation 4.4, which indicates a long–run statistically significant inverse relationship between Excess Return and ln(Valuation Difference Multiple). The higher the differences in valuation multiples, the lower the excess returns since higher valuation difference multiples means that the portfolios comprise predominantly of high P/B based portfolios (i.e., growth stocks) and vice versa.

$$\underset{(t)}{\widehat{\text{Excess Return}_t}} = 0.1137 - \underset{(-3.84)}{0.0312} \ln(\text{Valuation Difference Multiple}) \; ; \; T = 95. \tag{4.4}$$

The corresponding error correction models are shown in Table 4.4. A test of the autocorrelation of the residuals from the error correction models does not reject the null hypothesis of no autocorrelation.

4.4: Error Correction Models (z Statistics in Parentheses)

	Dependent Variable: Δy_t y = Excess Return	Dependent Variable: Δx_t x = ln(Valuation Difference Multiple)
	(1)	(2)
$\hat{u}_{t-1}$	-0.216^{***}	-4.028^{**}
	(-3.30)	(-2.03)
Δy_{t-1}	-0.004	0.791
	(-0.04)	(0.26)
Δx_{t-1}	0.001	$-0.0.049$
	(0.26)	(-0.45)
Constant	-0.0002	0.00001
	(-0.09)	(0.00)
Number of Observations	**95**	**95**

***Statistically significant at the 1% level **Statistically significant at the 5% level

Based on the error correction model results for Model 1 in Table 4.4, we can observe that the speed of adjustment is −0.216. This means that about 0.22 of the discrepancy between Excess Return and its equilibrium value (That is, its long–run value) at period t − 1 is reversed in period t. Model 1 in Table 4.4, however, shows that there is no statistically significant relationship between Excess Return and ln(Valuation Difference Multiple) in the short–run.

Post Estimation Tests

The post estimation checks show that the cointegration equation is stationary (as seen in Figure 4.7) and the estimated model is also stable (see Figure 4.8).

Figure 4.7: Predicted Cointegrated Equation

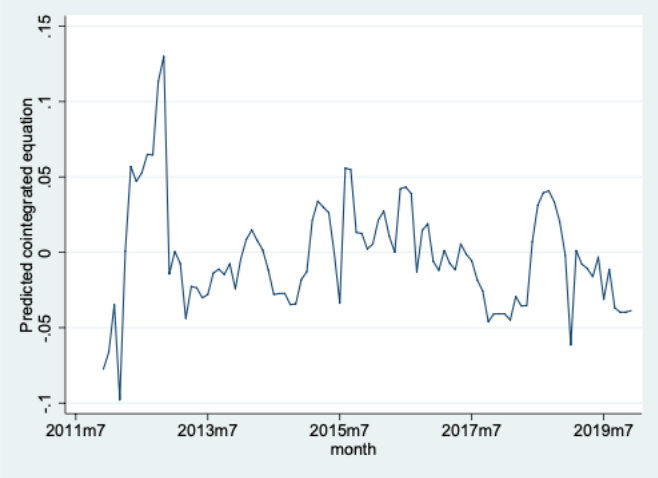


Figure 4.8: Roots of the Companion Matrix

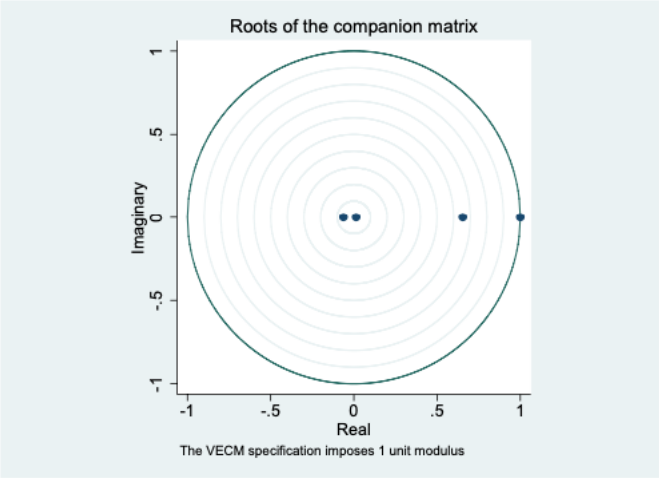
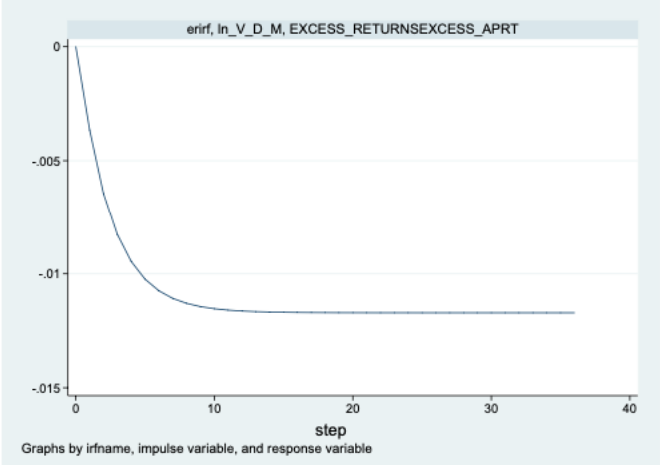


Figure 4.9 shows that an orthogonalized shock to ln (Valuation Difference Multiple) has a permanent effect on Excess Return.

Figure 4.9: Effect of a Shock to ln (Valuation Difference Multiple) on Excess Return



The above indicates that higher valuation difference multiples, associated with growth stocks portfolios have an inverse relationship with positive excess stock returns and, conversely, low valuation difference multiples, arising from a concentration of value stocks, are associated with higher excess stock portfolio returns. Thus, confirming the superiority of value investing and

thus answering research question 1. Research question 2 is alco answered in that low valuation multiples are confirmed to be the mechanisms of constructing a value portfolio.

In summary, the results presented under empirical test 1 indicate that the null hypothesis (no return difference in the two portfolio types of value and growth) was not accepted hence implying that there existed a value premium for value stocks over the growth ones on the NSE over the study period's investment horizon. In addition, there exists an inverse non-linear relationship between valuation differences multiples and the excess stock returns and that valuation difference multiples' shocks have a longterm impact on the excess annualised average stock returns. These results answer the two research questions and meet the stated research objectives.

Empirical research 2

Research Questions /Hypothesis:

The second empirical test aimed to address several research questions:

i. To what extent can the basic fundamentals-based investment approach, known as the F-Score, be transferred and applied to the Kenyan stock market? This research question sought to investigate the feasibility and effectiveness of applying the F-Score, a fundamentals-based investment approach, within the specific context of the Kenyan stock market. The objective was to ascertain the adaptability and utility of this approach in the Kenyan market and assess its potential for identifying investment opportunities.

ii. What alternative strategies are available for investors to achieve superior outcomes, and if so, can the best-performing strategy be identified? The F-Rank and BM portfolio combinations

were proposed and tested as potential alternatives. This research question aimed to explore alternative investment strategies that have the potential to generate superior outcomes for investors. The study introduced and examined two alternative strategies: F-Rank and BM portfolio combinations. The objective was to evaluate whether these alternatives outperformed the basic F-Score approach and determine which strategy exhibited the highest efficacy in achieving improved investment results.

iii. Does the book-to-market (B/M) ratio of a firm influence the success of the identified investment strategy? The BM 2-way portfolio construction methods, in conjunction with the F-Score and the F-Rank, were utilized to address this question. This research question examined the relationship between a firm's B/M ratio and the effectiveness of the identified investment strategy. The study employed the BM 2-way portfolio construction methods in combination with the F-Score and F-Rank strategies to explore whether the B/M ratio played a significant role in driving the efficacy of these investment approaches. The aim was to ascertain whether the B/M ratio exerted a substantial impact on the success of the identified investment strategy.

Evaluating the success of an investment approach based on the original methodologies that were originally applied to advanced markets and now being evaluated on an emerging market such as Kenya is akin to carrying out a robustness test in the manner demonstrated in Duong et al. (2014) and Kumsta (2015). This requirement was met by stating the first hypothesis as below.

Hypothesis 2.1: The F_Score approach to investing together with its variants can identify stocks that will win in the future in the Kenyan stock market.

Chapter 3's section 3.4.2 empirical research 2 showed that the F_Score composite measures were binary and hence a considerable likelihood of leaving out important financial statement information. Illustratively, a firm that has recently issued additional shares might receive a negative assessment and thus assigned a zero value on this specific measure, even though intuitively motivated by the fact that share issues lead to earnings dilution but without applying any grading. Thus, the size of the additional share capital issued is not weighted in the assignment of the binary values of 1 or 0 but all firms raising additional capital are assigned the value of 0. Such scenarios, if applied to the other variables could lead to a firm being identified as unworthy of investing in, at the worst. However, this should not pose problems in a long only portfolio because of the wide range of alternative high-ranking F_Score firms. It is the shorting of a stock that is unduly negatively rated that has adverse effects on the portfolio's overall performance (Safdar, 2022).

This all-or-nothing investment approach is appealing but is potentially sub-optimal and hence lends itself to possible improvements. Nevertheless, one needs to balance the high-return potential with the requisite additional resources of time and effort in implementation of the alternatives. This led to further analyses covering aspects that explore the practicality of improving the original method.

In the first aspect, the financial information from financial statements was graded in finer details to improve the simple binary measurements by applying a ranking system. Here, the alternative measures are relative and not absolute as was in the original F_Score. So, in the F_Score approach, firms are assigned a single defined score ranging from 0 to 9 no matter the peer firms'

number in the particular year. In the alternative method with ranking/grading, the alternative score is driven by how the other firms included in the sample set performed. In the second aspect, the ability of each of the Fi-rank to make forecasts was measured and hence the assumption was made that both past and future accuracies are correct. The next hypothesis was then stated as below.

Hypothesis 2.2*: Combining the alternative F_Score components produces better performance relative to the original* F_Score *investment strategy in the Kenyan stock market.*

A key variation from the Piotroski's (2000) approach was the inclusion of all the listed firms on the NSE and not just the high B/M firms where it was then justified on the grounds that too few firms (less than 50% of the sample) provided positive returns in the original study. The current study sought to improve the F_Score's binary characteristics that might have driven the above scenario as part of the preceding hypothesis, similar to Ho et al. (2022), Hyde (2018) and Kumsta (2015). Including all NSE listed firms here was justified on two fronts; first, on the practical considerations that the overall number of NSE listed firms is comparatively much lower and thus further lowering the quantity of data by leaving out all low B/M firms could result in having too low a sample size that could produce inconclusive results. Second, using the whole available data set aids in proving the original strategy's robustness (Hyde, 2018). A finding that the strategy works nullifies the need for investors to carryout additional work of classifying stocks based on their B/M ratios as a first step before application (Safdar, 2022). The hypothesis here was then stated as:

Hypothesis 2.3*: The F_Score strategy of investment with the related alternatives is able to identify winner and loser stocks no matter their linkage to any particular book-to-market ratio class.*

The research objectives under the empirical research 2 were stated as:

a. To carry out an empirical test of a previous successful investment approach on the Kenyan environment (The F_Score Method).
b. To extend this approach by applying forecasting principles with a view to improving the original investment strategy's results. This was achieved in theF_Score, F_Rank and BM portfolio combinations analysis.

The results of all the above are now presented next.

Firm descriptive analysis

In Table 4.5, the descriptive statistics of all the nine F_Score components are presented. The Book-to-Market ratio of an average (median) firm is 1.21 (0.87) and a market capitalisation of 27,049 (28,107) million Kenya Shillings (KES). The average (median) return on assets is 38.34 (35) percent irrespective of the firm's B/M ratio, with a related ROA change (DeltaROA) of -28.34 percent on average and a median of 30 percent. The average total assets (ATASSETS) average (median) quoted Kenyan firm was KES 57.4 (51.6) billion. The other columns in the table exhibit the standard deviations, the positive signals percentages as well as the lowest and highest values for each of the F-components.

Table 4.5: Firms Financial Characteristics

	ROA	CFO	DeltaROA	ACCR	DeltaLEV	DeltaLIQ	EQ	DeltaGP	ATURNOVER	BM	ATASSETS
Mean	38.34	35.66	28.34	39.78	30.88	17.88	75.50	1.09	23.19	1.21	57,352.97
Median	35.00	35.00	30.00	43.00	31.00	18.50	76.00	1.00	23.00	0.87	51,555.81
Standard Deviation	6.78	3.67	10.21	6.80	3.88	3.44	1.32	1.35	5.52	1.37	20,492.60
Kurtosis	-0.65	4.76	-0.16	-0.72	0.82	3.15	-0.87	2.58	-0.49	27.85	4.51
Minimum	25.00	23.00	4.00	27.00	25.00	6.00	73.00	0.00	11.00	0.42	28,366.24
Maximum	51.00	44.00	47.00	53.00	42.00	23.00	77.00	5.00	33.00	8.50	123,684.14

The correlation analysis of the basic F_Score strategy

Five portfolios were built up in the process of performing statistical analyses where stocks were assigned to one of the portfolios fquintiles based on a firm's computed F_Score. Here, neither stock size nor the B/M ratio was of relevance and hence only five portfolio fquintiles were dealt and thus one-dimensional portfolios (one-way portfolios) were the result. The fquintile cut-off points come from the firm years F_Score distribution and stay the same throughout the analysis for results' comparability purposes. Table 4.6 describes the Kenyan stock market situation in a crude manner. As depicted in Table 4.6, there were firm-year observations totalling to 2496. Here, firm years mean the cumulated firm numbers that give a complete set of the requisite data for the F_Score determination for the time period 2011 - 2019. As per the absolute frequencies' percentages in Table 4.6 column 3, the F_Scores were unevenly spread, with the smallest and largest fquintiles representing approximately 6% of the data. This intuitively appears to be due to the high number of observations. Succinctly stated, the lowest fquintile (L*) contains the least 7% of the F_Score stocks and range from 0-2 and, in turn is part of the low (L) fquintile ranging from 0-3. F_Score stocks ranging from 4-6 are part of the middle fquintile (M). Analogously, the high fquintile (H) of the 7-9 range F_Scores contain the highest (H*) making up 0.2% of the data and are contained in the 8-9 range of F_Scores. This therefore means that the cumulative distribution

comes out as L = 52.5%, M = 47.3% and H = 0.2% of all firm years and both L* and H* are part of the L and H, respectively. This partitioning was carried out on all the fquintiles in the portfolio analyses while generally assuming that a high F_Score equates to a better subsequent year market adjusted return.

Table 4.6: The F_Score Firm Years

F_SCORE	*Frequency*	*percent*	*Cum.*
0	0	0.00%	0.00%
1	11	0.44%	0.44%
2	157	6.29%	6.73%
3	1142	45.75%	52.48%
4	567	22.72%	75.20%
5	507	20.31%	95.51%
6	107	4.29%	99.80%
7	5	0.20%	100.00%
8	0	0.00%	100.00%
9	0	0.00%	100.00%
Total	**2496**	**100.00%**	

In Table 4.7, the correlation matrix was applied in the identification of individual F_Score components' relationships and the related subsequent returns in stocks. The correlation matrix here thus depicts the individual correlation between the F_Score components, the composite F_Score, and the consequent returns. The composite F_Score and the market return correlation was positive with values exceeding 0.23. The F_Score appeared to be chiefly determined by Return on Assets (ROA), Cashflow (CFO), Changes in Return on Assets (DeltaROA) and, Assets Turnover (ATURNOVER) since their correlations exceed 0.5 throughout, suggesting that where, for example, ROA is assigned value code 1, the CFO would likely follow suit (get a code value of 1) since their correlation coefficient is 0.52. The next best contributors to the aggregate (composite) F_Score, with values in excess of 0.1, are those F-components measuring liquidity changes (DeltaLIQ), and the change in gross profit margins (DeltaGP) whereas Accruals (ACCR), changes in leverage (deltaLEV), and equity injections (EQ) contribute the least to the aggregate F_Score, with respective values of only just below -0.1. Nevertheless, all the components were found significant at a 1% level and hence important in the investment strategy.

When the F-components were checked against the 1 and 2-year (winsorised) returns, there was a positive significant correlation between the profitability measures of DeltaROA and Accruals and all of the four returns with values consistently exceeded 0.12 but negative for ROA and most of the CFO save for the winsorised 2-year market return. Under the leverage, liquidity, and source of funds analysis, all the three measures (DeltaLEV, DeltaLIQ, EQ) correlated positively with returns. A firm's operating efficiency was not found to correlate well with the returns save for DeltaGP that only positively correlated with the winsorised 1-year return and the and ATURNOVER with the winsorised 2 -year returns. All in all, the ROA and CFO stayed as the variables that were most correlated.

Table 4.7: The Correlation Matrix: Stock returns, F-components, and F_Score

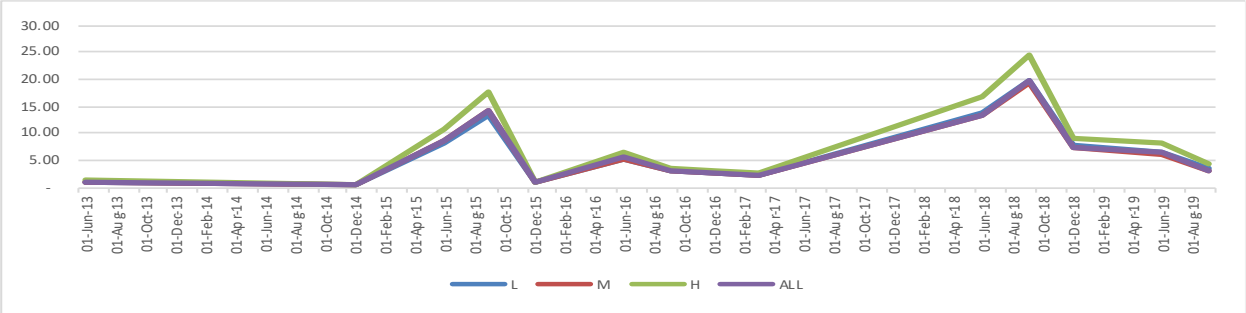
Variable	PROFITABILITY				LEVERAGE,LIQUIDITY, FUNDING			OPERATIONS EFFICIENCY		RETURNS				F_SCORE
	ROA	*CFO*	*DeltaROA*	*ACCR*	*DeltaLEV*	*DeltaLIQ*	*EQ*	*DeltaGP*	*ATURNOVER*	*RTURN1*	*WINSD_RTURN1*	*RTURN2*	*WINSD_RTURN2*	*F_SCORE*
ROA	1													
CFO	0.66	1												
DeltaROA	0.39	0.28	1											
ACCR	-1.00	-0.65	-0.41	1										
DeltaLEV	-0.65	-0.39	-0.33	0.64	1									
DeltaLIQ	0.13	0.09	0.00	-0.14	-0.41	1								
EQ	-0.26	-0.22	-0.34	0.26	0.21	0.06	1							
DeltaGP	-0.16	0.01	0.00	0.16	0.00	0.00	0.03	1						
ATURNOVER	0.50	0.30	0.31	-0.50	-0.33	-0.05	-0.28	-0.02	1					
RTURN1	-0.26	-0.03	0.20	0.25	0.16	0.19	0.05	-0.08	-0.03	1				
WINSD_RTURN1	-0.32	-0.03	0.23	0.32	0.17	0.27	0.12	0.12	-0.06	0.94	1			
RTURN2	-0.26	-0.02	0.20	0.26	0.16	0.20	0.06	-0.07	-0.03	1.00	0.95	1		
WINSD_RTURN2	-0.17	0.04	0.13	0.17	0.10	0.14	0.07	-0.11	0.05	0.95	0.88	0.94	1	
F_SCORE	0.50	0.52	0.85	-0.51	-0.30	0.15	-0.27	0.10	0.61	0.23	0.28	0.24	0.20	1

Table 4.8 presents the stock returns decomposed into their respective F_Score source segments of L, M, and H showing the buy-hold 1-year returns. The table shows each F_Score segment portfolio's mean returns (fquintiles subdivision), and the positive stock returns' means in each fquintile group. The largest number of observations were found to cluster around those firms

with F_Scores ranging from 3 to 6, aligning with Piotroski (2000) where it was inferred to imply an absence of absolute indication of financial strength or weakness in the firms. Figure 4.10 shows a plot of the F_Score segmented portfolios' mean returns. There is a steady upward increasing pattern in the average 1-year stock returns from the lowest to the highest F_Score portfolios. The parametric tests results are shown at the bottom of both panels.

The parametric testing process took two scenarios. The first scenario carried out statistical tests of significance between the highest F_Score portfolios and the whole set of all the portfolios. The second scenario compared the highest with lowest F_Score portfolios' mean returns. Significance at 10% was found in the t-statics for the 1-year returns. A significant mean returns difference was inferred in the H and L portfolios' results. The trend was sustained in the penultimate column showing the observations percentages having positive stock returns in the respective F_Score group. Positive observations in the highest F_Score exceed 50%, but just about 30% in the lowest portfolios.

Figure 4.10: One-year buy-and-hold positive returns of F_Score equally weighted portfolios



The value weighted portfolio results aligned with the equal weighted portfolios results as shown in Figure 4.11 and Table 4.9.

Figure 4.11: One-year buy-and-hold positive returns of F_Score value weighted portfolios

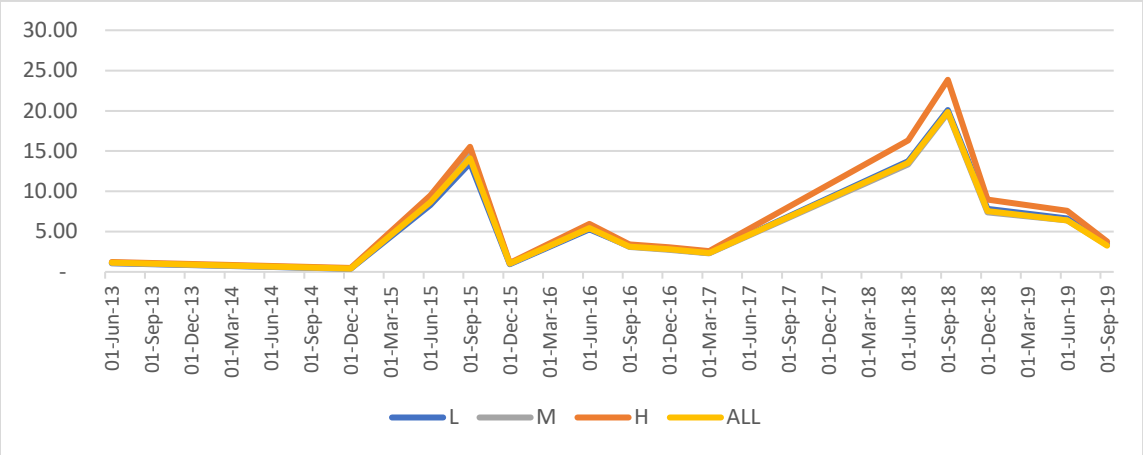


Table 4.8: One-year buy-and-hold returns of F_Score equally weighted portfolios

Returns	F-Score				t-test	
	L	*M*	*H*	*ALL*	*H-L*	*H-A*
Mean	2.200	-2.191	-2.946	-2.242	1.67	1.67
Median	-2.965	-3.138	-4.063	-3.159	(p=0.057)	
Positive mean returns	6.33	6.26	7.82	6.41		

Table 4.9: One-year buy-and-hold returns of F_Score value weighted portfolios

Returns	F-Score				Return differences	
	L	*M*	*H*	*ALL*	*H-L*	*H-A*
Mean	-0.735	-0.901	-0.609	-0.883	0.13	0.27
Median	-0.808	0.403	0.491	0.414	1.299	0.077

To sum up, the F_Score investment strategy's test results indicated the ability of the strategy in separating high from low stock returns and thus confirming the Piotroski (2000) finding. More so, the majority of returns tended to be mostly earned at least after year three of the portfolio construction and that high F_Score firms yielded the major portion of the overall profit in a short-long investment strategy, that is, higher returns came from the long (held) stocks as compared to the shorted ones. The results equate to the original US study findings indicating transferability of

the strategy to less developed markets like Kenya, more so given the fact that this research included the overall Kenyan stock market data and was not limited to the high-BM firms as was the case in the original F_Score study.

The F-rank approach alternative of portfolio construction

Under this methodology, the application of the ranking approach was done so as to remove the F_Score's binary nature's weaknesses. Stock returns ranking general application is to be found in time series regressions in the finance field, for example, in Jordan et al. (2014), ranked returns were applied to uncover evidence of underreactions of markets to firm information. Another study in Asness et al. (2020) applied the ranking method in the construction of value and momentum factors in the determination of portfolio weights. Regressing portfolio returns on the market index is the norm followed in these time series regressions with the intent of reducing the outlier undue influences where portfolios would appear to perform better when raw values are used. Ranks based results should therefore be more reliable despite this research being more cross-sectional in approach.

The respective test results that were then checked against the original F_Score are displayed in Table 4.10. The two halves of the table differ in F-rank calculation method and directly affects the fquintiles construction. It is worthwhile to recall that the F-rank is the composite measure of all 9 ranked and standardised F-components (the Fi-ranks). The process of standardisation leads to each Fi-rank value taking on a continuous value between 0 and 1. This therefore makes it possible for computing the F-rank's average or median. The mean and median were used to calculate the 1-year return following the same procedure as in the F_Score. The ability

to isolate the low/high-returning portfolios from others was not clear-cut in the F-rank investment approaches versions (mean and median-based) but were found to be significant just as in the F_Score t-statistics results. For instance, all the mean and median returns were of the same sign but with less defined differences. For instance, in Table 4.10, all the mean returns were negative and around the figure of negative 2.1. The mean positive returns in the respective F-rank terciles and are multiples higher than the full tercile mean returns (in excess of 6 compared to minus 2) but they still trended around the same mean irrespective of the F-rank tercile. The non-winsorised parametric t-test sections do not always give the same results but their respective t-test statistics showed significance in the mean and median portfolio differences.

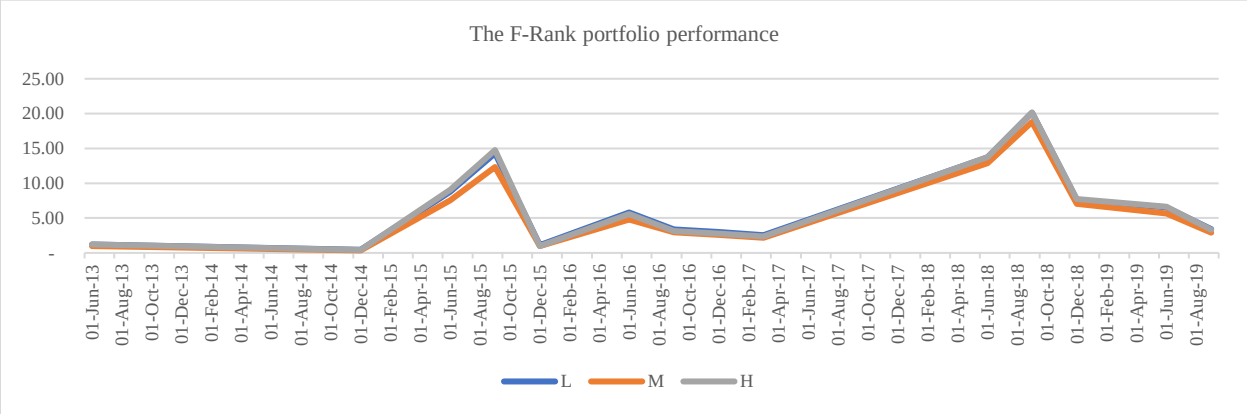
Table 4.10:F-rank portfolios

Returns	A. F-Rank (mean)				t-test	
	L	*M*	*H*	*ALL*	*H-L*	*H-A*
Mean	-2.38	-2.132	-2.211	-2.242	1.51	0.84
Median	-3.244	-2.860	-3.13	-3.159	p=0.07	
	B. F-Rank (median)					
Mean	2.948	2.908	-2.931	*-2.932*	1.75	0.43
Median	*-4.107*	*-4.083*	*4.086*	*-4.099*		
Positive mean returns	6.6	6.3	6.4	6.4		

The generalisable result was that vis-à-vis the F_Score strategy, the F-rank as an alternative tool in choosing stocks and constructing portfolios was less definite. Its appealing arguments in the ranking of financial statements items did not meet the statistical power exhibited in the binary approach as validated in its lower t-statistic in the tests carried out as well as less definite return differences. The F-rank strategy, however, was found useful in the basic argument for using accounting information to select winner stocks and dis-select losers. When only the positive

returns were plotted, the High F-rank portfolios outperformed all the other F-ranks as seen in the figure below.

Figure 4.12: The F-Rank positive returns portfolios



Empirical results in a two-way setting

In this section both the F_Score and the F-rank investment strategies' results are discussed with the second dimension; the book-to-market (B/M) ratio incorporated. This second dimension made it possible for portfolios to be demarcated more precisely and therefore enabled the test of the value investing core assumption of high-B/M firms producing higher future returns in comparison with the low-B/M firms. The Piotroski (2000) structure was mirrored in checking the applicability of the rank strategies in different B/M groups. It is noteworthy that an investor needs not to be conscious of the value-glamour dichotomy in order to practice the style akin to Friedman's (1953) note on billiard players being unaware of the complex algebra associated with their skills. The anomaly's source question, ranging from investor irrationality to behavioural finance to the EMH's risk-return relationship, comes to the fore after the basic observation ceases (Schredelseker, 2022).

The F_Score and the book-to-market ratio

Table 4.11 portrays the F_Score 2-way portfolios outputs where, for comparability with the 1-way counterparts, certain modifications were made. The middle portfolios (M) presentation was left out for analytical succinctness purposes. Further dissection of stocks was introduced to add low-BM and high-B/M portfolios presented on the vertical axis while keeping the F_Score portfolios' horizontal axis presentation. The B/M portfolios segmentation was made into terciles and here, the middle tercile was left out as well. The presented results are in percentages with the first section (A) made up of the mean returns while second part (B) contains the median returns. Hence, A depicts the mean test results while B portrays the median test results. In A, for example, the highest (H) F_Score and the Highest (H) B/M ratio portfolio yields returns of 32%. The low F_Score-Low B/M combination yields a 4.5% return implying a High-High, Low-Low preference in portfolio selection in the two-way portfolio combination approach. All other F_Score and B/M portfolio combinations earn negative annual returns. The two portfolios have a difference of 27% points (H-L) significant at 5% level (from the t-test) and analogously for the median returns and median test in panel B. The value-weighted portfolios (Table 4.12) consistently show that high BM portfolio combinations produce better returns than low BM combination portfolios.

Table 4.11:Two-way F_Score equally weighted portfolios

A	F-score (Mean returns)		t-test
	L	*H*	*H-L*
BM			
L	0.045	-0.701	-1.68
H	-0.425	0.321	P=0.05
H-L	0.470	-0.380	p=0.028

B	F-score (median returns)		t-test
	L	*H*	*H-L*
BM			
L	-0.003	-0.028	-2.02
H	-0.023	0.002	P=0.026
H-L	0.098		p=0.03

Table 4.12:Two-way F_Score value weighted portfolios

A	F-score (Mean returns)		t-test
	L	*H*	*H-L*
BM			
L	0.010	-0.027	-1.68
H	0.293	0.256	P=0.05
H-L	0.247		

B	F-score (median returns)		t-test
	L	*H*	*H-L*
BM			
L	-0.004	-0.010	-2.02
H	0.003	0.003	P=0.026
H-L	0.098		

Both panels of the table show the portfolio returns being positive for the high F_Scores mirrored by a high B/M ratio, on a consistent basis. Additionally, the high F_Score/high-B/M portfolio returns vertical differences were significant for both the mean returns and median test results (panel A and B, respectively). Things were different in the B/M portfolios in the low and lowest F_Score fquintiles where the mean-median returns vertical differences were mostly and extensively significant. The high B/M and the high-F_Score firms' vertical differences showed the expected directional sign and aligned with the empirical literature in the sense that high-B/M securities are associated with higher future returns as in Piotroski (2000).

A one-way F_Score portfolio comparison in Table 4.8 shows mostly lower horizontal mean return differences. The lower return differences indicate the undesirability of portfolio segmentation based on their B/M ratio, at first instance. Where the EMH holds such that stock returns relate positively with risk appetite, then continuous segmentation into B/M portfolios would be helpful to investors in making a preference choice between high-risk and low-risk investment strategies. The result would be the avoidance of high B/M portfolio investments that are normally associated with high risk levels that emanate from financial distress. This would lead to an untenable EMH argument depending on the condition of investors being expected to hold a long-short portfolio basket. In section A (Table 4.11), the portfolio returns show a long-only portfolio comprising a high F_Score and low-BM (high-B/M) returning only cents -0.7 (0.321) per annum. But, with investors shorting the respective low-F_Score portfolio intra-tercile B/M simultaneously, the return difference gets to cents 0.045 (-0.425) with a respective high t-test. The 2-way F_Score portfolio method came out as the reliable method to be used as a filtering tool of high return stock prospects because of the overall significant horizontal differences as well as the mostly highly significant vertical differences.

The Mean F-rank and the book-to-market ratio

The B/M second dimension's variant F-rank investment approach results are now discussed under this section and Table 4.13 and 4.14 (value weighted portfolios) mean F-rank approach structure mirrors the presentation in the 1-way portfolios of the F_Score and B/M selection method in Piotroski (2000) and Kumsta (2015).

Table 4.13:The mean and median F-rank equally weighted portfolios

A	F-rank (Mean returns)		t-test
	L	*H*	*H-L*
BM			
L	-0.134	-0.701	1.68
H	0.142	0.311	
H-L	0.276	1.012	P=0.051

B	F-rank (median returns)		t-test
	L	*H*	*H-L*
BM			
L	-0.018	-0.005	1.77
H	-0.013	0.001	
H-L	0.005	0.005	P=0.043

Table 4.14:The mean and median F-rank value weighted portfolios

A	F-rank (Mean returns)		t-test
	L	*H*	*H-L*
BM			
L	-0.142	-0.024	1.68
H	0.141	0.259	
H-L	0.283	0.283	P=0.051

B	F-rank (median returns)		t-test
	L	*H*	*H-L*
BM			
L	-0.017	-0.004	1.77
H	-0.010	-0.010	
H-L	0.006	-0.006	P=0.043

The outcomes were poor in the mean F-rank approach in comparison to the F_Score 2-way portfolios of the horizontal return differences. Their t-statics were a little lower, but their economic significance was observed to be meaningful (significant at 5% level). The non-parametric testing environment in the vertical return differences analysis showed the opposite outcome, save for the lowest F-rank portfolios. Here, significance was observed in the returns and the same compared

well with F_Score method's but there was the potential for the F-rank to better the investment results by way of portfolio further segmentation into B/M terciles. This was more so where the B/M stands in as a financial distress measure and therefore used as an investor's risk adjustment means in the F_Score 2-way portfolios manner. The median portfolios followed the same pattern as exhibited in panel B, with the vertical return differences coming out as significant at 10% and 5% level, respectively, in the high B/M and highest F-rank portfolios. The value-weighted portfolios did not appear to improve the results in any way but were consistent with those of the equally-weighted portfolios.

An equivalence can then be inferred given the F_Score and F-rank methods' 2-way setting's overall performance. Larger horizontal differences were observed in the use of the F_Score method as seen in panel A with the median returns being comparable with the F-ranks in panel B, an intriguing result for investors able to short positions, for instance, hedge funds. The drawback is in the lack of continuous significance hence affecting reliability scores, particularly the high F_Score median portfolios as exhibited under panel B and thus placing the mean F-rank method at the top.

The results from F-rank portfolio construction where the Fi-ranks' medians were determined that completed the basic F-rank strategy analysis showed the vertical differences to be insignificant in the set of the highest (H) F_Score fquintile portfolios in all the statistical methods. These findings were a drawback in their comparison with the original F_Score, more so the mean F-rank portfolios. The findings were also indeterminate in the high B/M and the low BM firms' vertical percentage portfolio differences when compared to the F_Score and mean F-rank

approaches to investing. The intuition here is that the median F-rank approach's economical and statistical significance of findings are confined to the highest fquintile with superiority established in the other two methods.

Inferior findings to the median F-rank and the F_Score methods were seen from the horizontal differences, given the low economic and statistical significance. The F_Score outperformed the two F-rank methods in virtually all aspects. It suffices to say that the diminished statistical power and the lower vertical and horizontal return differentials resulted in the median F-rank method version to take on a semblance of sufficient qualification for investor choice consideration. Nevertheless, the method, when used as a check of robustness validated the original F_Score method's underlying rationale as well as the high-BM firms' superior performance.

Evaluation of Findings

Empirical Research 1

The thesis' overriding research problem was to check for the evidence of the value investing approach' performance superiority over that of growth investing in Kenya with a view to contributing to the body of knowledge in the investment finance literature by addressing the key problems of value and growth style definitions, measurement, selection, and investment returns. Investigations on the superiority of value investing was still valid and therefore value premiums for stocks in environments prone to financial crises were to be expected and therefore needed further studying. The problem in the literature and in the practice of investment has been that the competing active investment styles of value and growth investing produced mixed results and hence no definitive consistent market superior style had been identified. The definitional problem of what constituted value and growth stocks still remained as well, giving rise to variable choice challenges hence affecting the research results (Lev, Baruch and Srivastava, 2020; Hou et al., 2018). The defined research objectives here were:

a) To determine which of the leading and competing active investment strategies of value and growth investing is superior.
b) Explore how the possible framework of value investing portfolio construction can be derived to yield superior returns.

The methods of inquiry and results under this section met these objectives as explained below.

The literature indicated that value stocks performed better than growth stocks over extended investment periods (Lev, Baruch and Srivastava, 2020; The Brandes Institute, 2009; Lakonishok et al., 1994). The value anomaly concept has attracted global research interest where

the research has indicated that this value anomaly exists in virtually all advanced markets. Some of the early prominent studies include Bauman et al. (1998), Lakonishok et al. (1994) and Fama and French (1992), which were carried out on advanced markets of Europe and the US, and more recently Gârleanu and Pedersen (2022), Li (2022), and Greenwald et al. (2020), and Kumsta (2015) on the European Markets. The emerging markets study of the Brandes Institute (2008) found a value stocks' average outperformance over the growth ones. The Brandes Institute (2009) follow up study on the possible indicators of value stock outperformance found the existence of a relationship valuation difference multiple of value and growth stocks and the subsequent value stocks outperformance in the American and other advanced markets. The historical observation has been that lower valuation difference multiples, a representation of a standardized relative disparity measure in value versus growth stocks valuations, is linked to the better performance of value stocks compared to their growth counterparts in a 5-year subsequent periods (Lev, Baruch and Srivastava, 2020).

The findings under the empirical research 1 depicted a virtual consistent pattern of the value portfolio yielding positive returns with the growth portfolios underperforming both the stock market index and the value stocks in most of the years of the study period. Both portfolios tracked each other in the earlier periods of the study. An inverse linear relationship was observed between the (P/B) ratios (valuation difference multiples) and the average 5-year holding period annualized excess returns, pointing to a significant superior performance of value stocks over the thesis's study period. The null hypothesis (no return difference in value and growth portfolios) was not accepted hence confirming that there was a value premium on the NSE over the study period's investment horizon.

The analysis of the valuation difference multiple and the successive annualised 5-year holding period excess return relationship found an inverse relation between the two. However, the relationship was not significant, indicating only a weak causality relationship over the study period. The error correction model results showed the speed of adjustment to be −0.216, implying that about 0.22 of the discrepancy between Excess Return and its equilibrium value (That is, its long–run value) at period t − 1 is reversed in period t.

Through the application of autoregressive modelling techniques, serial correlations in error term were corrected for. The final estimated model was then optimal, and indicative of valid statistical parameter estimates. The post-estimation results thus indicated that the cointegration equation was stationary and thus the estimated model was also stable.

The results thus confirmed that there existed a value premium for value stocks over the growth ones on the NSE over the study period's investment horizon. In addition, there exists an inverse non-linear relationship between valuation differences multiples and the excess stock returns and that valuation difference multiples' shocks have a longterm impact on the excess annualised average stock returns. These results thus answered the two research questions and met the stated research objectives.

The result aligned well with the literature, for example, Gârleanu and Pedersen (2022), Li (2022), Greenwald et al. (2020), and Lambrects and Roos (2017) findings that investigated the Joel Greenblatt's value investment strategy, which ranks stocks based on their price-to-earnings ratio and return on assets, which was found effective on the Johannesburg Stock Exchange (JSE).

The strategy produced statistically significant excess returns above the market index and superior risk-adjusted returns, positively correlating with the suggestions of the Greenblatt method on valuation multiples-based investment method as put in Greenblatt (2006) and Sareewiwatthana (2011). The studies also suggested a 3–5-year period as the optimal portfolio holding periods. This thesis' findings thus suggest that implementing Joel Greenblatt's-Brandeis Institute's value investment strategy based on valuation multiples on the Nairobi Securities Exchange (NSE) can lead to significant excess returns above the market index and hence the value investing approach's superiority of returns.

The finding of the existence of a value premium on the NSE intuitively implied that the EMH was not accepted and therefore the stock market was not efficient. The result also implied a case of some weak form of market efficiency where the value premium market anomaly was present with eventual market information travel that started correcting the anomaly (time lag effects in information processing and assimilation). Based on the error correction model results for it was observe that the speed of adjustment was −0.216, meaning that about 0.22 of the discrepancy between Excess Return and its equilibrium value (that is, its long–run value) at period t − 1 is reversed in period t. However, there is no statistically significant relationship between Excess Return and ln(Valuation Difference Multiple) in the short–run. These outcomes aligned with The Brandes Institute (2009) findings as well as the established literature as stated at the beginning of this section as well as the Hodnett (2014) and Lambrects and Roos (2017) finding that investigated the Joel Greenblatt's value investment strategy. These results were buttressed in Fielding (2019) findings on the JSE and Garleanu and Pederson (2022) active vs passive investing study of the Samuelson's dictum.

The empirical literature indicates that there are difficulties in interpreting results from empirical tests of market efficiency (Brooks, 2014; Fama et al., 2013). This arises due to the joint hypothesis problem where any efficiency test assumes an equilibrium model defining normal stock returns such that rejecting efficiency could be the result of either a truly inefficient market or an outcome of an erroneous equilibrium model. This joint hypothesis problem implies that it is technically impossible to reject market efficiency (Fama et al., 2020; Brooks, 2014). The second challenge has been said to be that perfect efficiency is an unrealistic yardstick unlikely to obtain in the real-world, as in Grossman and Stiglitz (1980) where it was shown that abnormal returns exist if and only if information costs are zero. Such abnormal returns would then be a prerequisite as a compensation to investors for their investment in additional information gathering and processing work. The returns, when netted off the information investment cost, then can no longer be viewed to be abnormal. However, only a minute abnormal returns portion can be justified by informational costs in large-highly liquid markets and the difficulty is in determining the size of these costs. Some authors have gone ahead and suggested that a more useful concept would be relative efficiency where different markets are compared as opposed to the enduring absolute efficiency concept (see for instance, Marcellino, 2016). Examples include, comparing the London Stock Exchange versus the Tokyo Securities Exchange, derivatives markets versus commodities markets, etc. The next discussion is an evaluation of the empirical research 2's findings.

Empirical research 2

An insightful discovery discussed at length by Kumsta (2015) from the Rapach et al. (2010) work was the failure of forecast combinations sophistication to do better than simple combinations

like the price-to-book based and the F_Score and F-rank portfolio combination methods. This outcome aligned well with the contemporary empirical literature. Their forecast combinations involved three varied time horizons with the results indicating a significant outperformance of a 15 economic variables combination over single variable forecasts. Combinations to forecast the US equity premiums saw benefits mostly in the extended research period, 1965-2005 but at 10% level of significance in the three investment windows.

The weighted forecast errors in the original work of Piotroski (2000) were also nearly the same. In this thesis, the results had varied outcomes compared to the above such that a comparison of the t-statistics and percentage return variations showed no conclusive preference for any one particular method, and this could be explained in terms of the variables that were used. In Rapach et al. (2010), and similarly in Hyde (2018) the analyses were on a combination of economic and stock market measures while Piotroski (2000) zeroed in on firm-specific accounting information variables (Lev, Baruch and Srivastava, 2020).

It follows that there could be existent limits to the explanatory power of macroeconomic variables of stock returns implying the diminishing utility of weighting. Ho et al. (2022) and Kumsta (2015) suggested parameter instability as the possible causality factors, a suggestion that appeared to have support in the literature, for instance, Lee (2014) and Hodnett (2014). Andrikopoulos et al. (2008) had had pre-emptive results over Rapach et al. (2010) where their study asserted the better stability of simple weighting (near equal or mean weighting) in the forecast of economic output growth (Lev, Baruch and Srivastava, 2020). In Hyde (2018) and Kumsta (2015), regulatory changes and monetary policy stances form that basis of the parameter

instability effect. This process impacts more those firms whose financial statements are prone to the environmental shocks in regulation, and monetary policies (Ho et al., 2022).

There is an insulation for individual firms from the mentioned effects since the F-rank method zeros in on firm-specific financial health measures that enable a tooth comb evaluation to take place. Hence, Piotroski's (2000) based investment approach anchored in accounting data suggests the dependability of the individual forecast errors weighting method to isolate winners from losers as compared to non- weighting. This suggestion is more pronounced in the mean returns as gleaned from the significance in both the parametric and non-parametric tests results. The intuitive results from the approach could be as a result of the general analysis approach applied as opposed to the referenced studies of Maloney, Thomas and Moskowitz (2020), Kok et al. (2018) and Rapach et al. (2010).

This dissertation's study was conducted on time series portfolios data analysis as past time series studies had extensive applications of the combination methods (Ho et al. 2022). The application of forecast combination techniques is an innovative way of differentiating future winner and loser stocks. First, putting in place the respective ranks and weights and then carrying out the following period's return would be of more practical relevance since the key goal of an investor is to be found in the period end accounts as opposed to the results from longer reporting periods. Second, the investor is liberated from the task of the holdout period time frame determination which is potentially arbitrary (Ho et al., 2022).

One of the research's goals was to mimic the Piotroski (2000) accounting-based investment approach in the Kenyan stock market. The dissertation augmented this work through an examination of other ways available for isolating winner and loser stocks. This was accomplished by use of varied methods of forecasting using the original F_Score components as firm specific stock return forecasts. The analysis inherently followed the fundamental analysis and forecasting strands of finance literature (Ho, et al., 2022; Naknok; 2022). Fundamental analysis is applied by investors in predicting stock returns but through methods that vary across investors and time. The main distinguishing factor of the F_Score and the alternative F-rank combination measures is the unnecessity of adjustments in the F_Score approaches hence the ease of implementation.

This study established a H-L (high-minus-low) premium in an emerging market in the relationship between a company's F-score and its stock returns. This H-L premium held for both large and small stocks and that the premium to high F-score stocks was consistent both in a value and equally weighted portfolio set. The H-L premium refers to the difference in returns between stocks with high and low book-to-market ratios. The study thus found that stocks with high F-scores earn a significant return premium over stocks with low F-scores. The F-score is a measure of a company's financial health, based on factors such as profitability and leverage. This positive premium was consistent across equally weighted and value weighted portfolios and time periods, suggesting that it is a robust finding.

Piotroski (2000) found that this premium was concentrated within small stocks, but this study views this to be an unlikely case in emerging markets and suggest that this may be due to other factors besides the rapid incorporation of new financial information into stock prices and

thus the efficiency of new information being impounded into stock prices cannot be the only explanation for the premium, and that there may be other factors at play as was argued in Hyde (2018) having established under empirical research one that the NSE was not market information efficient.

Two criticisms of accounting-based investment strategies' results were put forth in Richardson et al. (2010) and comprehensively analysed in Kumsta (2015). The first criticism was that the best working approaches could simply be products of in-sample fitting with no bearing on external or out of sample validity. The second criticism provided stated that research approaches could follow a "kitchen sink" process where analyses of stock returns are applied on different amounts of financial statements data arbitrarily devoid of an anchoring theory. This dissertation eliminated the first criticism in that its intention was to test rather than generate theory, and thus avoiding the in-sample fitting risks and the use of an official stock market data makes it meet the out-sample validity requirement in line with the literature, for instance, Safdar (2022), Ho et al. (2022) and Kumsta (2015).

The second drawback is more challenging to mitigate. Piotroski (2000) took measures to condense the financial statements variables quantity in comparison to other studies (see Lev and Srivastava, 2019; Kumsta, 2015) but was still put to task on his 9-F_Score components choice at will. Penman and Zhu (2016) relied on a qualitative approach in their identification of the value lead variables but only one of them made its way in the Piotroski (2000) composite F_Score. This drawback was reduced in this thesis by the introduction of a second dimension, the B/M ratio in

the 2-way stock analysis following Ho et al. (2022). This then leads to the following discussion on the 2-way portfolios.

The findings from this research on the Kenyan stock market accorded with Piotroski (2000) study such that the F_Score investment strategy can be transferred to non-US markets. Earlier in the chapter, it was discussed that the alternative F-rank strategy had both a robustness check utility and a data loss check function in the financial data transformation process to the binary F-components. The mean and median F-rank underperformed the F_Score strategy in the portfolio returns and was just like Piotroski's (2000) F_Score's rank-based robustness tests where the findings showed relative underperformance. Piotroski's explanation was that the outcome could have been because of the respective signal's sign loss in the course of the process of assigning ranks. This argument is challengeable, partly, by the vertical differentials' outcomes where an overall performance that was found to be more robust statistically and economically was found in this study's F-rank version.

Another aspect which missed in the Piotroski (2000) study that was provided in the present study is the evidence on how portfolios with median calculated returns perform, only a mention devoid of details was made about alternative specifications with the potential for producing better results. This was based on the foregoing to make the assumption that a binary strategy like the F_Score mimicked a continuous strategy like the F-rank for the Kenyan securities market. Mimicry here implied that both strategies could be used interchangeably in isolating high from low returns portfolios within the low-high B/M terciles as well as across the same terciles. Sorting firms into F_Score fquintiles in a sequential manner and then dividing them into numbered terciles intra each

fquintile had the import of controlling for a firm's financial health F_Score-wise in the analysis of the B/M ratio effects.

The results were the outperformance of high-B/M firms over the low-B/M counterparts, as established from the vertical return differences that were mostly significant. These findings were in alignment with the established empirical studies, for instance in Koutoupis (2022), Ho et al. (2022), Banerjee and Deb(2015), and were found broadly applicable to the Kenyan stock market. The Piotroski (2000) and Schade (2017) findings however appeared to rule out risk as being the causality factor in the high B/M firms' outperformance over the low B/M ones. The question of identifying other factor(s) that could explain the high B/M outperformance phenomenon was identified as qualifying for further research as it was outside the present study's scope.

The original F_Score ideas were expanded, and the performance of the emanating forecasting models analysed so as to make improvements in the basic accounting-based investment strategy's results. One problem here is that the Penman et al. (2015) critique applies to the extended models as well and the justification given thereof but using accounting data to forecast future stock performance appears to be an intuitively valuable step. The second problem emanates from the continued urge and attempt by researchers in forecasting stock returns as noted in Penman and Zhang (2015) to the effect that grasping the entire literature is an onerous challenge due to the ever-increasing multiplicity of methods and time horizons applied by researchers. The general observation in this regard was the presence of some concurrence on the subject of stock return predictability and this research relooked at the predictor variables with the conclusion that the accounting-based ones have an impressive performance.

The above conclusion comes with the suggestion that investment approaches with a top-down procedure do not end up with superlative return realisations. The stock return forecasting literature on the other hand is in short supply as regards the bottom-up approach but it continues to develop (for example, Huni and Sibindi, 2020) and is especially convincing in the F_Score combination with the forecasting methods as implemented in this thesis. Because no outright insights of those models' performance were presented in Piotroski (2000), it was impossible to carry out a like for like comparison in the findings of each model but only different ones. Hence, the F-rank model, as a key model applied in this study delivers plausible results but is inferior to the original F_Score and the B/M methods as was also observed in Koutoupis (2022), and Hyde (2018). It can then be said that to create a comparability base, this forecast methods' performance investigation with the related literature in its application would be useful in discovering its overall utility.

In the same vein as this dissertation, the Jordan et al. (2014) research on the forecast-ability of stock returns on out of sample basis on fourteen European markets confirmed the initial findings where combinations of single forecasts performed better than univariate models (see Koutoupis, 2022; Yan and Zheng, 2017; Zakaria and Hashim, 2017). This thesis analysed the F-components and the 1-year stock returns' correlations but did not carry out a specific performance test of the individual forecasts. Taking for granted that the previous empirical literature results are valid, and the combined methods (of the F-rank and B/M) return inferior results compared to the F_Score methods, it follows that the individual forecast must of necessity return inferior results. The relevant question is then whether a combination of the combined and the individual forecasts result

in superior performance when measured against the original Piotroski (2000) F_Score investment method. The fact that the results from the alternative combination techniques turned out to be inferior raised two follow up matters. The first matter points to the suggestion that it would be worthwhile to investigate the possibility of a non-linear forecasting model improving the results. The second one relates to explanations for the superior results of the F_Score approaches.

The first matter was addressed in Duong et al. (2014) where nonlinear combination methods resulted in higher forecasting accuracy in the forecast of the rate of inflation in the UK data. However, implementing their model in this research was impossible due to the data sample size requirements that are too large, a consideration that was identified in Gregory et al. (2013) with the conclusion that the data sample requirement effectively rendered non-linear combination methods ineffective. The work of Koutoupis (2022) argued that nonlinear models performance ability of simulating reality was no better than the linear models' because the nonlinear models generally come with a litany of variables, exacerbating the challenge put forth in Richardson et al. (2010) regarding the 'kitchen sink' approach.

The second matter was not addressed in Piotroski (2000) as pertains to the source of the investment strategy's success, whether emanating from inefficiencies in the market or rational economic behaviour. Alternatively, it could be that the F_Score/F-rank methods outperformance come from their noise reducing ability as alluded to in Koutoupis (2022), Hyde (2018), Hyde (2015), and Jordan et al. (2014). The Kenyan market being much smaller as compared to US and European markets might possibly be fraught with noise and hence differences in performance that are more pronounced. It is here reiterated that the efficiency of new information being impounded

into stock prices cannot be the only explanation for the premium to high F-score stocks as there may be other factors at play, such as analyst and investor/neglect as put forth in Ho et al. (2022) and Hyde (2018). Therefore, herein yet lies another gap worthy of explanation in future research; an emerging markets fuller explanation of the drivers of the premium to high F-score stocks.

Summary

The presentation in this chapter showed research evidence of the value effect in the NASI and that value stocks outperformed growth stocks in a much more significant way in periods with decreasing valuation difference multiples and this applied in all market capitalization segments. The empirical literature indicated that value stocks performed better than growth stocks over longer investment horizons, for instance, Fielding (2019) findings on the JSE, Garleanu and Pederson (2022) Kumsta (2015), The Brandes Institute (2009) and Lakonishok et al. (1994). The value anomaly concept has attracted global research interest where the research has indicated that this value anomaly exists in virtually all advanced markets. The above emerging markets' studies have found a value stocks' average outperformance over the growth ones. Follow up studies have found the existence of an inverse relation between valuation multiples and the subsequent value stocks outperformance in the American and other advanced markets (Domingues, et al., 2022).

This study's findings confirmed the existence of a value premium for value stocks over growth stocks on the NSE over the study period's investment horizon. The research also revealed an inverse non-linear relationship between valuation differences multiples and excess stock returns. Furthermore, the study showed that shocks to valuation difference multiples have a long-

term impact on the excess annualized average stock returns. These results successfully addressed the research questions and met the stated research objectives under the first empirical test.

The original F_Score investment strategy results were presented in this chapter from the Kenyan stock market data, with the strategy's key components being replicated to assess the utility of this investment strategy in an environment other than a developed market. The study did a ranking and standardisation of the F_Score's individual components and tested them as well. The resultant Fi-ranks' differences with the ranked one-year future returns were applied as single forecasts then combined in variant versions such that improvements in the original F_Score method was attained. The book-to-market ratio was introduced as a second dimension in the recursive modelling. The overall findings in this study showed that, as found in the original Piotroski (2000) work, the F_Score method is dominant to the two combination strategies (the F-rank and B/M). The results were then linked to the current literature.

The analysis of the research questions gave the following results. The first hypothesis was generally confirmed such that both the original F_Score and the related alternatives serve as appropriate mechanism of separating underperformers from promising stocks in the Kenyan environment. The key argument for this outcome is the possible overlaps that exist in stock markets, that is, adoption of world class regulatory frameworks by firms when listing or expanding access to capital and/or lowering capital costs (Djogbenou, et al, 2015) and this implies transferability of an investment strategy where the concerned markets aspire to international regulatory levels and thus create bonding and market segmentation as well as a higher homogeneity degree (Piotroski et al., 2013).

The second hypothesis constituted a main contribution of the chapter, where it was postulated that the original F_Score investment approach alternatives might perform better than the original F_Score strategy. The results from the study, however, did not confirm this hypothesis. While these alternatives are helpful in separating winner stocks from loser ones, they are not efficient and no rewards are available to investors for the extra effort put in their construction and hence the F_Score method, as simple as it is, comes out top, as was found in Rapach et al. (2010), since the introduction of complexity into forecasts fails to create any improvements in the outcomes, a point comprehensively illustrated in Patari et al. (2018).

However, an isolation of only those Fi-ranks which predict future returns in a more accurate manner succeeds only in circumstances where the return results outperform the no predictability benchmark. Here, the best outcomes come from within the alternative investment strategies group. The goal at this stage was to dissolve the effects flowing from the F_Score approach's binary nature. The inferior outcomes here lead to the conclusion that forecast combinations' anticipated benefits together with the application of financial statements data are outmatched by the limitations of the process of improvement itself, as pre-emptively provided in Piotroski (2013) and Rahman et al. (2021).

It is noted that, in spite of these findings, the strategies were taken to be checks of robustness for the main concept of successful stock choices depending on the firm's fundamental financial metrics. It should be recalled that the Piotroski (2000) F_Score test approach was limited to only high-BM firms, whereas this research included all firms, hence the lack of direct

comparability following the methodology applied in Walkshäusl (2020). However, the results here point out the usefulness of both the original and the alternative strategy applicable to low-B/M firms. The horizontal return variations in high-B/M stocks consistently exceed those of low-B/M stocks, thus arguing for this strategy's usefulness for long/short traders, confirming hypothesis three.

This chapter's results advance knowledge as follows. The value investing approach is confirmed to be superior in the Nairobi Securities Exchange as defined by the valuation multiples of P/B and B/M. This confirmation implies that the EMH does not hold in this market and hence, possibly, the behavioural finance scenario is the more likely influencing theory in this market's investment decisions operations. Secondly, the original F_Score strategy of investment was demonstrated to be transferable and can be operationalised in an emerging market like Kenya. Third, there's no equal in this approach's simplicity and possibly no improvements are tenable through introductions of complicated alternatives. Finally, the approach works beyond the high-B/M stocks and thus can be used in stock markets with a variety of attributes unlike the initial conclusion.

Nevertheless, there is still areas for further research along the lines of how far these investment strategies can extend in cases where intangible information is to be captured, following the Chinco et al (2019) finding that entities tend to follow intangible information in their trading decisions and thus affect the book-to-market outcomes hence the value premium. This documentation was buttressed in Gu et al (2018) where the intangibles were seen as equivalents to employee satisfaction with a satisfaction index above industry averages. Integrating both

quantitative and qualitative measures would go a long way in making improvements in the strategy without adopting a limiting tunnel view.

CHAPTER 5: IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS

Introduction

In chapter one, it was explained that the main aim of value investing was to ensure investor capital was preserved while at the same time yielding above market average returns and so the investment process goes through the cycles of capital formation (from lifetime earnings), capital protection (through 'smart' investments), postponed consumption (for retirement support), and ultimately, wealth distribution (through donations and bequeathals). In this regard investing for value ensures that the invested capital's purchasing power is preserved by hedging the investment returns from the effects of inflation (time value of money). This implies that investor preferences are driven by the human desire for improving their living conditions as well as their wealth maximization and thus better economic conditions. This has been confirmed by evidence in the investment and behavioural finance literature where stock buying has been observed to be motivated by the possibility of profit making that is accompanied with payoff loss minimization (Ayaba, 2020; Siddiquee, 2017).

Chapter one then discussed the ongoing debate about which of the competing active investment styles of value and growth investing performed better (and thus demonstrates superiority) and hence indicating the existence of value premiums in stock markets. This was gleaned from both the academic literature and the practice of investment where the investment styles of value and growth investing have produced mixed results. This aspect was extensively dealt with throughout the thesis from the literature review in chapter two, to chapter three's study methodology and the results discussion in chapter four. In addition, the definition of value and growth stocks has not been clear cut. The varied definitions of these two makes the study variables

choice a challenging task and hence affects the research results. The definitional objective was achieved in both chapter two and chapter three and is summarized here as follows.

The intellectual origin of value investing was laid out in Graham and Dodd (1934), with the fundamental philosophy being that of the buying of stocks that are valued below their intrinsic value, a value justifiable only from the selling firm's fundamentals of earnings capacity, dividend yields, assets quality and other accounting measures of the firm's financial performance data. In the Graham and Dodd (1934) investing philosophy, the core principles of value investing were specified as: shareholding being akin to owning a portion of business that is already operating, investable firms are selected due to their high quality as seen from sound financial fundamentals, buying the selected firms' shares is done when their prices are determined to be below their estimated intrinsic values, and investors must eliminate emotions in their market dealing activities, more so during periods of economic turmoil. These principles indicate that value investing's focus is not on price movements as is the case in growth investing.

The practitioners of growth investing style are referred to in the literature as growth investors and they buy into firms exhibiting above average growth rates notwithstanding the fact that the share price might appear to be expensive as measured along the metrics of price-to-earnings ratios or price-to-book ratios. Growth stocks could potentially outperform investments that exhibited slower growths like income stocks because of the capital gains reinvestment in the form of retained earnings or undistributed profits. On the other hand, a value investor's objective is to look for bargains and therefore selects low priced investments using the relative factors of earnings, sales growth, net assets value and book values of the firms' issuing stocks. In this regard,

popular blue-chip stocks might be deselected by a value investor despite their stable and steady past growth because the share prices are considered too high relative to the firms' fundamentals as deciphered from the financial statements. So, the value investor would buy into solid companies that are currently selling low and hope for price corrections over the long run. The underlying import of value investing is to yield long-term net positive returns to the investor without losing the principal invested (Koutoupis, 2022; Fielding, 2019). The key theme of value investing is to preserve the capital funds invested and thus ensuring the protection of the investor's purchasing power. Therefore, to a value investor, the asset value forms the primary basis of making investment decisions with growth assets being considered as speculative and therefore an investment that is unreliable. The value investor will therefore only buy into a firm when its trading price is below its intrinsic asset value and any growth value in the asset (price increases) is considered as transitory.

To others, for example, Lehto (2021), Park et al. (2021) and Lee (2014), value investing takes place when the stock trades are concluded because of perceptions of a present arbitrage opportunity out of the current market prices and the fundamental value (the present value of the expected future payoffs to stockholders) gap. This investment style is anchored on two observations. First, that a share of a stock constitutes a mere fractional claim on the continuing operations of a business and that claim forms the basis of the continuing operation's eventual value. Second, that in the meanwhile short-term planning periods, there are bound to be substantial price deviations from the long-run value of the stock. In this regard then value investing strategies entail buying stocks appearing to be cheaper than their intrinsic value and disposing of seemingly expensive stocks with short selling being envisaged in this situation.

There are two sides to value investing such that value firms are not merely those that are selling cheap in comparison to their capital stock but also comprise the cheap ones as compared to their future residual income's present value. There seemed to exist a misconception that value investing is the trading in cheap stocks relative to measures of the firms' capital as reflected in the accounting-based valuation methods where cheapness is expressed in lower market multiples as discussed in, for instance, Zhang et al. (2021), Siddiquee (2017) and Toit et al. (2014). However, the real value of a firm is fundamentally measured in two elements of capital and growth opportunities. The problem with the current accounting-based valuations is that the typical cheapness indicators of value only relate the stock prices to the capital in place (as measured by book values, capital earnings, or turnovers), leading to the exclusion of the second vital element of a firm's value in equity valuation: the growth opportunities.

Successful value investing is to be viewed as consisting in the key elements of identifying quality firms and then buying into them at prices considered reasonable, implying value investing is made up of cheapness (low prices) and quality. Cheapness is conventionally measured by a firm's market multiple relative to its asset base while a firm's quality is its future expected residual income's present value (as evaluated based on various performance indicators known at present in a fundamental analysis). Graham (1934) identified these indicators as lower gearing, high liquidity, and high rates of steady balance sheet growth and suggested firms exhibiting these characteristics to have the best chance of generating future rates of returns that are above the market.

There are therefore two key core features of value investing. First is the margin-of-safety, which is the difference between an asset's market price and its intrinsic value; and second is the

requirement of thorough security analysis from the perspective of overall business ownership. This means that an investment in traded stocks should be done in a similar manner as the analysis and due diligence that is done when acquiring a whole business.

Emanating from the above is the conclusion that value investing can never be a passive endeavour. It requires full application of a participant's analytical technical capacities in investment decisions and that fundamentals analysis cannot be avoided in value investing. Value investing has three central elements, which are: i) value investing is a bottom-up strategy that consists in identifying specific investment opportunities that are below their intrinsic value, that is, undervalued assets; ii) value investing goes for absolute performance and not relative performance oriented; iii) value investing tendency in risk-aversion with emphasis on both risk and return. These three set the scene for value investors in a bottom-up approach. Were it to take on a top-down approach, exact forecasting of a lot of variables would be required from investors which would then be a frustrating endeavour. It is now understood that value investing works when the Graham-Buffet approach is implemented, as dissected in the literature review chapter.

As a summary of value investing, the following have been put forth as the key tenets constituting value investing: Investment, speculation, and gambling are clearly distinguished and separated, investment in marketable securities should always be approached and understood as akin to buying part ownership in a tangible working business, a portfolio of investments is made up of a choice of good quality firms out of a rigorous analysis of earnings power and financial sustainability of firms, an investor only buys stocks of firms when their trading price is reasonably lower than the intrinsic value, the businesses' operational quality and the paid price relative to the

intrinsic value determines its risk, and the returns to the investor are significantly influenced by the psychology of the investor. Success therefore calls for emotional control thereby ignoring market volatilities and the mob decisions.

In summary, value investing has its roots in the Graham and Dodd (1934) masterpiece as the intellectual bedrock whose philosophy is buying undervalued assets which are being sold below their intrinsic values as determined from an analysis of financial data pertaining to the firms in question. The intrinsic value is different from market value since market value is subject to manipulation and/or psychological biases in the eyes of behavioural finance. In this thesis, the selection of value and growth stocks measurement variables was predicated on the description of these investment styles. The variables of analysis were derived ensuring they captured the elements described above as established in empirical literature on these styles.

This dissertation then set out to check the superiority of value investing in an African securities market with a view to generating new knowledge to the investment finance literature by addressing the key problems of value and growth style definitions, measurement, selection, and investment returns performance. The quantitative dissertation's purpose was to carry out an investigation to determine whether an investment basket of value stocks yielded superior returns compared to those of the growth alternative, in the active investment style class. The investigation was carried out in an African setting of the Nairobi Securities Exchange (NSE) in Kenya. The dissertation sought to determine the possibility of uncovering a link between returns in equities investments and the style of investment's characteristics. The relevant value phenomenon

predictor variable, the valuation difference multiple, was core to this study. The study also purposed to validate a fundamentals-based investment portfolio construction methodology in the local environment. It was thus anticipated that this would add to new data and knowledge to the field since there's only scanty research over this period in the chosen market of investigation.

The research objectives were thereby stated as below and were achieved as discussed under the Implications' subsections:

i. To determine which of the leading and competing active investment strategies of value and growth investing is superior.
ii. Explore how the possible framework of value investing portfolio construction can be derived to yield superior returns.
iii. To carry out an empirical test of a previous successful investment approach on the Kenyan environment.
iv. To extend this approach by applying forecasting principles with a view to improving the original investment strategy's results.

The study considered the importance of ethics in social research as underscored in the literature, for instance, Saunders et al. (2009). This took cognizance of the fact that participants need to be protected from any harm that may arise from their participation in the research process. The researcher must thus first obtain consent from respondents on their willingness to participate (Hilton et al., 2019; Chan et al., 2004). In this research, this aspect did not apply as no human respondents were necessary. The variables of interest were financial indicators such as prices of traded securities, stock volumes, securities return at an aggregated level and no individual investor

was a subject of study. As mentioned in Hilton et al. (2019), honest and accurate data are vitally important in any research process and have a more than significant impact on the validity of research outputs. This study managed data collected in such a way that it was independently verifiable, and the data analysis method deliberately stated such that the results would be verified by other interested parties. Viewed from a wider societal context, the results of this research will go a long way into making suggestions into alternative approaches of making investment decisions both to individual and corporate investors. The rest of the chapter details the takeaways from this research as pertains to the implications of the findings, their application, and recommendations for future research.

Implications

In the literature (e.g., Fama, 2020; Siddiquee, 2017; Kumsta, 2015), a reference was made to a quote attributed to Blaise Pascal by Warren Buffett's letter to the shareholders in 1982[1] as follows:

"It has struck me that all men's misfortunes spring from the single cause that they are unable to stay quietly in one room" (Kumsta, 2015:211).

The quote has found application in the financial markets' discussions as well as in the finance discipline built on the efficient markets hypothesis (EMH) and the relatively new school

[1] Berkshire Hathaway shareholder letter of 1982 (http://www.berkshirehathaway.com)

of behavioural finance (BF). The quote's relevance in the financial markets comes from the fact that it has historically been difficult for many investors to produce higher returns over time that were above the market returns (i.e., inability of investors to generate alpha) and thus never beating the market. As far as the literature in academia in concerned, for example, Koutoupis (2022), Safdar (2022), Siddiquee (2017) and Kumsta (2015) believe that the quote condenses the opposing views of the EMH and the BF theories. Thus, markets are beatable, but investors fail to realise this because of panic and/or speculative behaviour. This means that markets are not necessarily price information efficient, but the convertible opportunities are often lost due to the behavioural bias factors, more so, the herding behaviour as espoused in behavioural finance (Rahayu, et al., 2021; Arisanti and Asri, 2018; Zheng and Chiang, 2017).

The natural science view would argue for justifiably theorising about the spectrum of results only when the investor actively starts playing in the financial markets. In such circumstances, there's likely to be a concurrence of views by the adherents of both schools of thought on the building and application of algebraic methods to model out these hypothetical suppositions. However, as soon as the investor choses to play actively in the markets, natural science researchers would immediately come to the realisation of the impossibility of controlling for the investor's market actions, at least as reliably as assumed before in the laboratory environment. This will then coincide with most of the BF's proponents' assertions, one of the key underlying theories embedded in this study.

Contrastingly, the EMH adherents would not face such a challenge. The EMH propositions do not require strict mimicry of the natural science's requirements and neither widely embrace the

behavioural finance's propositions. Hence the "physics envy" phenomenon ultimately ends in misalignment in the modelled and actual results that have the investor behaviour as the ultimate driver. The cause of the theory versus real world outcome discrepancy remains to be determined. It is not yet known which of the two possibilities of erroneous model (due to either the model being incomplete or partially conceived) or the impossibility of modelling reality in a perfect manner, causes/explains this discrepancy.

The thesis discussed the similarities of both the EMH and BF schools of thought. The two literature strands aim to increase the understanding of the financial markets' evolutions over time such that practitioners are armed with appropriate tools that can help forestall disastrous events such as financial crises. Obviously, this intention implies a futuristic stance whereas finance research has the limitation of only looking at historical data from which it makes inferences. The EMH supporters have used this argument to validate their critique of the behavioural finance school and thus argue that explaining investor behaviour consequences only after having observed the outcomes was short-sighted since explanations must, of necessity, fit the data. Nevertheless, this does not appear to be too far removed from the more formal approaches.

The study therefore primarily applied the revised Chan and Lalonishok (2004) methodology, in the manner implemented in The Brandes Institute (2009), to the Kenyan stock market to identify the existence of any significant relations in valuation differences and the consequential performance of value vs. growth stocks, in the first empirical test. The selected firms were segmented into value and growth portfolios on the basis of their relative price-to-book value (P/B) and Book- to- Market (B/M) ratios. This segmentation was followed by calculating the relative differences in valuation

between the value and growth stocks. The various stocks portfolio performance was then tracked over the study data period. The valuation difference multiple served as a standardized valuation disparities proxy as in Garleanu and Perderson (2022), Toit and Krige (2014) and Toit (2012). The possible relationships in the past value cycles phenomena and the valuation difference multiple that were useful in making predictions of the future better outcomes of value stocks following Lee et al. (2020) were carried out. The second empirical research method involved portfolio construction based on a firm's aggregate accounting information variables-based score (F_SCORE) following the Piotroski (2000) original procedure while introducing ranking extensions in lieu of the binary F-Scores and further introducing the book-to-market dimension.

Scope of research

In chapter one, the research scope was outlined as seeking to discover the following aspects of investments. First, to test the outperformance of the value portfolio over the growth portfolio performance to identify whether there were possible anomalies of a cross-section stock returns where value stocks outperformed others on the Nairobi Stock Exchange over the study period. In this regard, the study findings were consistent with the empirical literature and demonstrated an outperformance of value-over-growth stocks, on average, over 5-year period investment horizons. Second, the research scope tested whether a simple implementable accounting fundamentals-based investment approach (the F_Score) could succeed in an emerging market environment like Kenya. This was also effectively a test of robustness of earlier findings in the US and European markets. Secondarily, this was also an existing knowledge expansion through the checking for other approaches beyond the original F_Score.

Here, the original F_Score approach's binary nature that potentially left out a substantial amount of vital information that could improve the performance was expanded into an F-ranking approach. In addition, the study made a methodological innovation where each of the portfolios' firms' proportions remained the same for each year as opposed to the original F_Score where firm proportions changed each year and thus had the potential to unduly impact the overall returns in periods of either overly positive or overly negative returns. The study then introduced a second dimension, the book-to-market ratio, to assess the potential key drivers of the F_Score and alternative strategies. The research scope finally included the aggregation of the findings into a knowledge addition to the financial markets' investments literature.

Research design implementation

This research was not aimed at replicating the 'natural science' methods and thus the test environment, as in all social science research, was more relaxed as to its strictness by bearing in mind that there were possible multiple realties that could emanate from the environment depending on the research method applied and thus probability assumptions are linked to outcomes instead of assuming direct causal relationships. The required data for conducting the analysis was provided by the NSE (stock prices and indices data). The firm specific accounting data was downloaded from the NSE website. The necessary variables figures were computed as defined in chapter three. The intra period data were interpolated (monthly financial statements data) from the period end data (from quarterly financial statements data).

Research questions and conclusions

The objectives of the study resulted into a hypothesis formulation which conjectured that returns from value stocks were higher the returns from growth stocks with the following resultant research questions:

i. Would a value stocks investment portfolio yield better returns than a growth stocks portfolio on the Nairobi Securities Exchange?
ii. How would a framework of value investing be constructed in an investment basket to ensure optimum investment returns?
iii. What is the extent to which the working of a basic fundamentals-based investment approach can be transferred and applied to the Kenyan stock market?
iv. Which alternative strategies exist that are implementable by investors in achieving better outcomes and, if so, is the best identifiable?
v. Does a firm's B/M ratio drive the success of the identified investment strategy?

Given the motivations stated in the preceding section, the research questions stated at the beginning of the chapter were investigated. Concerning the first research question, this study found a value effect on the NSE. The value quartile results found an inverse relationship between the change in the price-to book (P/B) ratios within each consecutive quartile and the average 5-year annualized return pointing to a significant superiority of value stocks over the thesis' study period. The null hypothesis (no return difference in value and growth portfolios) was not accepted hence implying that there was existence of a value premium on the NSE over the study period's investment horizon. The study finding of the outperformance of value-over-growth stocks, on average, over 5-year period investment horizons on the NSE were consistent with the financial

research literature. The finding also aligned well with the current investment environment which lays emphasis on risk-adjusted returns and the 2007/08 global financial crunch brought to the fore the need for heightened focus on risk management. This has meant that realising a specific return figure is less vital and thus investment practitioners must understand how style investing affects the risk-return framework of any given portfolio. There's great gain in ensuring that the different investment cycles are correctly predicted as the likelihood of attaining superior returns within manageable investment risk levels is improved.

Value premium phenomenon has been found to exist in the studies on international financial markets. Examples of such studies include Bauman et al. (1998), Lakonishok et al. (1994) and Fama and French (1992), on the mature markets in Europe and the USA. The leading work on the emerging markets on this topic was conducted by The Brandes Institute (2008) from the Worldscope database and an average value stock outperformance over growth stocks in these markets was observed. This was followed up in the following year with another study that sought to identify the possible determinants of the value stocks premium and found a correlation between the value and growth stocks' relative valuations and the subsequent superior performance of value stocks. Historical data indicates that the standardised measure of the relative disparity in valuations between value and growth stocks, the valuation difference multiple, had dipped in periods where value stocks performed better than the growth ones and by wide margins throughout the five-year period following the investments.

With regards to the second research question, the first value portfolio construction method was a price-to-book (P/B) based criteria. By classifying portfolios based on their P/B ratios, four

portfolios were constructed for each month. Quartile1 made up the top 25% of firms based on the P/B ratios (the growth portfolio) while quartile 4 was made up of the bottom P/B ratio firms (the value portfolio). Each portfolio's return was then tracked over a subsequent five-year period, and the procedure was employed every month for the study period (2011- 2019) from the NSE data. Portfolios were selected for each quarter and then subsequent 5-year returns evaluation. The result was that a P/B based portfolio construction qualifies as a viable framework for constructing value portfolios.

The findings under the empirical research 1 depicted a virtual consistent pattern of the value portfolio yielding positive returns with the growth portfolio's underperforming both the stock market index and the value stocks in most of the years of the study period. Both portfolios tracked each other in the earlier periods of the study. An inverse linear relationship was observed between the (P/B) ratios and the average 5-year annualized returns, showing that there was a significant superior performance of value stocks over the thesis study period. The null hypothesis (no return difference in value and growth portfolios) was not accepted hence confirming that there was existence of a value premium for value stocks over the growth ones on the NSE over the study period's investment horizon. The analysis of the valuation difference multiple and the 5-year annualised excess return relationship found a correlation between the two. However, the relationship was not significant, indicating only a weak relationship over the study period. Through the application of autoregressive modelling techniques, serial correlations in error term were corrected for. The final estimated model was then optimal, and indicative of valid statistical parameter estimates. This value effect was observed in the impulse response function where an

orthogonalized shock to the natural logarithm of the Valuation Difference Multiple had a permanent effect on Excess Return.

The finding of the existence of a value premium on the NSE intuitively implied that the EMH was not accepted and therefore the Kenyan stock market might not be efficient. The Roots of the Companion Matrix demonstrated that there were no other relevant exogenous shock originators to the Excess returns and thus only the differences in valuation multiples influenced the excess stock returns in the longterm. The first error correction model results showed that the speed of adjustment was −0.216, meaning that about 0.22 of the discrepancy between Excess Return and its equilibrium value (that is, its long–run value) at period t − 1 is reversed in period t. Subsequent models, however, showed that there was no statistically significant relationship between Excess Return and ln (Valuation Difference Multiple) in the short–run. The result thus implied a case of some weak form of market efficiency where the value premium market anomaly was present with eventual market information travel that started correcting the anomaly. These outcomes aligned with The Brandes Institute (2009) findings as well as the established literature as stated at the beginning of this section.

The empirical literature has shown the difficulties in interpreting results from empirical tests of market efficiency (Brooks, 2014) that arise from the joint hypothesis problem where any efficiency test assumes an equilibrium model defining normal stock returns such that rejecting efficiency could be the result of either a truly inefficient market or an outcome of an erroneous equilibrium model. This joint hypothesis problem implies that it is technically impossible to reject market efficiency (Fama et al., 2020; Brooks, 2014). The second challenge has been said to be that

perfect efficiency was an unrealistic yardstick that was unlikely to be observed in the real-world, as in Grossman and Stiglitz (1980) where it was shown that abnormal returns exist if and only if information costs are zero. Such abnormal returns would then be a prerequisite as a compensation to investors for their investment in additional information gathering and processing work. The returns, when netted off the information investment cost, then can no longer be viewed to be abnormal. However, only a minute abnormal returns portion can be justified by informational costs in large-highly liquid markets and the difficulty is in determining the size of these costs. Some authors have gone ahead and suggested that a more useful concept would be relative efficiency where different markets are compared as opposed to the enduring absolute efficiency concept (see for instance, Marcellino, 2016). Examples include, comparing the London Stock Exchange versus the Tokyo Securities Exchange, derivatives markets versus commodities markets, etc. The empirical research 1's finding that markets are not efficient should thus be interpreted with this in mind. The first two research questions were thus answered; that a stock investment portfolio consisting of value stocks outperformed that of growth stocks and thus value investing displayed superiority and that a value investing portfolio the best method of constructing a value portfolio is by means of low valuation price multiple-the P/B ratios.

Research question three's findings from this research on the Kenyan stock market accorded with Piotroski (2000) study such that the F_Score investment strategy was found to be a transferrable value portfolio construction framework to non-US markets. In the previous chapter, it was discussed that the alternative F-rank strategy provided a useful robustness check ability as well as accounting for data loss during the financial data transformation process to the binary F-

components. However, the F-rank method underperformed the F_Score strategy in the portfolio returns.

A book-to-market (B/M) dimension was added as a second criterion to the F_Score and F-rank investment approaches in a two-way portfolio choice model but with indeterminate results in the low-B/M and the high-B/M firms' vertical percentage portfolio differences when compared to the F_Score and mean F-rank approaches to investment. However, the method, when used for robustness check purposes validated the original F_Score method's underlying rationale as well as the high-B/M firms' superior performance. The results were those of the outperformance of high-B/M firms over the low-B/M counterparts. This effectively implied that investment approaches work best in high-B/M firms, with the specific approach determining the degree of returns superiority success and thus providing the answer to research questions four and five (i.e., that the F-Rank and the B/MM alternatives exist and are implementable by investors in achieving better outcomes and the B/M ratio criteria can identify winner stocks and thus drives the success of the identified investment strategy in a high-high combination F-score to B/M).

The F_Score investment method was thus identified as a successful method of constructing value portfolios and found to be robust. This framework has had an empirical support in markets other than the US. For instance, Koutoupis (2022), Ho et al. (2022) and Banarjee and Deb (2015) methodologies involved calculating an 'F-score' for each value firm by adding binary signals for nine key variables. They then formed portfolios based on the F-score, with ten equal-size portfolios for each year and found that the success of a value strategy historically depends on the strong performance of a few firms, while many deteriorating companies within the broad value group had

poor performance. They also showed that firms with strong fundamentals within the value group outperform their less robust counterparts, both in absolute terms and on risk-adjusted measures.

The thesis' one-way portfolios selection analysis that looked at the absolute returns and the returns in a long/short scenario had the same conclusion as the studies in the other markets. In addition to replicating the original F_Score methodology, the study looked at the alternative variations of the F-rank method. The outcome was that the additional effort and computational resource requirements with the inherent forecast errors added no enhancement to the subsequent results and hence, the F_Score method retained superiority in both performance and ease of application in the marketplace. The F-Score methodology is yet another value stocks construction method where 'value' firms comprise the high F-score firms. Overall, this methodology and study provide insights into the performance of value firms and the importance of strong fundamentals in determining their success. Yes, the results of the study can have useful implications for investors in the Kenyan equity market. The study highlights the importance of distinguishing between strong and weak performers within the broad category of value stocks and suggests that investing in high F-score value stocks with strong fundamentals could lead to better returns and potentially lower risk. Investors in the Kenyan equity market could potentially use the F-score methodology to identify high-quality value stocks with strong fundamentals and use this information to make more informed investment decisions. This could potentially lead to improved performance and better risk management. However, it is important to note that no investment strategy is fool proof, and careful consideration of individual stocks, market conditions, and other factors is always necessary when making investment decisions. Investors should also be aware of the potential risks associated

with investing in the Kenyan equity market, such as currency and political risks, and should seek professional advice before making any investment decisions.

Limitations

This research was carried out on a single country, Kenya, with a stock market that is still developing with less than one hundred listed firms as compared to thousands on the developed markets in Europe and the US. The applicability of the research findings in other economies might therefore be limited and the interpretation of the results would need to be cautiously done.

The literature has identified that it is probable that data mining bias in the original F_Score of Piotroski (2000) cannot be totally ignored (Koutoupis, 2022) and this might be a limitation in this study because of the inactive development of the nine F_Score components from financial statements, effectively an adoption from other published works (published financial statements)and hence the possibility of the carry over effects of the potential biasness or typological errors in the original publications.

The variables used in the study were mostly derived variables, save for the stock prices that were actual prices traded on the NSE and provided by the Exchange, and therefore they served as proxy variables and not directly observed. In this regard, there's always the likelihood of errors in measurement and hence inadequate measures of the intended behaviour/variable. This might then introduce outcome biases hence lowering the reliability index of results.

The critical examination of the results of the research for generalization is important. However, the reliability and the scope of generalization is enhanced from the fact that the study chose the deductive research approach. Because this study investigated the performance of value stocks compared to growth stocks as measured by their returns, numerical data was singly obtained and thus the quantitative method was used in the study. The quantitative deductive method of study was thus employed in answering the research question. The method was applied on historical stock prices and accounting information, from which returns are computed with a construction of value and growth stocks. Still, caution is recommended in viewing the research outcomes in line with the issues mentioned above, more so for emerging and frontier stock markets.

Recommendations for application

The literature review indicated that value stocks performed better than growth stocks over longer investment horizons. The value anomaly concept has attracted global research interest with results showing that this value anomaly exists in almost all mature markets. Studies on emerging markets have also found a value stocks' average outperformance over the growth ones. The Brandes Institute (2009) follow up study on the possible indicators of value stock outperformance found the existence of a positive relative valuations of value stocks relationship and the subsequent value stocks outperformance in the American and other advanced markets. The observation from historical data has been that a dipping valuation difference multiple which represents a standardized relative disparity measure in value vis-à-vis growth stocks valuations, is linked to the better performance of value stocks compared to their growth counterparts in a 5-year subsequent period. The research findings in this study were consistent with the established literature.

The study demonstrated an outperformance of value-over-growth stocks, on average, over 5-year period investment horizons on the NSE. The results of the F_Score portfolio construction method showed that there could be possible limits to the explanatory power of macroeconomic variables of stock returns when it comes to weighting. This implies that weighting diminishes in its usefulness as more weights are assigned to variables. The literature also indicated that regulatory changes and monetary policy stances could be the basis of the parameter instability effect and thus affect returns forecasting/predictability. This process impacts more those firms whose financial statements are prone to the environmental shocks in regulation, and monetary policies. Individual firms are insulated from the mentioned effects since the F-rank method focussed on firm-specific financial health measures that enable a tooth comb evaluation to take place. Hence, Piotroski's (2000) based investment approach that is anchored in accounting data suggests that weighting does not add much value when it comes to the dependability of the portfolio construction method in isolating winners from losers.

The above suggestion is more pronounced in the mean returns as gleaned from the significance in both the parametric and non-parametric tests results. The intuitive results from the approach could be because of the general analysis approach applied as opposed to the referenced studies of Rapach et al. (2010) and Kok et al. (2018). This dissertation's study was conducted on a cross-sectional setting different from the purely time series data analysis of the two studies above. Past time series studies had extensive applications of the combination methods, but cross-section application of forecast combination techniques is an innovative way of differentiating future winner and loser stocks. First, putting in place the respective ranks and weights and then carrying out the next period's return would be of more practical relevance since the key goal of an investor

is to be found in the period end accounts as opposed to the results from longer reporting periods. Second, the investor is liberated from the task of the holdout period time frame determination which is potentially arbitrary.

Besides the goal of replicating the Piotroski (2000) accounting-based investment approach in the Kenyan stock market, the study augmented this work through an examination of other ways available for isolating winner and loser stocks. This was accomplished by use of varied methods of forecasting (the F-rank and the B/M combination) using the original F_Score components as individual stock return forecasts. The analysis inherently followed the fundamental analysis and forecasting strands of finance literature. Fundamental analysis is applied by investors in predicting stock returns but through methods that vary across investors and time. The main distinguishing factor of the F_Score and the alternative F-rank combination measures is the unnecessity of adjustments in the F_Score approaches hence the ease of implementation. The implication here is that the additional enhancements of the F_Score method are not essential to the portfolio construction method and therefore extra resources can be saved with the same results when the F_Score method is applied on its own as originally designed.

The accounting-based investment strategies' results have faced some criticisms, the first one being a claim that the best working approaches could simply be products of in-sample fitting with no bearing on external or out of sample validity. The second criticism comes from the possibility put forth that research approaches could follow a kitchen sink process such that regressions of stock returns are applied on different amounts of financial statements data arbitrarily without being backed by a strong theory. This dissertation eliminated the first criticism in that its

intention was to test rather than generate theory, and thus avoiding the in-sample fitting risks and the use of an official stock market data makes it meet the out-of-sample validity requirement. The second drawback is more challenging to mitigate. Piotroski (2000) took measures to condense the financial statements variables quantity in comparison to other studies, for instance, Walkshäusl (2020), Lev et al. (2019) and Tikkanen et al. (2018) but was still put to task on the 9-F_Score components choice at will. Penman and Zhu (2016) relied on a qualitative approach in their identification of the value lead variables but only one of them made its way in the Piotroski (2000) composite F_Score. This drawback was reduced in this thesis by the introduction of a second dimension, the B/M ratio.

The above then implied that since the findings from this research on the Kenyan stock market agreed with Piotroski (2000) study, the F_Score investment strategy can be transferred to non-US markets. It was shown that the alternative F-rank strategy had both a robustness check utility and a data loss check function in the financial data transformation process to the binary F-components. The mean and median F-rank underperformed the F_Score strategy in the portfolio returns and was just like Piotroski's (2000) F_Score's rank-based robustness tests where the findings showed relative underperformance. Piotroski's explanation was that the outcome could have been because of the respective signal's sign loss during the process of assigning ranks. This argument is challengeable, partly, by the vertical differentials' outcomes where an overall performance that was found to be more robust statistically and economically was found in this study's F-rank version.

Another aspect which was missed in the Piotroski (2000) study that was provided in the present study is the evidence on how portfolios with median calculated returns perform. Only a mention devoid of details was made about alternative specifications with the potential for producing better results in the original study. The addition was based on the foregoing to assume that a binary strategy like the F_Score mimicked a continuous strategy (the F-rank) for the Kenyan securities market. Mimicry here implied that both strategies could be used interchangeably in isolating high from low returns portfolios within the low-high BM terciles as well as across the same terciles. Sorting firms into F_Score fquintiles in a sequential manner and then dividing them into numbered terciles intra each fquintile had the import of controlling for a firm's financial health F_Score -wise in the analysis of the B/M ratio effects. The results were the outperformance of high-B/M firms over the low-B/M counterparts, as established from the vertical return differences that were mostly significant. These findings were in alignment with the established empirical studies (for instance Ho et al., 2022; Walkshäusl, 2020; Patari et al., 2018; Hyde, 2018) and were found broadly applicable to the Kenyan stock market. The Piotroski (2000) and Schade (2017) findings however appeared to rule out risk as being the causality factor in the high-B/M firms outperformance over the low-BM ones. This finding implies that in investment practice, the use of B/M ratios in combination with the F_Score method as a value portfolio construction method is likely to be a much better approach than singular approaches.

As said before, the original F_Score ideas were expanded, and the performance of the emanating forecasting models analysed to make improvements in the basic accounting-based investment strategy's results. One problem here is that the Penman et al. (2015) critique applies to the extended models as well and the justification given thereof. But using accounting data to

forecast future stock performance appears to be an intuitively valuable step. An additional problem emanates from the continued urge and attempt by researchers in forecasting stock returns as noted in Penman and Zhang (2015) to the effect that grasping the entire literature is an onerous challenge due to the ever-increasing multiplicity of methods and time horizons applied by researchers. The general observation in this regard was the presence of some concurrence about stock return predictability and this research relooked at the predictor variables with the conclusion that a majority of them have had a less than impressive performance. This conclusion particularly holds for macroeconomic variables with the suggestion that investment approaches with a top-down procedure do not end up with superlative return realisations. The stock return forecasting literature on the other hand is in short supply as regards the bottom-up approach but it continues to develop and is especially convincing in the F_Score combination with the forecasting methods as implemented in this thesis. Because no outright insights of those models' performance were presented in Piotroski (2000), it was impossible to carry out a like for like comparison in the findings of each model but only different ones. Hence, the F-rank model, as a key model applied in this study delivers plausible results but is inferior to the original F_Score and the B/M methods. It can then be said that to create a comparability base, this forecast methods' performance investigation with the related literature in its application would be useful in discovering its overall utility.

In the same vein as this dissertation, the Jordan et al. (2014) research on the forecast-ability of stock returns on out of sample basis on fourteen European markets confirmed the initial findings where combinations of single forecasts performed better than univariate models (for instance, Walkshäusl (2020), Yan and Zheng, 2017; Zakaria and Hashim, 2017; Kumsta, 2015). This thesis

analysed the F-components and the 1-year stock returns' correlations but did not carry out a specific performance test of the individual forecasts. Taking for granted that the previous empirical literature results are valid, and the combined methods (the F-rank) return inferior results compared to the F_Score methods, it follows that the individual forecasts must of necessity return inferior results. The relevant question is then whether a combination of the combined and the individual forecasts result in superior performance when measured against the original Piotroski (2000) F_Score investment method.

The fact that the results from the alternative combination techniques turned out inferior raised two follow up matters. The first matter points to the suggestion that it would be worthwhile to investigate the possibility of a non-linear forecasting model improving the results. The second one relates to explanations for the superior results of the F_Score approaches. The first matter was addressed in Duong et al. (2014) where nonlinear combination methods resulted in higher forecasting accuracy in the forecast of the rate of inflation in the UK data. However, implementing their model in this research was impossible due to the data sample size requirements that are too large, a consideration that was identified in Gregory et al. (2013) with the conclusion that the data sample requirement effectively rendered non-linear combination methods ineffective. The works of Hyde (2018) and Kumsta (2015) argued that nonlinear models performance ability of simulating reality was no better than the linear models' because the nonlinear models generally come with a litany of variables, exacerbating the critique provided in Richardson et al. (2010) regarding the kitchen sink approach.

The second matter was not addressed in Piotroski (2000) as pertains to the source of the investment strategy's success, whether emanating from inefficiencies in the market or rational economic behaviour. Alternatively, it could be that the F_Score/F-rank methods outperformance come from their noise reducing ability as alluded to in Jordan et al. (2014). The Kenyan market being much smaller as compared to US and European markets might possibly be fraught with noise and hence differences in performance that are more pronounced and therefore caution in singly applying this methodology in this market is recommended and a combination for methods should be preferred.

In summary, the study found research evidence of the value effect in the NASI and that value stocks outperformed growth stocks in a much more significant way in periods with increasing valuation difference multiples and this applied in the all-share market capitalization segment. The test variables results were generally found to be robust and positively correlated. The empirical literature indicated that value stocks performed better than growth stocks over longer investment horizons. Data has shown that a declining valuation difference multiple moves together with the better performance of value stocks over the growth counterparts. These findings were consistent with the established literature over 5-year period investment horizons on the NSE and thus implying that value investing is recommendable for all long-term view investors.

In addition, the original F_Score investment approach results were presented from the Kenyan stock market data, with the strategy's key components being replicated to assess the utility of this investment strategy in an environment other than a developed market. The study did a ranking and standardisation of the F_Score's individual components and tested them as well. The

resultant Fi-ranks' differences with the ranked one-year future returns were applied as single forecasts then combined in variant versions such that improvements in the original F_Score method was attained. The book-to-market ratio was introduced as a second dimension in the recursive modelling. The overall findings in this study showed that, as found in the original Piotroski (2000) work, the F_Score method is dominant to the two combination strategies (the F-rank and BM). The findings were then linked to the current literature. The analysis of the research questions gave the following results. The first hypothesis was generally confirmed such that both the original F_Score and the related alternatives serve as appropriate means of separating underperformers from promising stocks in the Kenyan environment. The key argument for this outcome is the possible overlaps that exist in stock markets, that is, adoption of world class regulatory frameworks by firms when listing or expanding access to capital and/or lowering capital costs (Koutoupis, 2022; Djogbenou, et al, 2015) and this implies transferability of an investment strategy where the concerned markets aspire to international regulatory levels and thus create bonding and market segmentation as well as a higher homogeneity degree (Piotroski et al, 2013). The fundamentals-based components composite method of portfolio selection is thus implied as most recommendable in portfolio choice decisions.

Recommendations for future research

This chapter's results advance knowledge as follows. Foremost, an individual starting life without initial capital either from inheritances or bequeathals, but now with cashflows can augment his/her capital through value investing as one of the investment strategies. Second, the original F_Score strategy of investment was demonstrated to be transferable and can be operationalised in an emerging market setting like Kenya. Third, there was no equal in this approach's simplicity and

possibly no improvements are tenable through introductions of complicated alternatives. Finally, the F_Score approach works beyond the high-B/M stocks and thus can be used in stock markets with a variety of attributes unlike the initial conclusion.

Nevertheless, there are still areas for further research along the lines of how far these investment strategies can extend in cases where intangible information is to be captured, following the Chinco et al. (2019) finding that entities tend to follow intangible information in their trading decisions and thus affect the book-to-market outcomes hence the value premium. This documentation was buttressed in Gu et al. (2018) where the intangibles were seen as equivalents to employee satisfaction with a satisfaction index above industry averages. Integrating both quantitative and qualitative measures would go a long way in making improvements in the strategy without adopting a limiting tunnel view.

Additionally, the limitations presented in the earlier section suggest the following potential areas for future research. The first pertains to the research approach. Here, a more qualitative research approach could be useful in analysing the different high-returning firm's characteristics much deeper, as a complementary to the quantitative research approach adopted in the current study. This would also incorporate such qualitative aspects of firms as management quality and other firm assessment models like Capital, Management, Efficiency, Liquidity, Sensitivity (CAMELS). The use of qualitative information in making investment decisions is a practice

embraced by practitioners such as Warren Buffett as evidenced from his shareholder letters[2] where he explained seeking businesses that were easier to understand with trustable managers as his criteria for buying into firms.

Other qualitative information that could be included in the investment package is executive management contract terms, competitor analysis, industry dynamics as well as audit opinions on accounting statements. These qualitative criteria components could then be used in conjunction with the F_Score method for investment decision making. Furthermore, investment decision analysis could be made with a thorough inter-industry comparison and is supported following the Dobbs (2014) study that showed higher earnings from competitive industry compared to the less competitive ones despite the general view that oligopoly markets maximize profits as their sole objective hence higher returns. Therefore, there exists another research gap as to the relationship between an investment approach and an industry competitive structure à la Michael Porter's five forces framework as analysed in Dobbs (2014). Extended studies could also be carried out to include other nascent African stock markets to check whether the results would be similar or different ensuring to consider the varied economic and political regimes.

The results showed that high-B/M firms did better than the low-B/M as seen from the vertical return differences. These findings were in alignment with the established empirical studies and are applicable to the Kenyan stock market. The Piotroski (2000) and Schade (2017) findings

[2] Berkshire Hathaway (http://www.berkshirehathaway.com/letters/1991.html)

however appeared to rule out risk as being the causality factor in the high-B/M firms outperformance over the low-B/M ones. The question of identifying other factor(s) that could explain the high-B/M outperformance phenomenon qualifies for further research.

The stock return forecasting literature is still developing as regards the bottom-up approach and is especially convincing in the F_Score combination with the forecasting methods as implemented in this thesis. Because no outright insights of those models' performance were presented in Piotroski (2000), a like for like comparison in the findings of each model was not done. The F-rank method, as a key model applied in this study delivers plausible results though inferior to the original F_Score and the B/M methods. It can then be said that to create a comparability base, this forecast methods' performance investigation with the related literature in its application would be useful in discovering its overall utility, as an area of future research.

In the same vein as this dissertation, the Jordan et al (2014) research on the forecast-ability of stock returns on out of sample basis on fourteen European markets confirmed the initial findings where combinations of single forecasts performed better than univariate models (e.g., Hashim, 2017; Yan and Zheng, 2017; Zakaria and Rapach et al., 2010). This thesis analysed the F-components and the 1-year stock returns' correlations but did not carry out a specific performance test of the individual forecasts. The question of whether a combination of the combined and the individual forecasts result in superior performance when measured against the original Piotroski (2000) F_Score investment method would be better answered in future research.

The fact that the results from the alternative combination techniques turned out inferior raises two follow up matters that can be addressed in future studies. The first matter points to the suggestion that it would be worthwhile to investigate the possibility of a non-linear forecasting model improving the results. The second one relates to explanations for the superior results of the F_Score approaches. Here, an alternative equilibrium asset pricing model such as the intertemporal investment CAPM model may be useful.

It was also reckoned that the efficiency of new information being impounded into stock prices cannot be the only explanation for the premium to high F-score stocks as there may be other factors at play, such as analyst and investor/neglect as put forth in Ho et al. (2022) and Hyde (2018). Therefore, herein yet lies another gap worthy of explanation in future research; an emerging markets fuller explanation of the drivers of the premium to high F-score stocks.

Conclusions

The literature review in this study revealed that there was a significant amount of knowledge about value investing but there remained an immense work to be done about why it worked and on the possible construction methods of a successful value portfolio. The thesis' analysis and its empirical reviews borrowed from tools and concepts involving behavioural finance, efficient markets hypothesis and value investing in practice with a view to testing and improving a framework for value portfolio construction.

In chapter two, a review of the relevant investment finance theories as well as the current research issues and findings in the research topic was presented. It led to the identification of the

research gap that this thesis narrowed down to, having highlighted the past and present research on the topic as well as the current state of academic knowledge showing the linkage of the research topic to this body of knowledge. Further to this, it critically examined the research frameworks implemented by academic research to inform the subsequent chapters particularly the research design and methodology. The rationale here was to provide a guideline that aided in following the research process, the thesis' thought process and argumentation and its final expectation. Having presented the theoretical framework, the practical implications of the theories were reviewed consisting of summaries, interpretations, and critical reviews of the current empirical works around the research topic. The general result pointed to the presence of anomalies in patterns of stock investment returns indicating the failure of the key school of thought of efficient markets. The academic literature recognized the existence of these anomalies and therefore the subsections in the empirical review part clarified the stances of the two dominant schools of thought on these anomalies as well as their explanations of this phenomenon. The explanations provided on the anomalies varied from simple logic to extreme complexities with no settlement to an unambiguous explanation.

Chapter two therefore located the research topic within the academic literature and motivated the topic's extension, variation and ultimately addition to the body of knowledge. It provided a summary of the relevant finance theories pertaining to portfolio investment as well as the evolution of these theories focusing on the two main schools of thought constituting the pillars of contemporary financial literature. The EMH is anchored in the expectation of rational behaviour of investors and leads to the conclusion that markets have perfect information about the prices of assets traded in that market and thus no arbitrage opportunities exist.

This then implies that no investment approach was better than another and returns on assets cannot be better than what the market provides. On the other hand, the behavioural finance school makes an assumption that rational behaviour was absent in investor actions and therefore investors applied heuristics in investment decisions potentially creating biases or anomalies in the market and hence mispricing of assets. This creates possibilities of investment approaches that beat the market. The empirical review then found the following summary of the empirical literature.

The anomalies literature looks at strategies that have the potential to produce superior risk-adjusted returns, for instance, investing in momentum stocks or in value as opposed to glamour stocks. Other studies examined real investment results investing as to whether professional money managers were able to produce higher than market results, but the results were found to have been inconclusive. These studies then proposed several strategies which would have been responsible for superior results along the anomalies literature explanations.

There, therefore, remained questions on whether the anomalies were reflections of risk premiums absence in the simple risk-return models or merely reflected data mining. The apparent failure of active investment strategies adopted by money managers in turning these anomalies into better profits on actual investment portfolios added to the doubt in the anomalies' reality. This study identified that there existed a value premium where value stocks outperformed their growth counterparts and thus the EMH could not hold and therefore active trading should be expected to do better than passive investments styles that assume no market anomalies.

Chapter three linked the literature review to the empirical results that were expected from chapter four. The respective philosophical settings were first spelt out. Information on the Nairobi Securities Exchange was provided from which the research methods discussed in chapter 3 were applied. Chapter three thus focused on providing an understanding of how the investigation was conducted to answer the research questions that were set out. Parametric regressions-based analyses and non-parametric fundamental accounting data analysis methods were presented as the primary data analysis tools.

In chapter four, the results of the hypotheses tests were presented including the F_Score and F-rank strategies of investment findings which followed and extended the Piotroski (2000) work. The chapter provided the linkage to the research methods of chapter three. The key issues here included the test of the inter-stock market transferability of a simple investment strategy and thus return a similar rate of success with an extension of this strategy into other options available with the mixing and varying of techniques, representing the chapter's main contribution. This was vital on the practical side where actual money management is involved, as in the eyes of a fund manager, the value of a trading strategy positively correlates with the strategy's success of application in limitless differing stock markets as are to be found. When this is realised, fund managers have a broad spectrum of alternatives in which to place investments.

Chapter four also provided the link, deductively, to the research generalisability concept as assumed in the thesis. This implies that the present research was carrying out a test(s) of theory and thus a similarity of results was expected for Kenya as in other markets. That is to say that both

the efficient market hypothesis and the behavioural finance theories need consistent research results for one of these theories to be confirmed.

Because this thesis assumed some form of market inefficiency, the investment strategy should be readily implementable in the Nairobi Securities Exchange (NSE), otherwise the research result would be unsupportive of either theory. The explanation emanates from the variability of the human behavioural factor that is common in both schools of thought as described in Lo (2007) where it is either rational, and thus producing efficient markets or fractionally rational and thus explained by behavioural finance. Consistent results should be produced from the application of a strategy no matter one's viewpoint, but tests of different strategies may yield varying results amongst them. These variations in results make the proving of the rational or non-rational stock markets nearly impossible. Another aim of chapter four was to provide a spectrum of investment strategies that could be useful in improving the outcomes of the original F_Score method, justified by the original work's shortcomings of binary coding of accounting information signals and the equal weighting of the same.

The findings in this research were consistent with past research in the sense of the value stocks producing superior results over investment periods of 5-years and over. The study found support for the expectation of a positive value stocks outperformance and low log of the valuation difference multiples relationship. Against global markets, these findings led to the conclusion that Kenya as a developing market follows the happenings and developments in the advanced markets and does not lead the international market events. This therefore implies that global financial

markets developments and trends would have a significant influence on the relative performance of financial assets in the Kenyan securities market.

The above finding was reached at by applying the revised Chan and Lalonishok (2004) methodology, in the manner implemented in The Brandes Institute (2009), to the Kenyan stock market to identify the existence of any significant relations in valuation differences and the consequential performance of value vs growth stocks. This methodology has recently been applied in a number of studies owing to its utility in fund management applications (Kourtis et al., 2022; Chinco et al., 2019; Ghosh, 2019; Kondor, 2019). The selected firms were segmented into value and growth portfolios on the basis of their relative price-to-book value (P/B) and Book- to- Market (B/M) ratios. This segmentation was followed by calculating the relative variation in valuation between the value and growth stocks. Each of the various portfolio's performance was then tracked over the study data period. The valuation difference multiple served as a standardized valuation disparities proxy as in Toit and Krige (2014) and Lee et al. (2020). The past value cycles and the valuation difference multiple relationships were identified so as to use them in predicting future relative better performance of value vis-à-vis growth stocks. Starting from the general acceptance that value stocks outperform growth stocks on a risk-adjusted basis as presented in Fama and French (2020), the first part of this thesis's aims was to verify this acceptance.

The next objective was to check for the existence of a relationship between valuation differences and the ensuing performance of value and growth stocks, a 'la The Brandes Institute (2009). Following from this, the beginning null hypothesis was that there is no significant difference between the returns of a value stocks-based portfolio and those of a growth stocks-based portfolio.

The results confirmed that value stocks outperformed growth stocks. The next hypothesis tested the existence of an identifiable relative valuation disparities vis-à-vis subsequent performance of value and growth stocks significant relationship. Here, the results showed that there was an inverse non-linear correlation between historical higher valuation difference multiples associated with growth stocks with stock market excess returns and thus value stocks, associated with low multiples significantly outperform growth stocks.

The relevant P/B ratios were computed followed by the ranking of all stocks forming part of the NSE All-Share Index on their relative P/B ratios basis in order to categorise stocks into monthly portfolios. The highest P/B ratios' stocks formed the first quartile (quartile 1). P/B ratios decreased in each next quartile with the smallest P/B ratios forming the 4^{th} quartile (quartile 4). Consequently, at each month end, four portfolios were created with quartile 1 making up the growth portfolios (the highest one quarter of P/B ratios) and quartile 4 constituting the value portfolios (lowest of P/B ratios quarter).

The above process was recursive carried out month on month with four new portfolios being constructed at each month-end. With the portfolio construction process completed, each portfolio's relative performance was then tracked over the following five-year period as specified by The Brandes Institute. An investment horizon of five-years was selected because it ensures strategies that are adapted to long-range investors and further justified as in Bradfield (2003) where it was argued that using historical data for estimation purposes over too long a period could be inappropriate and was regarded irrelevant since business risk's nature, as taken on by firms, is

prone to significant disruptions over such elongated time horizons and each democratically elected political regime takes, on average, a five-year period.

The firms' relevant performance was determined and captured from each firm's price and profits data in the 4-newly constructed investment portfolios. Equal weighting of the stocks within the portfolio was done in order to derive the portfolio return. However, value weighted stocks were also derived for robustness check purposes. Price data was captured monthly while monthly dividend yields were used to proxy dividend payments. Month by month capital gains or losses were computed and 1/12th of the monthly dividend yield added to compute the total monthly return with an inverse correlation being identified in the results as discussed above.

An additional objective of this thesis was to find out a method of value portfolio construction, if any, that can be applied in the real world. Here, the study applied the F_Score methodology. The Piotroski's (2000) investment methodology's basic idea was to avail a simple tool for selecting winner stocks from the universe of available stocks. The winning portfolio selection method concept's real-world application and its embedded concepts is rife with assumptions. Under the assumptions of market efficiency, continuous above market mean returns cannot be achieved since all relevant stock price information is always reflected in a stock's price. The behavioural finance assumptions on the other hand claim the existence of market inefficiencies resulting from the market participants irrational behaviours. The research results on the F_Score strategy have a bearing on the efficient markets theory of investments since the F_Score strategy's success lent support to the behavioural school indicating that a similarity of heuristics affected by

cognitive biases are used by investors from wherever they are located and therefore embellish the behavioural finance theory's generalizability.

A key goal in the study's methodology was to mimic the Piotroski (2000) accounting-based investment approach in the Kenyan stock market. The dissertation augmented this work through an examination of other ways available for isolating winner and loser stocks. This was accomplished by the use of varied methods of forecasting using the original F_Score components as individual stock return forecasts. The analysis inherently followed the fundamental analysis and forecasting strands of finance literature. Fundamental analysis is applied by investors in predicting stock returns but through methods that vary across investors and time. The main distinguishing factor of the F_Score and the alternative F-rank combination measures is the unnecessity of adjustments in the F_Score approaches hence the ease of implementation.

The preceding exposition followed directly from Koutoupis et al.(2022), Lee et al.(2018), Kumsta (2015) and Rapach et al. (2010), where returns forecast combination methods were argued to be seldom in the literature on financial markets research despite their prevalence in economics research. The F_Score approach comes out as the simplest of the investment methods that use financial statements data among those tested in the study given that the F_Score strategy can be applied straight away without needing historical stock returns data nor the computation of any ranks and would thus align with the Rapach et al. (2010) assumption. Were this not to obtain, the F_Score robustness would be puzzling and that would mean that the strategy's success would be a result of in-sample fitting and the absence of external validity (a holdout sample omission). However, the study countered these possibilities because in-sample fitting was eliminated by

ensuring sample parameters were based on market price data observed in actual trades and independently provided by the exchange and hence no data mining. This voids the need for a holdout sample and the Piotroski (2000) original study already serves this purpose.

The B/M effect conundrum and its interplay with the respective investment strategies was analysed as a second dimension in the F_Score and F-rank combinations. The outperformance of high-B/M firms has been explained as being a result of the compensating premium for high risk taking (the efficient markets hypothesis proposition) and emanating from asset mispricing (the behavioural finance argument). Though Piotroski (2000) looked at only high-B/M firms, this study's findings produced evidence affirming the supremacy of the investment approaches based on a composite measure in the generation of superior returns no matter what the B/M ratio of a firm is. This again qualifies as an expansion on the original F_Score work.

The fact that this research was largely in sync with the past studies on global markets means that Kenya as a financial market must be viewed in the context of its interaction with other economies. The developments in communication, technology, global capital flows, economic integrations growth have led to the world becoming a global village where financial markets are virtually accessible by citizens of all countries. All these developments have resulted in increasing competition among investment firms and thus piling pressure on these firms to deliver consistent returns that are above market norms. Firms delivering consistent above average returns in the long run attract more clients and increase the amount of investable capital in their hands to promote firm growth and their sustainability.

Style investing has been gaining interest of late among investors and money managers and comes with different inherent risk-return profiles. The selection of an investment style requires a consideration of both and hence provide higher than market returns and a risk premium as well. There's the caveat that past performance is not necessarily a predictor of future performance and therefore findings and conclusions based on historical data may not be overstretched into future extrapolations irrespective of the relevant underlying fundamentals and events that could affect future returns. But gaining a deep understanding of the mechanisms and the history of market movements will minimise errors in attempts in market making.

The literature gap was narrowed in this study where a composite financial statement items-based measure was tested on the Kenyan stock market, a nascent financial market. Results comparability with other markets outcomes was ensured by following the Piotroski (2000) pre-set parameters and thus conformed to Richardson et al. (2010) requirement of being guided by theory and not just an outcome of in-sample fitting as in Greig (1992) critique and the expansion in Walkshäusl (2020) and Kumsta (2015). The original F_Score approach alternative was tested and established as a corroboration of the initial results of the existence of convertible opportunities out of the inefficiencies in the market and therefore buoy the arguments for behavioural finance.

This thesis has shown that investors can make choices about their portfolio construction strategies over and above the passive strategies of index-based investing and thus reap the benefits that exist in active market making with simple implementable portfolio selection methods (Bofinger et al., 2022). This goes against the old era investment philosophy of portfolio diversification under interest and index funds only. While the existence of value premium is

incontrovertible, its causes remain debatable with behavioural finance suggesting that heuristics come in handy when investors are confronted with complexity and uncertainty. The F_Score method tested and confirmed as effective in this thesis serves as a method that reduces complexity in investor decision making.

This section has presented a conceptual conclusion and illustrated the gaps in the literature which were narrowed through superimposing an investment framework that has worked in advanced markets on the Kenyan stock market and extending the same strategy beyond its binary nature. Alternatives were created and tested, and their performance compared to the original strategy. Before the replicated investment strategy was tested, the study first tested the value premium existence on the Kenyan market by applying an econometrics approach with a price-to-book ratio portfolio construction approach.

This research's uniqueness was thus threefold: first, it combined two different methodologies in the value-growth performance comparison (the price multiples and the valuation differences multiple), second, it replicated two different methodologies of style investing research (The Brandes Institute Methodology and the Piotroski F_Score methodology) on an emerging stock market, and third, it extended these methodologies into varied combinations and identified which one was consistent in superior value stocks construction and in this respect satisfies the requirements for a modest investment finance knowledge contribution.

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APPENDICES

Appendix A: Ethics Forms

REAF - Version 3.0

UNICAF UNIVERSITY
RESEARCH ETHICS APPLICATION FORM

The Research Ethics Application Form (REAF) should be completed by:

- Bachelor's students undertaking undergraduate final year projects requiring relevant ethics review and consideration.
- Master's students in academic programmes with research based dissertation / project modules.
- Doctoral level candidates who are embarking on the first of their Dissertation stages.
- Faculty researchers who are either full time members of Unicaf University staff or part time members of staff.

Important Notes:

- For **students** at all levels, an electronic version of the completed form should be uploaded to the relevant submission link in the VLE. Your supervisor will then review this and provide feedback commentary. Once their initial approval is given then the supervisor will forward this on, for final approval by the Unicaf University Research Ethics Committee (UREC). See Appendix I and II for guidance.
- Faculty members should submit their applications directly to the UREC secretary.
- Please type your application and **do not** submit paper copy scans. Only *PDF of Word* format documents should be submitted to the committee.
- If you need to supply any supplementary material, not specifically requested by the application form, please do so in a separate file. Any additional document(s) should be clearly labelled and uploaded in the relevant VLE link.
- If you have any queries about the form, please address them to your dissertation or project supervisor.

☒ **Before submitting your application, please tick this box to confirm that all relevant sections have been filled in and that the information contained is accurate to the best of your knowledge.**

REAF - Version 3.0

UNICAF UNIVERSITY
RESEARCH ETHICS APPLICATION FORM

UREC USE ONLY:
Application No:
Date Received:

Student's Name:	NORMAN NAAMAN AMBUNYA
E-mail Address:	ambunya@icloud.com
Student ID #:	R1704D260716
Partner University:	UNICAF University Malawi
Program of Study:	Ph.D (Accounting and Finance)

1. Title of Proposed Research Project:

The Superiority of Value Investing: A Nairobi Securities Exchange Empirical Assessment

2. Please indicate the category of the proposed Research Project:

(a) UU Faculty research project ☐
(b) UU Doctoral Student dissertation research ☒
(c) UU Master's Student dissertation / research project ☐
(d) UU Bachelor's Student final year research project ☐
(e) Other, please specify: ☐

3. Proposed Research Project Investigator(s):

a) Please fill in below the details of the Principal Investigator(s) as per 2(a).
In the case of student projects (categories 2.b, 2.c and 2.d) fill in the details of the Faculty supervising the project (supervisor).
Please fill in the details of the:

Principal Investigator	
Title:	Mr
First Name:	Norman
Last Name:	AMBUNYA
Position:	Student
School/Department	UNICAF Malawi, School of Business
Telephone:	+254705280536
Email address:	ambunya@icloud.com

Principal Investigator	
Title:	
First Name:	
Last Name:	
Position:	
School/Department	
Telephone:	
Email address:	

b) Details of co-investigators (category 2.a) or co-supervisors (categories 2.b, 2.c and 2.d) if applicable:

Co-Investigator	
Title:	Dr
First Name:	Olajide Solomon
Last Name:	Fadun
Position:	Dissertation Supervisor
Organisation:	Tutor, UNICAF – School of Business
Telephone:	+2348028478319
Email address:	o.fadun@unicaf.org

Co-Investigator	
Title:	
First Name:	
Last Name:	
Position:	
Organisation:	
Telephone:	
Email address:	

c) In the case of student projects (categories 2.b, 2.c and 2.d), please provide details of the student:

Student			
Fist Name:	Norman	Student ID:	R1704D260716
Last Name:	Ambunya	Email	Ambunya@icloud.com
Programme of study:	PhD Accounting and Finance		
Level of study:	Doctoral		
Supervisor:	Dr Olajide S. Fadun		
Co-Supervisor:			

4. Please state the timelines involved in the proposed research project:

Estimated Start Date: 2019

Estimated End Date: 2020

5. External Research Funding (if applicable):

(a) Please list any external (third party) sources of funding you plan to utilise for your project. You need to include full details on the source of funds (e.g. state, private or individual sponsor), any prior / existing or future relationships between the funding body / sponsor and any of the principal investigator(s) or co-investigator(s) or student researcher(s), status and timeline of the application and any conditions attached.

NA

(b) If there are any perceived ethical issues or potential conflicts of interest arising from applying for and receiving external funding for the proposed research then these need to be fully disclosed below and also further elaborated on, in the relevant sections on ethical considerations later on in this form.

NA

6. **Summary of Project:**

In this section please fully describe the purpose and underlying rationale for the proposed research project. Ensure that you pose the research questions to be examined, state the hypotheses, and discuss the expected results of your research and their potential.
It is important in your description / discussion to use plain language so it can be understood by all members of the UREC, especially those who are not necessarily experts in the particular discipline. To that effect please ensure that you fully explain / define any technical terms or discipline-specific terminology.

There are several motives behind the savings and investment decisions of individuals and corporates. It is generally assumed that the prospect of a return or profit is the overarching objective. Of course, there are theories of savings and investments objectives other than profit. For instance, some players save and invest for altruistic reasons and thus their objective is to create wealth not for themselves but for other generations as well as wealth preservation. Investors once settled on the objective of investing need then to select the type/investment vehicle. This dissertation proposes to empirically analyze whether investments in value stocks leads to better realization of investment objectives as compared to investments in growth stocks. It is posited that value investing with stock valuation avails intrinsic value observed through discounted cash flows valuation models and others. Although, quoted stocks are chosen in this study as the primary investment vehicles for analysis, alternative investments are also investigated for possibilities of generating intrinsic value. The stock markets analysis is particularly studied because of data availability. The study will attempt to generate knowledge in answering three fundamental questions faced by investors: i) how can an individual create a life that minimizes financial dependence when s/he can no longer work? ii) How does an individual who begins life without inherited assets but now able to generate a stream of cash flows convert them into sustainable wealth? iii) Would a portfolio made up of value stocks outperform a portfolio consisting of growth stocks on the NSE 20 Index?

7. **Project execution:**

Please give a description of the research method(s) that will be used:

Research Method and Results

A quantitative deductive method of study is proposed to be employed in answering the first research question. The method will be applied on historical stock process and accounting information over an extended period, from which returns are computed with a creation of value and growth stocks. A review of empirical literature and standard quantitative finance and econometrics tools will help in refining the methodology and the appropriate choice of the models to be tested.

Research Method

Two alternative research methods are provided in Bryman and Bell (2011); the qualitative and the quantitative methods which can be used in data collection and analysis. The distinctions between the two methods, at the basic level is the fact that numbers are used in quantitative methods while words dominate the qualitative methods to describe events. At a deeper level, further distinctions are made among the two as follows (Gregory & Michou, 2003). The quantitative method is to be experienced more in the deductive research approach where hypotheses are made from existing theories and then tested. The method does not dwell on details but moves quickly the generalizations from large samples such that general conclusions are suggested (Saunders, 2009). Tools such as graphs, tables, charts and other statistical calculations are extrapolated and applied in making inferences (Bauman & Miller,1998).

The qualitative method is employed when new theories are to be generated and thus follows the inductive approach to research. It also focuses on in-depth understanding by verbalizing thoughts and conclusions and thus words are given preeminence.

The decision as to which method to choose is informed by the data type to be collected. Because this study will investigate the performance of value stocks as compared to growth stocks as measured by their returns, numerical data will be predominant and thus the quantitative method will be dominant in the study. Hypotheses will be formed form existing investment theories (Grant & Trahan,2009).

8. Does the Project involve the recruitment and participation of additional persons other than the researchers themselves?

Note: The definition of "participation" includes both:
(i) Active participation, such as when participants knowingly take part in an interview or complete a questionnaire.

YES ☐ NO ☒

(i) If you have answered "NO" to Question 8 please directly proceed to Section 18.
(ii) If you have answered "YES" to Question 8 please complete all the following sections.

9. Relevant Details of the Participants of the Proposed Research

Please state the number of participants you plan to recruit, and describe important characteristics such as: demographics (e.g. age, gender, location, affiliation, level of fitness, intellectual ability etc). It is also important that you specify any inclusion and exclusion criteria that will be applied (e.g. eligibility criteria for participants).

N/A

10. Recruitment Process for Human Research Participants:

(i) Please clearly describe how the potential participants will be identified, approached and recruited.

(ii) State any relationship between the principal investigator(s), co-investigators(s), student investigator(s) and participant(s). For example if you are conducting research in a school environment on students in your classroom (e.g. instructor-student).

(iii) If any poster(s), advertisement(s) or letter(s) are to be used for participant recruitment, then please provide a copy of that.

N/A

11. Informed Consent of Research Participants:

a) Describe in details the process that the investigator(s) will be using to obtain valid informed consent from study participants.
If the participants are minors or for other reasons are not competent to give written consent, describe the proposed alternate source of seeking consent, including any permission / information letter to be provided to the person(s) providing the consent on their behalf (e.g. parent or guardian).
Also, in such a case please discuss how you plan to obtain verbal assent from the actual study participants, and if this is not warranted please explain why.

N/A

(b) You need to provide a copy of these important additional documents:

1. **Informed Consent Form / Certificate of Consent for Research Participants**
2. **The content of any telephone script (if applicable).**
3. **Any other material that will be used in the consent process.**

(c) Will the participants be deceived in any way about the true purpose of the study?
YES ☐ NO ☐

(d) If you answered "YES" to the above, please describe the nature and extent of the

deception involved. Explain how and when the deception will be revealed, and who will administer this debrief to the participants.

N/A

12. Details of Participant Debrief and Further Information:

Please explain and further elaborate on what information will be provided to the participants after participation in the research.
For example, will you be providing a more complete description of the purpose of the research (over and above the information provided in the informed consent form and in the debriefing form, or provide information of future access to the results of the research).

N/A

13. Ensuring the Participants' Right to Withdraw:

a) Describe how the participants will be informed of their right to withdraw from the project.

N/A

b) Explain any consequences for the participant from withdrawing from the study and indicate what will happen to the data of participants who chose to withdraw.

N/A

c) Describe how the participant will be informed of their right to access their data.

N/A

14. Details of Proposed Compensation Given to Participants (if applicable):

Will participants receive compensation for participation?

(i) Monetary **YES** ☐ **NO** ☐

(ii) Non-Monetary **YES** ☐ **NO** ☐

(iii) No compensation

YES NO

(a) If you answered "**YES**" to **either** (i) or (ii) above, please provide details below:

N/A

(b) In the case of participants who exercise their right to withdraw, prior to completion of the proposed study, and you answered "YES" to either (i) or (ii) above, will they still be entitled to compensation and on what terms (e.g. full / partial or no compensation given)?

N/A

15. Confidentiality of the Participants' Data:

(i) Will all participants be anonymous? **YES** ☐ **NO** ☐

(ii) Will all data be treated as confidential? **YES** ☐ **NO** ☐

Note: Participants' identity/data will be considered confidential if an assigned ID code or number is used, but it will not be anonymous. Anonymous data are defined as those which cannot be in any way traced back to an individual participant.

(a) Describe the procedures to be used to ensure anonymity of participants and/or confidentiality of the collected data both during the conduct of the research and in the subsequent release of its findings.

N/A

(b) If participants' anonymity or confidentiality is not appropriate for this proposed research project, please explain why, providing details of how all participants will be informed of the fact that any data which they will provide will not be anonymous or confidential.

N/A

16. Storage, Access and Disposal of Collected Research Data:

Please describe in detail (see appendixes 1):
(i) How the collected research data will be stored,
(ii) What type of data will you be storing,
(iii) Where will they be stored,
(iv) For what period of time,
(v) What are the measures that will be put in place to ensure the security of the data,
(vi) Who will have access to the data, and
(vii) The method and timeline for the disposal of the data.

Publicly published data will be used for the study.

17. Are there any other approvals required (in addition to ethics clearance from UREC) in order to carry out the proposed research study?
For example do you need any kind of institutional permission (e.g. school principal or company director) or approval from a local ethics or professional regulatory body?

☐ YES ☒ NO X NOT APPLICABLE

If you answered "YES" to the above then please provide the essential details below.

18. Significance of the Proposed Research Study and Potential Benefits:

Outline the potential significance and/or benefits of the research.

This dissertation's purpose is to investigate whether a portfolio investment basket of value stocks generates superior returns compared to a portfolio of growth stocks. The investigation is proposed to be carried out in an African setting of the Nairobi Securities Exchange. Because financial markets go through considerable fluctuations and the sample period of investigation includes the financial crises years, the study will also look at the impact of the crisis on investment returns. It is anticipated that this will add to new data and knowledge to the field since there's only scanty research over this period in the chosen market of investigation.

19. Potential Risks of the Proposed Research Study:

(a) Outline any potential **Individual** risks associated with the conduct of the research. This may include potential harm coming to research staff, research participants, other individuals not directly involved in the research. Please also state the measures that will be taken to minimise any such risks and the procedures to be adopted in the event of any misadventure.
Please refer and complete the Risk Assessment Form for Ethics Application (Appendix III) and submit it along with the current document.

Subject selection and Biases

The ever-present risk in a research project is that author preconceptions might affect the research process and subsequently the results. The preconceptions or opinions usually arise from previous personal experience, value systems of beliefs as well as from educational backgrounds (Bryman and Bell, 2011, p. 30). In this regard, researchers are advised to observe objectivity and independence and hence abstract from their individual biases. One way to achieve this is through peer reviews of one's research work. Additionally, combining both qualitative and quantitative methods minimizes subjectivity in the research process (Athanasakos, 2009).

(b) Outline any potential **Environmental** or **Societal** risks that may arise from the proposed research. If you perceive any such risks it is important that you state what measures will be taken to minimise these, as well as the procedures to be adopted in the event of any misadventure.

Ethical and societal considerations

The importance of ethics in social research has been underscored in Saunders et. al (2009) as participants need to be protected from any harm that may arise from their participation in the research process. The researcher must thus first obtain consent from respondents on their willingness to participate (Chan, L. K., & Lakonishok, J., 2004). In our particular research, this aspect will not apply as no human respondents are necessary. Our variables of interest will be on prices, stock volumes, returns at an aggregated level and no individual investor is a subject of study.

As mentioned in Crandall and Diener (1978), honest and accurate data are vitally important in any research process and have a more than significant impact on the validity of research outputs. There's an ever-present ethical temptation for researchers to change data to fit the outcome or also change results to fit data. This study will manage data collected in such a way that it can be independently verified, and the data analysis method deliberately stated such that the results can be verified by other interested parties.

Viewed from a wider societal context, the results for this research will go a long way into making suggestions into investments decisions both to individual and institutional investors. It is our intention that we'll demonstrate that wealth building investments are better achieved through investing for growth as opposed to capital gains.

20. Are there any other ethical issues associated with the proposed research study that are not already adequately covered in the preceding sections?

Yes ☐ No ☒

(a) If you answered "YES" to the above, please specify these below:

N/A

21 Application Checklist

Please mark √ if the study involves any of the following (for additional information, see Appendix III):

- Children and young people under 18 years of age, vulnerable population such as children with special educational needs (SEN), racial or ethnic minorities, socioeconomically disadvantaged, pregnant women, elderly, malnourished people, and ill people. ☐
- Research that foresees risks and disadvantages that would affect any participant of the study such as anxiety, stress, pain or physical discomfort, harm risk (which is more than is expected from everyday life) or any other act that participants might believe is detrimental to their wellbeing and / or has the potential to / will infringe on their human rights / fundamental rights. ☐
- Risk to the well-being and personal safety of the researcher ☐
- Administration of any substance (food / drink / chemicals / pharmaceuticals / supplements / chemical agent or vaccines or other substances (including vitamins or food substances) to human participants. ☐
- Results that may have an adverse impact on the natural or built environment ☐

Please check that the following documents are attached to your application.

	ATTACHED	NOT APPLICABLE
1. Recruitment advertisement	☐	x
2. Informed Consent Form / Certificate of Consent for Research Participants (Appendix IV)	☐	x

3. Questionnaire	☐	x
4. Interview Schedule	☐	x
5. Debriefing Form Template (Appendix V)	x	
6. The content of any telephone script (if applicable)	☐	x
7. Risk Assessment Form for Ethics Application (Appendix I)	x	☐
8. Gatekeeper Letter Template (Appendix VI)	x	☐
9. Any other approvals required in order to carry out the proposed research study, e.g., institutional permission (~~e.g.~~ school principal or company director) or approval from a local ethics or professional regulatory body.	☐	x

22. Final Declaration by Applicants:

(a) I declare that this application is submitted on the basis that the information it contains is confidential and will only be used by Unicaf University and Unicaf University Research Ethics Committee (UREC) for the explicit purpose of ethical review and monitoring of the conduct of the research proposed project as described in the preceding pages.

(b) I understand that this information will not be used for any other purpose without my prior consent, excluding use intended to satisfy reporting requirements to relevant regulatory bodies.

(c) The information in this form, together with any accompanying information, is complete and correct to the best of my knowledge and belief and I take full responsibility for it.

(d) I undertake to abide by the highest possible international ethical standards governing the Code of Practice for Research Involving Human Participants, as published by the UN WHO Research Ethics Review Committee (ERC) on http://www.who.int/ethics/research/en/ and to which Unicaf University aspires to.

(e) In addition to respect any and all relevant professional bodies' codes of conduct and/or ethical guidelines, where applicable, while in pursuit of this research project.

(f) I will report any changes affecting the ethical aspects of the project to the Unicaf University Research Ethics Committee (UREC). Note: In the case of student projects the responsibility lies with the Faculty Dissertation / Project Supervisor as per 3 (a).

(g) I will report any adverse or unforeseen events which might occur to the relevant Unicaf University Research Ethics Committee (UREC). Note: In the case of student projects the responsibility lies with the Faculty Dissertation/Project Supervisor as per 3 (a).

Print Name of Principal Investigator of the Research Project:	Norman Ambunya
Print Name of Project Supervisor (in the case of student research projects):	Olajide S. Fadun
Date of Application:	2 August 2019

Important Note:
Please now save your completed form (we suggest you also print a copy for your records) and then submit it to your UU Dissertation/project supervisor (tutor). **In the case of student projects the responsibility lies with the Faculty Dissertation/Project Supervisor as per 3 (a).** If this is a student application then it should be submitted via the relevant link in the VLE. Please submit only electronically filled in copies; **do not** hand fill and submit scanned paper copies of this application. Faculty members should submit this application electronically to the UREC secretary.

REAF - Version 3.0

Informed Consent Form / Certificate of Consent for Research Participants

This document consists of two parts: the **Informed Consent Form** (to share information about the research study with you) and the **Certificate of Consent** (for signatures if you choose to participate). You will be given a copy of the full Informed Consent Form.
This Form is for research interventions that cover the following research activities: questionnaires, in-depth interviews, focus groups discussions, elicited conversation, observations, recorded listening, videotaped activities and interviews.
[**NB**: Please use simple language and local and simplified words rather than scientific terms and professional jargon. In your explanation, consider local beliefs and knowledge when deciding how best to provide the information.]

Informed Consent Form for:	N/A
Researcher's Name:	Norman Ambunya
E-mail:	ambunya@icloud.com
Programme of Study:	PhD (Accounting and Finance)
Partner University:	UNICAF University Malawi
Project / Dissertation Title:	*The Superiority of Value Investing: A Nairobi Securities Exchange Empirical Assessment*
Supervisor's name:	Dr Olajide S. Fadun
Supervisor's e-mail:	o.fadun@unicaf.org

Part 1: Informed Consent Form

1. **Introduction**

Human participant will not be engaged for the study

2. The purpose / aims of the research

This dissertation's purpose is to investigate whether a portfolio investment basket of value stocks generates superior returns compared to a portfolio of growth stocks. The investigation is proposed to be carried out in an African setting of the Nairobi Securities Exchange. Because financial markets go through considerable fluctuations and the sample period of investigation includes the financial crises years, the study will also look at the impact of the crisis on investment returns. It is anticipated that this will add to new data and knowledge to the field since there's only scanty research over this period in the chosen market of investigation.

3. Participation in the research

No external participants

4. Participant selection

N/A

5. Voluntary participation

N/A

6. Risks and benefits to participants

N/A

7. Confidentiality

N/A

8. Sharing the results

Possibly journal publications

9. Contact details

N/A

Part 2: Certificate of Consent
This section is mandatory and should to be signed by the participant(s)

I have read the foregoing information about this study, or it has been read to me. I have had the opportunity to ask questions and discuss about it. I have received satisfactory answers to all my questions and I have received enough information about this study. I understand that I am free to withdraw from this study at any time without giving a reason for withdrawing and without negative consequences. I consent to the use of multimedia (e.g. audio recordings, video recordings) for the purposes of my participation to this study. I understand that my data will remain anonymous and confidential. I consent voluntarily to be a participant in this study.

Print name of Participant:	N/A
Signature of Participant:	N/A
Date:	N/A

If illiterate:
I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had an opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness:	N/A
Signature of witness:	N/A
Date:	N/A

/

Debriefing Form Template

Debriefing is an important element of the research process at which the researcher takes the opportunity, once data has been collected, to provide participants any necessary or additional information to understand the nature of the researcher's project / dissertation.

A Debrief Form should include the following:

- The title of the study
- Thank the participant for taking part in the study
- Provide a description on the nature of the investigation. Ensure that the language used to describe the study is appropriate to the participant population i.e., a psychology student will have a much greater understanding of the terminology or jargon than a member of the public. The Form should also include the aim of the research, details of the tasks participants were asked to undertake, how each task is measured and the researcher's hypothesis (if appropriate).
- Provide us assurance that data will be held confidential or anonymous as appropriate and that participants have the right to withdraw their data retrospectively and without explanation.
- Provide contact details of the researcher (and supervisor in the case of dissertation):

Name of researcher	Name of Supervisor
Unicaf contact details	Unicaf Supervisor Contact details
Norman Naaman Ambunya	Dr Olajide S. Fadun
Tel: +254705280536	Tel: +2348028478319
Email: Ambunya@icloud.com	Email: o.fadun@unicaf.org

RISK ASSESSMENT FORM FOR ETHICS APPLICATION

1. Introduction

The purpose of this document is to identify the hazards and associated risks related to the research activities which are carried out for the purpose of research project/dissertations and to describe the control measures/procedures which will be adopted to reduce the level of risk by researchers conducting research. It is important that researchers consider what hazards might arise in the course of their research activities both of their own safety and for their safety of their participants and then consider the measures required to reduce the level of risk posed by these hazards to safeguard health and safety.

Any student or faculty who embarks on a research project/dissertation must complete the Risk Assessment Form in consultation with their academic supervisor before starting their dissertation/research project. The Form should be signed by the student and supervisor or by the faculty member who will conduct research. The Risk Assessment Form should be submitted with REAF for approval from UREC.

The Risk Assessment should be revisited if any changes are made to the proposed research or if any circumstances change.

This document covers the following research activities: questionnaires, interviews (including online questionnaires and interviews), focus groups, elicited conversation, observations, recorded listening, videotaped activities and interviews.

2. Definitions

Please read the following definitions while completing this form:

Hazard: The potential of harm

Risk: The probability of that harms occurring within a defined time interval and the severity of its consequences.

Risk Assessment: The process of deciding on actions to be taken to reduce risk to an acceptable level, preferably, "low" or "high" through the implementation of control measures / procedures. Risk Assessment involves consideration of physical and psychological risks along with the protection of privacy. The student / researcher must develop procedures that reduce and minimize any risks to human participants.

Risk Rating: the simplest form of risk assessment is to rate risk as "low" or "high", depending on how likely the activity is to cause harm and how serious that harm might be.

Low Risk: Harm arises under controlled conditions. Low risk activities show that you have correctly identified a hazard, but that in the particular circumstances, the risk is insignificant. No more than minimal risk is greater than what is typically encountered in everyday life.

Low Risk research activities do not involve:

1. Those who are considered vulnerable (persons who are incapable of protecting their own interests):
   - Children under 18.
   - Persons who have relative or absolute impairments in decisional capacity, education, resources, strength, or other attributes needed to protect their own interests.
   - People who are marginalized, stigmatized, or face social exclusion or prejudice that increases the likelihood that others place their interests at risk, whether intentionally or unintentionally.
   - Individuals in hierarchical relationships.
   - Institutionalized persons.

might arise during your research activities and list in the table below the potential hazards and persons at risk identified.

Name:	Norman Naaman Ambunya
Student Number:	R1704D2607168
E-mail:	Ambunya@icloud.com
Programme of Study:	PhD Accounting and Finance
Partner University:	UNICAF University Malawi
Title of Research Project:	*The Superiority of Value Investing: A Nairobi Securities Exchange Empirical Assessment*

Brief Description of research activity (mentions the research design you propose to use, details of all research instruments and procedures to be deployed and attach any relevant documents, such as questionnaires):

Intended Data Collection Tool and Analysis

Researchers have three main sources of data and literature to pick their study from namely primary, secondary and tertiary data sources (Saunders et al., 2009). When the data source is such that its appearance is for the very first time. This could when a report is published for the first time, when governmental publications first appear, for instance in an economic survey, when manuscripts or memos appear as first editions. In a secondary data source, discussions of information already in the public domain are the focus. The literature and data concerned here will have been published as primary sources elsewhere. Examples include text books, published articles/journals/dissertations and memoes (Saunders et al., 2009 and Fama, E., and French K.,1995, 1998, 2012). In tertiary literature sources, tools such as indexes, encyclopedias, bibliographies are used to combine both primary and secondary sources.

This research will largely rely on secondary sources like texts, scholarly journals as well as official published databases. In developing our theoretical frameworks and literature survey, the study will explore existing journal articles, chapters in books and data on public stock exchanges as well as other trading exchanges where investments take place. In collecting relevant literature and data on internet sites, key search words such as value investing, value stocks, growth stocks, securities trading and alternative investments will come in handy. At this stage, we believe that a lot of the numerical data required will be available on sites such as The Nairobi Securities Exchange (NSE), Morning Star, Thomson Reuters Data Stream and others.

Secondary sources have the special advantage of cost effectiveness both in time and money wise. They also

provide authors with new and helpful ready interpretations but suffer from the limitations of the researcher not having familiarity with data which can be complex at times to make meaning out of (Bryman & Bell, 2011). The solution suggested here is the research having to allocate more time in data comprehension as well as ensuring the data source itself is reputable.

Data Reliability, Replicability and Validity

Bryman et al (2011), have made a point that the above attributes of reliability, replicability and validity form the key criteria in business related research to ensure quality and credible results generation. Reliability is achieved when the study results can be repeatable in other studies. This essentially requires that studies of the same problem should be able to come to the same conclusions. In this case, reliability is closely linked with the quantitative research and therefore this study. As Bryman et al (2011) have explained, three factors of *'stability, internal reliability and inter-observer consistency'* define reliability. Stability in this case holds where *'a measure is stable over time or not and if the results would be the same if the study was conducted in another point of time'* (Bratland et al, 2014). When the various indicators forming the scale or index of the research show consistencies, then internal reliability is said to exist (Bryman & Bell, 2011; Fama, E., French K., 1992) and Bratland & Maxi, 2014). On the other hand, inter-observer consistency refers to the degree of subjectivity existing in the study. This study will ensure reliability through collecting historical trend data from reputable sources as mentioned earlier. Applying strong existing theoretical frameworks will neutralize any subjectivities inherent in such a research project.

Bratland et al (2014), suggest the similarity between replication and reliability with replication being achieved where a different research is carried out in a similar manner and achieves the same result (Bryman et al, 2011). Clear presentation is required to achieve the forgoing. Replication is crucial in quantitative research, a focus of this study.

In validity, we are interested in ensuring that the concept of study is actually measured by the indicator selected and therefore validity can be said to be the most important criteria in ensuring quality. Validity has four main subdivisions; 'measurement validity, internal validity, external validity and ecological validity' (Bryman & Bell, 2011; Athanasakos, G., 2009).

Measurement validity is where a proxy closely approximates the variable of interest and is correctly quantified. Internal validity is concerned with the causality relationship between study variables (independent and dependent). External validity concerns the degree to which the results can be generalized whereas ecological validity relates to the applicability of results in the real world (Bryman & Bell, 2011, and Bratland et al, 2014).

To assure measurement validity the tools to be used in this study on investing variables will have a strong empirical backing (i.e the estimation model with variables selection and measurement will be supported by current empirical literature). The model results will be subjected to empirical rigour. The external reliability will be self-assured since the data will be picked from actual investment results as published on exchanges with the results applicable to other exchanges all over the world. The ecological validity is irrelevant in this study since no humans are used as test objects.

Sampling Method to be Used

Our sample will include all the listed securities on the Nairobi Securities exchange (NSE) and hence this sample is considered a population as the whole group is included without cherry picking (see Bauman, W. S., Conover, C. M., & Miller, R. E. ,1998). We'll develop a criterion of excluding some securities/companies where outlier effects are evident. For instance, as presented in Bratland et al (2014),

> *'First, if companies have both "A" and "B" shares only the "B" share will be part of the population. Second, companies that have been listed after the period of study or delisted during the time period of our study will be excluded as well. Third, for some companies there is no data available and they will be eliminated from the population. Lastly, some companies could have either very high or very low multiplies which creates rather extreme outliers and these will be excluded from the population.'*

Ethical and societal considerations

The importance of ethics in social research has been underscored in Saunders et. al (2009) as participants need to be protected from any harm that may arise from their participation in the research process. The researcher must thus first obtain consent from respondents on their willingness to participate (Chan, L. K., & Lakonishok, J., 2004). In our particular research, this aspect will not apply as no human respondents are necessary. Our variables of interest will be on prices, stock volumes, returns at an aggregated level and no individual investor is a subject of study.

As mentioned in Crandall and Diener (1978), honest and accurate data are vitally important in any research process and have a more than significant impact on the validity of research outputs. There's an ever-present ethical temptation for researchers to change data to fit the outcome or also change results to fit data. This study will manage data collected in such a way that it can be independently verified, and the data analysis method deliberately stated such that the results can be verified by other interested parties.

Viewed from a wider societal context, the results for this research will go a long way into making suggestions into investments decisions both to individual and institutional investors. It is our intention that we'll demonstrate that wealth building investments are better achieved through investing for growth as opposed to capital gains.

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REAF - Version 3.0

Dates (from/until): August 2019/August 2020

Area/Locations that the research project will take place: Nairobi, Kenya

Hazards (e.g. travel risks to location of research project, physical threat or abuse, chemical or biological hazards involved): N/A The research project will use data form The Nairobi Stock exchange. This information will be accessed electronically hence no specific hazards are foreseen.

1.

2.

3.

Who can be harmed (e.g. disabled persons, people who have pre-existing health condition):

NO ONE

1.

2.

3.

How can someone be harmed (e.g. physical injury, psychological harm)? - N/A

1.

2.

3.

Number of people affected: N/A

Consequences (e.g. exposure to risks of everyday life, such as road accidents and infectious illness, psychological harm as a result of violence or of the nature of what is disclosed during the interview): N/A

1.

2.

3.

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Existing Control Measures (e.g. researcher to be aware of health and safety policies of research location): NONE **1.** **2.** **3.**
Comments:
Risk Rating (choose one): **1. High** 2. Low
Further possible control measures (e.g. Indicate what precautions you will take to minimize the identified risks): N/A – Publicly published data will be used **Normal observation of traffic laws whenever required to visit the exchange in person.**
Further actions required (e.g. Mention the person responsible, description of hazard, details of action taken, date completed): Publicly published data will be used **No further action is specifically required.**

The signatures below confirm that the hazard, risks and appropriate control measures / procedures outlined above have been read and understood.
We the undersigned have assessed the activity and the associated risks and declare that the risks will be controlled by the methods listed.

Researcher's signature: Norman Naaman AMBUNYA

Supervisor's signature: Dr Olajide Solomon FADUN

Date: 1 August 2019

Appendix B: Consent Forms

Good Afternoon,

Please see the attached as requested.

Kind regards,

Emily Kigen
Clearing Operations Analyst
Nairobi Securities Exchange - The EXchange, 55 Westlands Road
☎ : (Office) (020) 2831277
www.nse.co.ke

From: Dr Norman Ambunya [mailto:ambunya@icloud.com]
Sent: 15 April 2021 19:13
To: NSE Data Services <dataservices@NSE.CO.KE>
Cc: Data Services <nsedataservices@gmail.com>
Subject: Re: [EXTERNAL] Re: Purchase Confirmed

Thanks

I'll bw waiting for the NSE 20 ans 25 index as well

Sent from my iPhone

On 15 Apr 2021, at 18:57, NSE Data Services <dataservices@nse.co.ke> wrote:

Please see the attached

Emily Kigen
Clearing Operations Analyst
Nairobi Securities Exchange - The EXchange, 55 Westlands Road
☎ : (Office) (020) 2831277
www.nse.co.ke

On 13 Apr 2021, at 10:44, NSE Online Library <library@nse.co.ke> wrote:

Hi **Norman**

Thank you for Your Purchase

Indices					
	0	Historical Weekly Indices By Period - 29/jan/2010 To 29/jan/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 26/feb/2010 To 26/feb/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 31/mar/2010 To 31/mar/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 30/apr/2010 To 30/apr/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 31/may/2010 To 31/may/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 30/jun/2010 To 30/jun/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 30/jul/2010 To 30/jul/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 31/aug/2010 To 31/aug/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 30/sep/2010 To 30/sep/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 29/oct/2010 To 29/oct/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 30/nov/2010 To 30/nov/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 31/dec/2010 To 31/dec/2010	1	40	**40**
	0	Historical Weekly Indices By Period - 31/jan/2011 To 31/jan/2011	1	40	**40**
	0	Historical Weekly Indices By Period - 28/feb/2011 To 28/feb/2011	1	40	**40**
	0	Historical Weekly Indices By Period - 31/mar/2011 To 31/mar/2011	1	40	**40**
	0	Historical Weekly Indices By Period - 29/apr/2011 To 29/apr/2011	1	40	**40**
	0	Historical Weekly Indices By Period - 31/may/2011 To 31/may/2011	1	40	**40**