An empirical analysis of the relationship between market multiples and share returns using South African data

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DECLARATION

I, Gilbert Ncube, hereby certify that this dissertation which is submitted to the University of South Africa is my own work and all sources that have been used or quoted have been indicated and acknowledged using references.

Signed  Date: 31/01/2023

ABSTRACT

For many years, there has been an attempt to change the study of economic environment to pure science, and even if this has been elusive, significant effort has been made. The aim is to understand and predict economic environments for decision-making that enables successful investment. One such phenomenon has been the development of metrics such as multiples to understand the health of businesses. This study seeks to investigate the nexus between price multiples and share returns using South African data. A sample is obtained from the Top 40 Johannesburg Stock Exchange (JSE) - listed companies for the period from 2010 to 2021. These data are then analysed through regression analysis to establish the strength as well as the direction of the relationship. The study established a negative relationship between Price-to-Earnings (P/E) and Price-to-Sales (P/S) ratios with share returns while a positive relationship was found with Price-to-Book (P/B), Price-to-Cash Flow (P/CF) and Price-to-Earnings Before Interest, Taxes , Depreciation and Amortisation (P/EBITDA) ratios. The results obtained provide an impetus for further studies to incrementally develop finance theory for the betterment of successful investment decisions in emerging markets in general and South Africa in particular. South Africa is the biggest investment destination in Africa but there is a paucity of information on how the market multiples relate to share returns, which relationship has helped investor decision-makers in developed as well as some emerging markets in Asia.

Keywords

Market multiples, Emerging markets, Stock returns, Capital Asset Pricing Model, Efficient Market Hypothesis, Price-to-Earnings Ratio, Price-to-Book ratio, Price-to-Sales ratio, Price-to-Earnings, Before Interest, Taxes, Depreciation & Amortisation

LIST OF ABBREVIATIONS/ACRONYMS

BE/M ..... Book Market Equity
B/M ..... Book-to-market
CAPM ..... Capital Asset Pricing Model
EM ..... Enterprise Multiple
EMH ..... Efficient Market Hypothesis
EPS ..... Earnings Per Share
EV ..... Enterprise Value
FE ..... Fixed Effects
FF3FM ..... Fama and French's Three-Factor Model
FTSE ..... Financial Times Stock Exchange
GDP ..... Gross Domestic Product
GMM ..... Generalised Methods of Moments
HPR ..... Holding Period Return
IRESS ..... Integrated Real-time Electronic Securities System
JSE ..... Johannesburg Securities Exchange
KLCI ..... Kuala Lumpur Composite Index
KSE ..... Karachi Stock Exchange
NASD ..... National Association of Securities Dealers
NYSE ..... New York Stock Exchange
OLS ..... Ordinary Least Squares
P/B ..... Price-to-book
P/CF ..... Price to Cash Flow
P/E ..... Price-to-earnings
P/EBITDA ..... Earnings before Interest Taxes, Depreciation & Amortisation
P/S ..... Price-to-Sales
RE ..... Random Effects
RSA ..... Republic of South Africa
SARB ..... South African Reserve Bank
SEM ..... Statistical Equation Modelling
S/P ..... Sales to Price
S&P 100 ..... Standard and Poor 100
SML ..... Security Market Line
US ..... United States
UNDP ..... United Nations Development Programme

ZSE ....Zimbabwe Stock Exchange

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CHAPTER 1: INTRODUCTION, PROBLEM STATEMENT, OBJECTIVES AND SIGNIFICANCE OF STUDY

1.1 Context and background of the study

In a quest to understand security market behaviour investment and make a profit, analysts have persistently sought ways of outsmarting the market using a variety of informational avenues that value shares and predict share returns. All this would involve analysing market variables to establish relationships and patterns (Bonga-Bonga, 2012).

One of the popular accounting variables that are analysed and used to predict share returns are market multiples. Over the years, researchers, investors and investment advisers have always believed that there is a relationship between market multiples and share returns (Musallam, 2018). The five most prominent multiples are; Price-to-Earnings (P/E), Price-to- Book (P/B), Price-to-Sales (P/S), Price-to-Cash Flow (P/CF) and Price-to-Earnings before Interest, Taxes, Depreciation & Amortisation (P/EBITDA). As these ratios are used to value shares, it is believed that they can be used to predict the future value of shares and subsequent returns (Ping-fu & Kwai-yee, 2016).

The share prices follow the rules of basic economics of supply and demand. If the price of a share decreases, the demand for the share rises, and when the prices of shares increase demand decreases. There exists an inverse relationship between the price of shares and their demand. Market participants study the market environment all the time for information that indicates that profits can be obtained. Some key indicators used are market multiples – if it is perceived that a company has growth prospects after observing a higher P/B ratio for example, there will be high demand for the company's shares and that has an effect of pushing up the values of the shares as well general positive perception of the company thereby guaranteeing good earnings and subsequent returns (Akthar, 2020).

Market multiples have gained popularity in many economies as a vehicle for predicting and valuating shares, as shown in Table 1 below. According to Fabozzi, Forcadi, and Jonas (2017), market multiples accounted for 92.8% of valuations used by the respondents in their research with a mean of 68.6%.

Table 1. Most Widely Used Valuation Approaches among Respondents of a 2015 CFA Institute Study

Valuation Approaches: Global ranking In evaluating individual equity securities, which of the following valuation do you use?	Percentage of Respondents	Percentage of cases in which the Respondents Uses each Approach (mean)
A market multiples approach	92.8	68.6
A discounted present value approach	78.8	59.5
An asset-based approach	61.4	36.8
A (real) options approach	50.0	20.7
Other approaches	12.7	58.1

Source: Fabozzi et al., 2017

A total of 1,980 practitioners in the Americas (66% of the total) Asia Pacific (12% of the total) and Europe, the Middle East, and Africa (22% of the total) participated in the CFA Institute Survey (Fabozzi et al., 2017).

The prevalence of the market multiples across the world indicates the confidence businesses have in the use of these metrics. Studies have been done in the developed and emerging markets. Emerging markets have a continuum of levels of development, for example, Asian markets exhibit characteristics of developed markets to a greater extent (Akhtar, 2020) as compared to African emerging markets.

In the US, a research was done by Mukherji and Lee (2013) where they found that P/B and P/S showed positive relationships, while P/E indicated negative relationships for prior and forward P/E multiples. A study in Hong Kong showed no relationship between P/E and P/S but a significant positive relationship with P/B (Ping-fu & Kwai-yee, 2016:116). A recent study by Akhtar (2020) in the European and Asian markets showed that market multiples are better able to predict share returns in Europe than in Asia (Akhtar, 2020) – this could be because of differences in market efficiencies even though in a study by Akhtar (2020) the P/E ratio exhibited a negative relationship. Igrejas, da Silva, Klotzle, Pinto and da Gama Silva (2007) studied P/EBITDA in the Brazilian stock market from 1996 to 2017 and found a very strong relationship which would guarantee abnormal profits (Akhtar, 2020). No studies have been done in the South African markets (according to the author's investigation) on the study of the relationship between share returns and market multiples; however, related concepts such as the Random Walk Hypothesis (RWH) and Efficient Markets Hypothesis (EMH) have been explored. It was discovered that the South African market exhibits characteristics of efficient markets to a greater degree (Chitenderi, Maredza & Sibanda, 2014). This study explores the relationship between market multiples and shares returns in South Africa.

Emerging markets present good investment opportunities because of their rapid growth rate. Africa is particularly unique from other emerging markets in that it has a young and growing population as well as ample physical resources that can be tapped for economic value (Techo, 2018). Despite the potential economic growth of South Africa as an emerging country, the JSE might not show the same price efficiency as Asian countries and developed economies like the US and this makes a South African-focused study important. The researcher is a resident of an emerging market, so studying this market poses a natural interest because it will assist a developing economy like South Africa and other African countries that are yearning to develop their economies.

1.2 Development and trend analysis of the JSE All Share Index

Historically, the JSE was established on 8 November 1887 following the discovery of gold on the Witwatersrand in 1886, which resulted in many investors seeking to buy shares from the gold companies (Kotze, 2017). In the early years, few companies were trading on the JSE; however, today the JSE has more than 400 listed companies (Mpofu, 2011).

The development of the JSE led to the formation of the Financial Times Stock Exchange (FTSE)/Johannesburg Stock Exchange (JSE) popularly known as the FTSE/JSE Top 40 Index. The FTSE/JSE Top 40 Index is managed by the FTSE group which is a British service provider of stock indices. The index was developed with a base value of 10 399.53 as of June 21, 2002 (Kotze, 2017). At inception in 1995, the FTSE/JSE Top 40 Index was at 4 779.621 and closed at 47 669.35 on 30 June 2017, which translates to 900% growth over 22 years (Kotze, 2017). Even if the index shows significant growth, during the global recession from 2008 to 2009, the index lost 50% of its value (Kotze, 2017). A further analysis using hard currencies such as gold and USD would yield a different result; such analysis is done at the end of this section.

The FTSE/JSE Africa Index Series is established to indicate the performance of South African companies and provides investors with comprehensive indices that measure industry sectors in the South African market (Kotze, 2017). According to Kotze (2017), the FTSE-Russel which manages the JSE has fact sheets that provide the following:

Objective: The index has to create index-tracking funds and derivatives as a performance yardstick.

Invisibility: Stocks are valued and weighted to ensure that the index is investable.

Liquidity: The selection of stock is meant to guarantee tradability.

Most of the companies listed on the JSE have a presence in international markets and are thus denominated in dollar (USD) terms. It is considered that the JSE Top 40 companies should have a strong USD dollar hedge. When the South African rand depreciates, the incomes of the companies are increased resulting in index levels rising (Kotze, 2017). During the period of weakening of the rand, analysing the index in USD dollar terms compares worse than in rand terms; for example, on 30 June 1995, the dollar value of the index was 1 314.17 and increased to 3 632.28 on 30 May 2017. This is only an increase of 176.4% compared to the 900% of rand growth (Kotze, 2017). This clearly shows that the JSE analysis has to be done in USD as well.

Gold is another hard currency to be used for evaluating the performance of the index. On 30 June 1995, the rand value of the index at 4 779.62 was equivalent to 3.42 ounces of gold while 47 699.35 (30 June 2017 index value) bought 2.86 ounces, which is a decline of 16.7%, while the rand terms yielded 900% increase. All these analyses and trends indicate that the evaluation of the All Shares Index has to be done from different facets to establish the real value of its performance.

1.3 Developments of market multiples in South Africa

Market multiples are fundamental variables that are used to estimate the value of shares and further establish if a share is overvalued or undervalued. Investors are thus assisted by this valuation in the stock selection process to mitigate investment losses (Akthar, 2015). In both developed and emerging economies market multiples have been used for forecasting the price of securities and they quickly gained popularity because they are simple to compute as values needed to compute them are readily available (Akthar, 2015).

Akthar (2015) documents that the price-to-earnings (P/E) was first introduced by Graham and Dodd in 1934 as a measure of securities market performance. It is further asserted by the same author that an association to link price-to-earnings multiple and share returns was done by Nicholson in 1960, and it was firmly established that low P/E ratio stocks yield high returns. This initial investigation on the use of P/E formed an impetus to explore the use of other multiples that have gained popularity across the globe.

In South Africa, Nel (2009) investigated if the P/E ratio was the most popular multiple and whether it was useful in all sectors. It was concluded that the ratio was the most popular; however, its usefulness in all sectors was questioned. This is probably because the use of P/E in companies making net losses would not be possible. Nel (2009) concluded that emphasis on the P/E ratio was unwarranted.

Nel, Bruwer and le Roux (2013) studied the performance of equity-based multiples in the South African context. The research identified four value drivers of price multiples which are earnings, assets, cash flow and revenue. These value drivers are denominators in the multiples, so this makes them important because as their values increase the multiple values decrease and vice-versa. The study established that earnings offered the greatest accuracy in share valuation and return prediction, and this is congruent with other empirical studies. Cash flow was found to be a poor value driver in South Africa according to Nel et al. (2013) study although studies in some developed markets point to average results.

Seemingly no studies have been done in South Africa to establish the relationship between market multiples and stock returns. Previous studies have mainly been based on share valuation.

1.4 Problem Statement

Investors have for many years relied on financial ratios to understand the health of businesses. It has been established that the use of these ratios and their interpretation differs from country to country (Decker & Brunner, 1997). This implies that even if market multiples relate to shares, this relationship differs from country to country, and market to market. As market multiples give more information about the health of a company, they thus influence the price of shares and ultimate share returns.

This research proposes to investigate a relationship that exists between market multiples and stock returns in South Africa, to finally generalise results to emerging markets or an impetus to do further research in the country as well as other African (developing) countries.

Extensive research on finding the relationship between market multiples and share returns has been investigated in both developed and Asian emerging markets. Mukherji and Lee (2013) studied explanatory factors of market multiples and expected returns in the United States of America; in Hong Kong, Ping-fu and Kwai-yee (2016) investigated the relationship between share returns and financial ratios; Akthar (2015) researched the relationship between portfolio returns and market multiples in Pakistan; and a study in South Africa by van Heerden and van Rensburg (2015) focused on the impact of fundamental and technical analysis on share returns in the JSE. In a recent study in 2020, Akhtar (2020) investigated the impact of market multiples on stock returns in emerging (ASEAN) and developed (European) financial markets (Akhtar, 2020).

The results of these studies have been contradictory. No research has been done in South Africa on the nexus between market multiples and share returns (according to the author's knowledge) despite the country's great potential for investor returns. The author envisages that such research would assist all economic stakeholders in the country. Using market multiples based on research from foreign countries brings useful insight into the application of multiples but it is not effective as the behaviour markets differ from market to market, and errors of judgement are likely to occur (Akhtar, 2020).

South African market environment is fundamentally different from other Asian markets and developed ones because of differences in socio-political landscapes. Political and institutional risks affect the cost of capital which ultimately affects required returns (Yartey, 2008). Governance policies as well as political risk may make the South African securities market to be less developed and less efficient. Studies have found that most investors in the JSE purely speculate and treat the market like a casino (Phiri, 2015). This is evidence of a lack of a scientific way of analysing the market. Such behaviour weakens the efficiency of the stock exchange. The other factor that weakens the efficiency of the stock market is the lack of black people's participation in the market. Research in 2013 indicated that only 10% of black South Africans participated in the JSE (Phiri, 2015). Black population participation is not proportionate to the demographics of the country with 79.2% black people according to the 2011 South Africa National Census. If more black

people participated in the JSE, then there would be many players and this would add to the efficiency of the South African stock market. Bonga-Bonga (2012) alludes to the weak efficiency of developing and emerging markets too, low trading, low liquidity, and uninformed investors because of insufficient reliable information. With the aid of better ways of analysing the markets most South Africans would be encouraged to trade in the JSE, adding to investment players and incidentally improving the efficiency of the stock market.

The use of market multiples in South Africa could assist economic players in making quality decisions and thus protect their investments. A plethora of research that examines how market multiples influence share returns is needed in the South African markets to add to the reliability of such research through replication.

1.5 Research Objectives

This section addresses the primary and secondary research objectives.

1.5.1 Primary research objective

The primary aim of this study is to examine the relationship between market multiples and share returns on the JSE from 2010 to 2021.

1.5.2 Secondary research objective

- To examine the relationship between the price-earnings ratio and share returns of JSE-listed shares.
- To examine the relationship between price sales ratio and share returns of JSE-listed shares.
- To examine the relationship between price book value ratio and share returns of JSE-listed shares.
- To examine the relationship between price cash flow ratio and share returns of JSE-listed shares.
- To examine the relationship between enterprise value multiples and share returns of JSE-listed shares.

1.6 Significance of the study

South Africa as a major African emerging market presents a great opportunity for local and off-shore investments. It is important to establish variables that drive the JSE so that potential investors find a dependable basis for making sound investment decisions.

The study aims to provide investors with skills and capabilities of studying market ratios such as market multiples to enable them to understand how these multiples affect share returns in the South African securities market. As not much research has been done in South Africa, this research would be beneficial to investors including other researchers who want to further explore the relationship between price multiples and shares on the JSE. A study was done by Nel (2009) to establish the effectiveness of multiples in South Africa. The researcher found that more research was needed on multiples and that the effectiveness of the P/E ratio was overestimated, and that it only needs to be used to augment other valuation techniques (Nel, 2009). Another almost similar research was conducted by van Heerden and van Rensburg (2015), and the focus was the relationship between fundamental and technical analysis and equity returns in the JSE. Both studies do not address the focus of this study which examines the relationship between market multiples and share returns but they highlight fundamental insights.

This study would assist global investors to focus on using market multiples in predicting share returns, that is, from a general standpoint. African markets and other developing and emerging markets would find relevance in the study because of their proximity to their socioeconomic and geopolitical circumstances. Current South African and prospective investors would find the findings useful as an added layer of strategic analysis of their investment market, as it has been found in previous studies that the relationship between market multiples and share returned is largely market-specific (Akhtar, 2020)

1.7 Structure of the dissertation

The dissertation comprises six chapters and these chapters are further divided into sections and sub-sections. Chapter 1 provides an introduction to the study by giving a solid background. The problem statement, objectives and significance of the study are explored as well. Chapter 2 provides a theoretical review of the study and this focuses on finance theory underpinning the major aspects of the study, to give the reader a firm understanding of the concepts concerned. An empirical literature review follows in Chapter 3. This is an exposition of similar studies done by other researchers where a discussion on methodologies and results is done. Chapter 4 deals with the methodology of the study. The theoretical background of various methods is discussed followed by specific methods to be used. A comprehensive analysis of how the study was carried out is done in this chapter. In this study, multivariate regression models are presented to give a concise background of analysis and testing to be done on relevant statistical application software. Analysis and comprehensive discussion of results follow in Chapter 5. Lastly, Chapter 6 gives a brief conclusion, limitations, significance and recommendations for the improvement of similar studies in future.

CHAPTER 2: THEORETICAL LITERATURE REVIEW

2.1 Introduction

This section deals with the basic epistemology and theory of concepts under study, these being returns on shares and market multiples. Theories discussed include Capital Asset Pricing Model (CAPM), Arbitrage Price Theory (APT), the Augmented CAPM, the Random Walk Hypothesis (RWH), the Efficient Market Hypothesis (EMH) Fama and French Three-Factor and Five-Factor Theory (FF3FM and FF5FM).

2.2 Definition of key terms

For an effective understanding of the study, key terms are explained and discussed. These key terms include shares, share price, price multiples and their various types, share returns, cash flow, CAPM, APT, RWT and EMH.

2.2.1 Shares

In simple terms, a share is part ownership of a business. A company can raise money to run a business by ‘going public’, in which case it asks members of the public to buy its shares from a stock exchange. By buying these shares each investor owns part of the company and is ordinarily called a shareholder of the company (Correia, Flynn, Uliana, Wormald, M & Dillion, 2015).

2.2.2 Share price

According to Correia et al. (2022), a share price is the current price of a company shares traded on a securities market. All listed companies attach a monetary value to a share and this reflects the worth of the company. The price of the share fluctuates in tandem with a variety of factors that include changes in the whole economy, changes within firms, political events and environmental changes (Correia et al. (2022).

2.2.3 Share returns

A share return is a financial gain or loss from an investment, this means money lost or gained. To compute a return, the share appreciation value is added to the dividend and then divided by the original share price. Hatem (2017) defines a share return as the growth rate of the market share price. The formula for calculating share return below is a simplified method; in practical situations, such factors as dividend and fees are considered in calculating share returns (Ray, 2020). The simplified version uses the appreciation of share prices as well as a declared dividend, where the equation below is applicable.

Equation 2.1

$$\text{Total Stock Return} = \frac{(P_1 - P_0) + D}{P_0}$$

Where;
P_0= Initial stock price
P_1= Ending Stock Price (Period 1)
D = Dividend

2.2.4 Cash Flow

Bhandari and Adams (2017) define cash flow as the net amount of cash and cash equivalents transferred in and out of an organisation. An organisation's success is premised on generating positive cash flow in the long term. There are three types of cash flows: operating, investing, and financing. These involve the movement of cash in, business operations, buying assets and investments and proceeds from debt and equity as well as payments by the firm, respectively (Correia et al., 2015). An important form of cash flow is free cash flow, which indicates residual cash after cash outflows to maintain operations and capital assets. A firm adds value to investors by maximising free cash flow in the long term. (Bhandari & Adams, 2020).

2.2.5 Free Cash Flow (FCF)

Different scholars defined Free Cash Flow in different syntactical ways but all essentially mean the same thing. Dittmar (2000) defines 'Free Cash Flow' as financial flows that are at the company's discretion without affecting operating activities, whereas Jansen (1986) defines it as net cash operating cash after capital expenditure, stock inventory expenditure and dividend pay-out. Another definition of Free Cash Flow by Copland (1968) is operating income after tax, plus non-cash expenses less investment on assets.

Harbula (2001) maintains that most businesses prefer funding projects from internal sources of funds rather than external funds such as equity and debt. The internal sources of funds come from FCF. The reason for use of FCF according to the writer is that there is information asymmetry between borrowers and lenders. As lenders anticipate a possibility of payback failure they charge exorbitant costs to compensate for default risks (Harbula, 2001). While increased FCF is good, it can also be a disadvantage if not carefully utilised by managers and can ultimately lead to reduced share returns. Chepkwony (2014) concurs by asserting that increased FCF leads to management misuse and organisational efficiency and organisational performance is achieved by paying dividends which reduces FCF. Fama and French (2004) concur by saying dividend pay-out signals positive news about a company's performance and value. Another setback of having high FCF under management control is stated by Oler and Picconi (2005) who say that shareholders only realise the negative effects of high FCF after about two years when managers misuse the funds and company value falls. This becomes an agency problem when managers use funds for their own wealth to the detriment of shareholder wealth.

2.2.6 Financial and Economic Theories on Risks and Share Returns

Investors in the securities market and other stakeholders are interested in estimating share price behaviour as a result there has been several theories propounded to explain this phenomenon (Ruhani, Islam & Ahmad, 2018). Some of these theories advanced are the random walk hypothesis, the Capital Asset Pricing Model,

Arbitrage Price Theory, the efficient market hypothesis, and Fama and French's Three-factor and Five-Factor Models, among others.

2.2.7 Capital Asset Pricing Model (CAPM)

The concept was initially developed by Sharpe (1964), Lintner (1965) as well as Black (1972). It was developed on Markowitz's (1959) portfolio theory which argued that a rational investor is risk-averse and builds a portfolio of assets that will bring a stochastic return over time. The model was popularised by its ease of use in predicting the required rate of return against prevailing risks, albeit with poor empirical results at inception (Fama & French, 2004). It became useful in the field of finance and investment evaluation as it focused on the expected return on financial assets by focusing on systematic risks (Mukhacheva, 2012). Systematic risk is the only factor that CAPM uses in extrapolating the required rate return and this is denoted by beta (*β*) which is a covariance of assets risk and market risk. A beta of more than 1 denotes that the asset is more volatile and riskier than the overall market. The required rate of return on risker assets should be higher to compensate for more exposure to losses.

*CAPM equation for measuring return on shares (*2015)

Equation: 2.2

Expected Return = $r_{f+\beta\,(}r_{m-}\,r_{f)}$

Where:

r_f = Risk-free rate

β = Beta

r_m= Return on the market

A risk-free rate is a rate that is offered by assets that are not risky, for example, government bonds. Beta is a measure of how much risk the investment will add to the portfolio. This is the basic theory that links risk and returns. It holds that diversifiable risk is a major threat to investment opportunities, and hence affects

overall returns. The non-diversifiable risk is denoted by beta (β) in the CAPM equation (Gitman et al., 2010). Systematic risk denotes business threats that are inherent in the whole market and it is the factor that guarantees high returns (Muchacheva, 2012). The model implies that the return of a share should be positively correlated to its risk and that beta is the sole risk indicator under CAPM. As investors are risk averse, they either avoid taking a risky investment decision or seek higher returns for all risky ventures (Muchacheva, 2012). CAPM thus helps in estimating the required rate of return an investor should want.

Practical applications of CAPM can be illustrated using two major functional graphs: Security Market Line (SML) and Efficient Frontier. SML is constructed from CAPM equations while Efficient Frontier is from CAPM as well as Markowitz portfolio theory.

Security Market Line (SML)

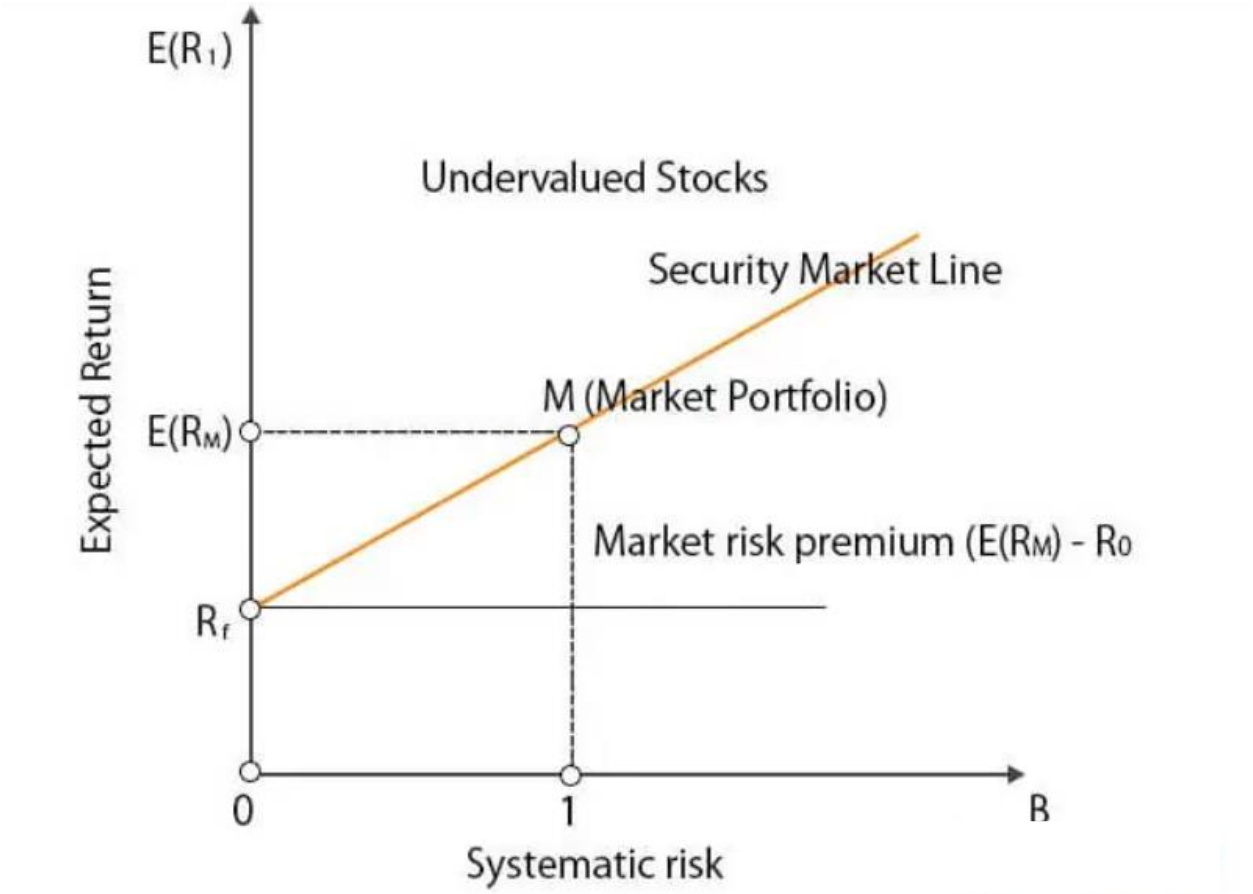

Figure 1. Security Market Line

SML represents a linear equation of CAPM;$E(R1) = Rf + \beta(Rm - Rf)$

Systematic risk is represented by the horizontal line and the vertical represents the expected return. β of a security is an important metric that indicates the non-diversifiable risk or systematic risk of a security. SML is used to value securities' risks and expected returns. Securities are plotted on the graph, and their position will determine the expected return required. A beta (β) of 1 shows the risk of the overall market. A beta (β) of more than 1 indicates that the security is more volatile than the market; as a result; the required return of the security will be more than that of the market. The sloping line is the SML; it shows returns expected for a specific level of risk (beta). All stocks above the market line are low risk, they offer high returns for low risks, and such stocks are undervalued. Securities below the SML are overvalued and are high-risk securities because expected returns do not overcome inherent risks (Hassan, 2013).

Efficient Frontier

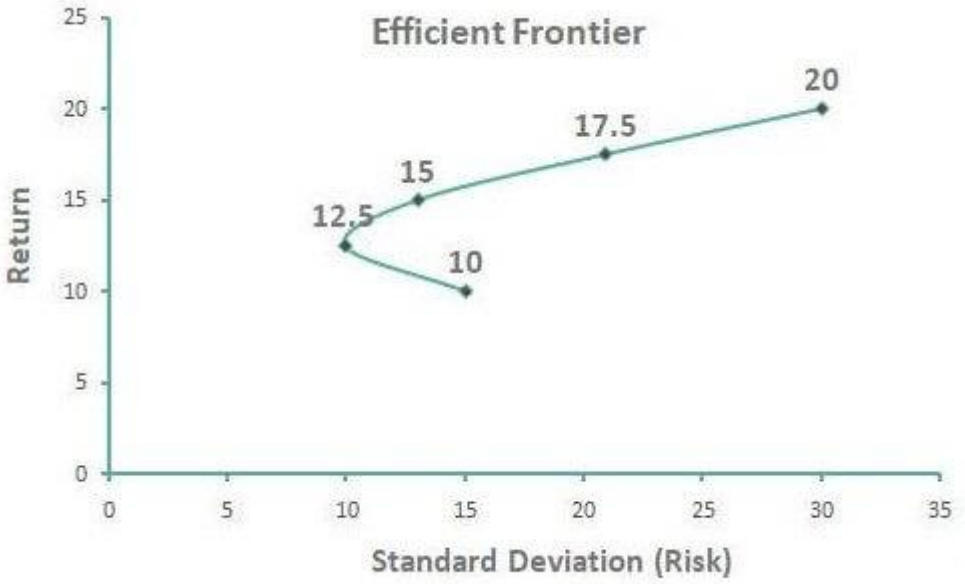

Figure 2. Efficient Frontier

The graph represents CAPM and portfolio construction and this represents a trade-off between risk and returns in a portfolio (Jordan, Miller & Yuce, 2008). Risk and

return have to be balanced off as extremity could be detrimental to investment. All points on or very close to the frontier line indicate positions of shares that can be selected for a portfolio with good returns for comparatively fewer risks (Jordan et al. 2008).

An investor analyses risk and returns that are offered by shares in a potential portfolio; all the risk-return points are plotted on a line that goes through all upper points and this line is the efficient frontier. It shows a combination of shares that offer higher returns for relatively less risk. All securities on the line or close to the line are selected for investment (Hole, 2014). There is no better position on the line; all this is dependent on the requirements or risk appetite of the investor. An older risk-averse investor, for example, may choose low-risk securities, like bonds, while young investors prefer the securities market, where they do a buy-hold strategy anticipating a higher return in the longer term (Hole, 2014).

Assumptions of CAPM (Fama & French, 2004)

CAPM is based on the following major assumptions:

- Investors hold diversified portfolios as a result seek returns on systematic risks because the unsystematic risk is eliminated.
- Investors can borrow and lend at a free rate of return.
- All securities are correctly priced, because of being in a perfect market, but for this to hold there must be no taxes, and no transactional costs as well as many buyers and sellers who are rational and risk-averse and also have the same expectations and freely available similar information.

Critics of CAPM

The model is criticised for its assumptions that are viewed as an oversimplification of reality but like in any theory assumptions are important in understanding critical concepts. Some assumptions held by proponents of the model are: Investors are risk averse; there is a belief that investors make risk-calculated decisions, implying they analyse all aspects of a potential investment, including risk analysis resulting in investing in assets on the efficient frontier to maximise returns while minimising risks; all investors have similar expectations, meaning that all investors expect the price of a share to be a result of all known information about the share and they assume

share return behaviour should be understood similarly by all participants since they have access to the same information (Muchechevu, 2012). Sigman (2005) supports this by saying that there is an assumption that covariances, variances and average returns of shares are known by market players. Essentially, critics of CAPM hold that investors are a diverse group of individuals with varied business acumen, experience and expectations. So, to assume homogeneity is a gross oversimplification of reality.

The model assists investors in setting a benchmark for the required return they would want. The inclusion of beta as a measure of risk implies that investors must consider their level of risk aversion before buying, and if they buy, then a risk premium needs to be factored in for those shares that are riskier, as investors make decisions and trade on the stock exchanges that in turn influences the price of the stock and subsequent returns. Empirical research on the usefulness of the model was criticised by Ball (2009) as cited by Njuguna (2017) who explains that CAPM considered only beta as a risk factor and that the beta is not easy to measure. The Fama-French three-factor model made a better alternative. As a result of the prominence of CAPM, researchers studied how it compared to other market determinants, like multiples and no convincing evidence of its superiority in predicting that share returns were established. The inability of the capital asset pricing model to explain the cross-section of returns has led to the exploration of alternative factors in pricing assets, for example, Augmented CAPM, Arbitrage Pricing Theory (APT) and many others.

2.2.8 Arbitrage Pricing Theory (APT)

Using the concept of CAPM, Ross propounded the APT. CAPM hinges based on the covariance of asset risk relative to market portfolio risk (Fama & French, 2004). The APT model presents several other macroeconomic variables that contribute to the riskiness of the asset, and these include but are not limited to inflation, interest rates, industrial production, consumer sentiments and other similar variables. When practically applied, the model does not specify which variable to use; the user chooses the variables they want to use and works out a model based on the specific selected factors.

APT models are as follows (Zubairi & Farooq, 2013):

Equation: 2.3

$R_i = \quad E(R_i) + \beta_{i1}\delta_1 + \beta_{i2}\,\delta_2 + \ldots + \beta_{in}\,\delta_n + \varepsilon_i$

Where:

R_i = Actual (random) rate of return of an asset i

$E(R_i)$) = Expected return on asset i

δ n = Common factor with a mean-variance that influences returns on all assets

β_{in} = Sensitivity of asset *i* to factor *n*

ε_i = Random error term unique to asset i

In line with the assumption of zero arbitrage profits, the above equation culminates in the APT model:

Equation: 2.4

$E(R_i) = \lambda_0 + \quad \beta_{i1}\lambda_1 + \beta_{i2}\lambda_2 \quad + \ldots + \beta_{in}\lambda_n + \eta_i$

Where:

λ_η = The risk premium related to an *n* factor

λ_0 = Expected return of an asset with zero systematic risk

β_{in} = Sensitivity of asset *i* to factor *n*

η_i = Error term for asset *i*

Much as APT propounds that identical assets have similar prices, in reality, it happens that assets are mispriced. In this situation an investor buys a cheaper asset in one market and sells to a different one at a higher price, thereby making a risk-free profit (Sun & Zhang, 2001). This scenario does not happen in perpetuity because the market quickly auto-corrects until prices are the same in all markets.

While APT is superior to CAPM because of the application of various risk factors, it has a weakness in that it does not explicitly specify specific macroeconomic variables to use (Hassam & Awais, 2015). This leaves the user to decide on factors

to use resulting in a lack of comparability of results where different factors have been used.

Several studies were done across the world to ascertain the effectiveness of APT in predicting share returns.

Assumptions of APT

The theory holds the following key assumptions:

- Asset returns are affected by systematic risk factors, and unsystematic risks are eliminated upon the diversification of portfolios.
- Well-diversified portfolios do not create arbitrage opportunities.

The purpose of APT in the study is to provide a basis for determining expected returns on a portfolio of assets.

2.2.9 Augmented CAPM (ACAPM) / The Liquidity LCAPM (LCAPM)

Following criticism of the CAPM developed by Sharpe (1964) and Lintner (1965) Fama and French (1993) introduced the Augmented CAPM. The aim was to improve on the weaknesses of the Sharpe and Lintner model. Liu (2006) argues that a share's liquidity is a critical aspect for big international investors. If a security is illiquid it poses risk to the investor as it would be difficult to sell, and this subsequently affects its price and returns. The illiquidity of securities markets is prevalent in developing and emerging markets because of limited market participants. At the beginning of the 21st century, several studies were conducted on finding the impact of illiquidity on emerging markets.

In ACAPM, the expected return of a risky portfolio *p* is postulated as being a function of the following variables: the premium return from a market portfolio, R*m* - R*f;* the difference between the return of a big firm and small firm size shares, SMB; the

difference between the return of and high and small liquid stock and illiquidity (ILLIQ). β_p and S_p are factor sensitivities in the regression (Hearn, 2010).

Therefore, the excess expected return of the share of emerging markets using ACAPM is expressed as:

Equation: 2.5

$$E(R_p) - R_f = \beta_p [E(R_m) - R_f] + S_p E(SMB) + S_p E(ILLIQ)$$

Where

R_p : denotes portfolio return

R_f : denotes risk free return

β_p : denotes the beta of the portfolio

R_m : denotes the market return

S_p : denotes the risk sensitivity of the factor

SMB : denotes the market size of the sector

ILLIQ ; denotes liquidity of the market

The above formula denotes excess expected return has to be added to traditional CAPM resulting in expected return that incorporates the illiquidity of the market and market size. The model that incorporated both liquidity and stock size proved superior to both the CAPM and Fama-French models in African emerging markets. Such development to CAPM means that the cost of capital and expected return on shares can be explained by a plethora of market variables. The model is also based on efficient markets, which means it is linked and complements assumptions of the EMH (Hearn, 2010).

2.2.10 Random walk hypothesis (RWH)

The RWH postulates that share prices move randomly and it is, therefore, not possible to predict future prices in the long run. Past trends cannot be used to predict future prices according to this theory (Erdos & Ormos, 2009). Fama (1965) indicates

that there is no guarantee that share prices will move in the same direction as the precedent day. RWH assumes that; share prices randomly move independently of each other, past prices cannot be used to predict future prices, it is thus impossible to make superior gains in the market all the time without assuming additional risks and that investment advisors do not add value to an investor's portfolio (Mehmood et al., 2012).

The theory hinges on two distinct premises – one economic and the other statistical. The economic premise holds that security markets operate based on full information to the investors and, therefore, are efficient to ensure that no super profits can be made. The statistical premise argues that security price changes are dependent on random risk events, which are independent of each other. A good example is the 9/11 incident – no one would have envisaged it the day before it happened, and that harmed global share prices. Thus random share prices happen as a result of many market participants using unexpected information and events previously unforeseen. This is supported by Malkiel (1998) who says that the logic of random walk is that information flow is not curtailed, and reflects share prices today; tomorrow's prices will be determined by tomorrow's news, both such news being independent of each other.

Evident from the analysis of RWH is that securities do not move randomly without any outside influence but the behaviour of markets after receiving news influences the new equilibrium price of the share, resulting in random fluctuations that make it difficult for anybody to predict the future direction.

RWH is opposed by technical and fundamental theories. The technical theory hinges on the view that history repeats itself while the fundamental theory views security as having an intrinsic value based on its earning potential. RWH argues that numerous buyers of security cause the values to randomly move around their intrinsic value resulting in a lack of clear predictability (Chitenderu et al., 2014).

The model used was modified from that of Box-Jenkins (1986) specified as below:
Equation: 2.6

$$\mathrm{ALSI}_t = \alpha_1 \mathrm{ALSI}_{t-1} + \alpha_2 \mathrm{ALSI}_{t-2} + \cdots + \alpha_p \mathrm{ALSI}_{t-p} + \theta_1 \varepsilon_t + \theta_2 \varepsilon_{t-2} \ldots + \theta_q \varepsilon_{t-q} + \varepsilon_t$$

Where;

ALSI_t= All Shares Index in the current period t

ALSI_{t-1}= All Shares Index of the previous period

θ = moving average parameter

ε_t = error term

P = the number of autoregressive terms and,

q = is the number of moving averages

The formula indicates that the overall movement of aggregate share values of listed companies is a function of all the variables stated in the formula.

RWH generally agrees with EMH in that it is not possible to outperform the markets, however, the EMH gives specific explanations on how the existence of many market partakers brings about efficiency in pricing and less manipulation by players.

2.2.11 Efficient Market Hypothesis (EMH)

Samuelson and Fama (1960) developed the EMH theory which propounds that the price of securities reflects available information and is thus correctly priced. The theory is premised on the competitive behaviour of profit-seeking role players who through their trading interactions influence prices to be rapidly and continuously adjusted as new information becomes available (Phiri, 2015, as cited by Jawadi, Bruneau, and Sghaier 2009). EMH is closely linked to the RWH in that they are both based on market efficiency. Making abnormal profits is by chance in efficient markets. In the modern world, it should be even harder to beat the market, because of available information from a plethora of media platforms.

Assumptions of an efficient capital market (Correia et al., 2015)

EMH is based on the following major assumptions:

- A large number of market players whose sole aim are to make profits and participate independently of each other. There is no collusion, and they use information independently available and interact in manners they deem fit for their financial gain.
- New information randomly and independently comes into the market. There is thus no anticipation of events.
- Security prices quickly respond to new information through the interaction of profit-seeking participants.

Forms of Efficient Market Hypothesis

EMH is viewed in three forms which include the weak form, the semi-strong form and the strong form (Correia et al.2015).

The weak form contends that share prices follow a random walk based on all information contained in past prices of shares, implying it is not possible to predict future share prices. Using charting techniques to outperform the market is not possible according to the weak form.

The semi-strong form proclaims all available public information about a share is immediately priced in the security value; it is not possible to use fundamental analysis to outperform the market. Investors constantly search for strategies to outperform the market and there is a continuous debate among academics and other interested players on investment strategists.

The strong form holds that the use of privately or publicly available information cannot be used to outperform the market, implying even with inside information, it is not possible to make excess profits.

In all these forms the emphasis is that no market player can make super profits by outperforming the market. For all practical purposes, the strong form remains an ideal position for fair market operations but it lacks practical reality. In any market set-up, there will always be a small group of people who will be privy to information before it is made public and such would be senior managers, auditors and

executives of a company through the availability of inside information. Such information can be secretly available to them even for a very short time, but this can still be used for their financial gain. Testing the strong form is also difficult because of the secrecy of insider information (Barnes, 2009).

Like any cognitive theory, it endured criticisms from psychologists and behavioural economists who argued that its assumptions do not conform to the rationality of human behaviour (Chitenderi et al. 2014). EMH is popular for assuming that it is impossible to outperform the market; especially in widely trading stock markets EHM contradicts fundamental and technical analysis theories that use geometric patterns and accounting metrics to determine the intrinsic value of a share (Correia et al. 2015).

There are, however, critical views about the EMH, in general, as Grossman and Stiglitz (1980) argue that it is impossible to have a perfectly efficient market. Accordingly, securities markets would collapse if investors were not compensated for the cost of gathering information. There is a belief that it is the magnitude of inefficiency that encourages investors to expend on information gathering and subsequently earn profits, Marozva (2017). Grossman (1976) Grossman and Stiglitz (1980) and Malkiel (1998) argue that the proclamation of an efficient market does not exist in real experiences but an oversimplification of reality. The same authors opine that information is expensive, so it cannot be available to everyone in the same quantity and quality. Only those well-resourced are at an advantage (Njuguna, 2017). Such a notion makes investors and other interested parties seek ways of understanding market dynamics.

An important concept related but contradictory to EMH is share price mispricing. Mispricing is the difference between the share price and its fundamental price (Lo, 2007). Proponents of EMH believe that all markets are efficient and, therefore, all share prices reflect their fundamental value, yet the concept of mispricing is real from time to time (Lo, 2007). All this mispricing happens because of random and unpredictable market errors (Brennan & Wang, 2007). Hou and Moskowitz (2005) are documented by Brennan and Wang (2007) where it is stated that mispricing can be caused by a delay in assimilating new and fundamental information that affects the share market price. Liquidity of the share is another factor Brennan and Wang

point to as contributing to mispricing. To maximise their wealth, investors constantly look for shares that are mispriced by holding onto under-priced shares and selling overpriced ones (Brennan & Wang, 2007). Financial analysts use metrics to identify shares that are mispriced. This is done by relating the price of a share to fundamental financial data. Such metrics are P/E, P/B, and EV/EBITDA, among others (Lo, 2007).

Despite a modicum of criticism against EMH, it helps explain the movement of share prices and their behaviour which is useful for investor decision-making.

2.2.12 Fama and French's three- and five-factor models

These are models developed following the criticism of CAPM and they involve the incorporation of some macroeconomic variables that influence share prices.

2.2.12.1 Fama-French three-factor model (FF3FM)

Following the shortcomings of CAPM (the major being the use of only one factor – market risk denoted by beta) in research and practice, the 3-Factor model was developed by Fama and French (1993) and this added two more risk variables, book-to-market equity (BE/ME) and company size measured by market capitalization. The selection of these additional factors was related to economic fundamentals (Steffen, 2017). The three-factor model brings a multifactor perspective that adds to Merton and Ross's one-factor focuses on sensitivity to the market. The multifactor model is richer as it factors in many sources of diversifiable risks.

High BE/ME equity signifies lower share market prices compared to book values, an indication of low earnings from assets. Lower BE/ME is connected with high profitability. The size seemed to be related to profitability. As BE/ME was controlled, results indicated that smaller firms had lower earnings on assets than bigger ones. Research conducted during the 1980s' economic depression proved that bigger firms posted good results while smaller ones performed badly (Fama & French, 1995; Steffen, 2017).

Evidence that average share returns are related to BE/ME equity ratio is explained in the dividend discount model, which says that share price is the present value of expected dividend per share. From this supposition, it can be deduced that if two firms have the same expected dividend but different share prices then the share with a lower value has higher expected returns (Steffen, 2017).

FF3FM equation:
Equation: 2.7

R_{it} - R_{ft} = a_i + $\beta_i(R_{mt-} R_{ft})$ + $s_i\, SMB_t\; h_i\, HML_t\; e_{it}$

Where;

R_{it} = Return on portfolio *i*
R_{ft} = Risk-free rate
R_{it} - R_{ft} = expected excess return on market portfolio
$s_i\, SMB_t$ = Expected return on the mimicking portfolio for the size factor
$h_i\, HML_t$ = Expected return on the mimicking portfolio on the BE/ME risk factor.

Probably motivated by an insufficient explanation by FF3FM, additional risk factors were sought, and this led to the coining of Fama and French's Five-Factor Model (FF5FM).

2.2.12.2 Fama and French's Five-Factor Model

Novy-Marx (2013) and Titman, Wei and Xie (2004) produced evidence that the FF3FM missed a lot of variation connected to profitability and investment (Fama & French, 2014). The two factors of profitability and investment were added to the FF3FM to make it FF5FM.

The FF5FM is as follows:
Equation: 2.8

R_{it} - R_{ft} = $a_i + b_i(R_{Mt}$ - $R_{ft})$ +$s_i\, SMB_t + h_i\, HML_t + r_i\, RMW_t + c_i\, CMA_t + e_{it}$

Where;

b_i, h_i , s_i , r_i *and* c_i are co-effificients of the five factors.
$(R_{Mt}$ - $R_{ft})$ = Market premium
SMB = The difference between small and big firms in terms of market cap.
HML = The difference between returns of portfolios with robust and weak profitability
CMA = The difference between returns of portfolios of stocks of low and high-investment firms
e_{it} = Error term

The FF5FM as an improvement of the FF3FM does not seem to be the final model in the Fama and French model refinement. Other models like the FF6FM and FF7FM and FF8FM seemed to have been added to this refinement trajectory but this research ends with the five-factor model.

All these theories and models aim to explain securities' required rate of return as well as related risks. From the understanding of risks and returns, market multiples add another dimension of knowledge to assist investors in how market multiples can be studied and used to predict future share returns for successful investment endeavours.

2.2.13 Multiples

Smith (2019) propounds that multiples are a generic term for a class of indicators used to value a share. The author further indicates that valuation takes place through comparative analysis of shares in the same industry, where an average industry multiple is used as a multiplier to establish the value of an unknown share. Other than for valuation purposes, multiples are also used for predicting share returns as they act as an impetus for market sentiments, and thus influence share returns. Popular price multiples are Price-to-Earnings (P/S) Price-to-Book (P/B) and Price-to-Sales (P/S) and Price-to-Cash Flow (P/CF). Enterprise Value to Earnings Before Interest, Taxes and Amortisation (EV/EBITDA) is also gaining popularity. All these

multiples will be studied in this research and are also known as price multiples. A price multiple is defined as a ratio that compares some sort of money flow or value to a security (Ping-fu & Kwai-yee, 2016). Market players use these ratios in share-buying and selling decisions. Decisions made relate to whether to buy or sell when the price is high or low (Nel, 2009).

2.2.13.1 Price-to-Earnings (P/E) ratio

The ratio indicates the relationship between the company's share price and earnings per share (Correia et al., 2015). It has been extensively used by investors and securities analysts to choose shares to buy; it became popular because, it is easy to understand and compute (Fun & Basana, 2012). Essentially, the ratio indicates how much investors are prepared to pay per unit currency of earnings. P/E ratios are categorised as high or low, through comparison with peer companies. Low P/S companies are regarded as value firms and offer high returns while high P/E are considered to have good growth prospects (Dayag & Trinidad, 2019).

The Price-to-Earnings ratio shows a share's value based on the current and subsequent profits of a company. A fairly valued share's P/E should justify its price, the reality, however, is that most shares are either undervalued or overvalued and this allows investors to make super profits at least in the short term (Terzo, 2022). In the long run, prices autocorrect as more market players participate, resulting in market efficiency. Githinji (2009) maintains that according to Fama and French (1970), markets efficiently reflect information about the value of shares. The efficiency of markets is categorised in three forms viz weak, semi-strong and strong. In the weak form, prices of securities reflect historical information. In the semi-strong, historical information and information available to the public are reflected, whereas in the strong form historical, public and private information is reflected. P/E is also used the valuation of shares in corporate transactions that involve buying and selling of firms (Dayag & Trinidad, 2019).

Apart from being used for share valuation, the ratio is also used to establish the extent of confidence the market has about a firm or industry (Pike & Neale, 2003, cited by Victoria & Yue, 2013: 32). The positive confidence measure would mean

that investors buy the share, which action would further increase the value of the share. The P/E ratio can arguably be used to predict the volatility of the share price as well as returns. Previous researchers established that a low P/E ratio yields higher returns (Victoria & Yue, 2013: 41). Low P/E means that the share price is low and as the company improves its performance, investors who bought while the share price is low would thus realise higher returns.

From the above arguments, there is a majority consensus that Low P/E produces good returns, however, there are contradictory indications, and because of the geographic limitations of the scope of the research, there is a need to carry out further research.

Three major types of P/E ratios (Penman & Zhang, 2004)

Training P/E = Price per share/most recent annual earnings
Rolling P/E = Price per share/some of EPS for the most recent four quarters
Forward or Leading P/E = Price per share/forecast of next year's EPS

While the merits of the P/E ratio are that; it is easy to compute, the information needed is readily available and it can be easily used to value unlisted companies, its setbacks are that it uses historical data and that different organisations normally use different accounting policies resulting in different methods of calculating earnings (Correia et al. 2015). Another demerit of the ratio is that it cannot be used for a loss-making company as the earnings would be negative

2.2.13.2 Price-to-Book (P/B) ratio

This is the market price of the share to its book value as indicated in the books of the company (Correia et al. 2015). The ratio indicates the number of times investors are willing to pay for a book value of a share. A higher ratio indicates positive investor sentiments, in anticipation of future growth owing to favourable opportunities and reduced risks. Gitman et al. (2010) concur by saying that companies that post good profits increase their market share and have products and services accepted by the market and realise good returns as compared to their peers in similar market risk.

The ratio has been used to value the company's shares and guide stock selection (Ping-fu & Kwai-yee, 2016).

P/B signals a company's value. It gives information to external interested parties about the governance of a company. A high P/B informs investors that the company is a good investment and is thus encouraged to invest in the company (Bustani et al., 2021). It is essential to realise that investors are not only attracted to shares with high P/B but also to those with low P/B depending on their investment strategy. Preference for shares with low P/B signifies value investing. These are under-priced, so they are relatively cheaper to buy and they tend to pay higher dividends (Steyn, 2019). The opposite of value investing is growth investing; this is where the P/B ratio is high (Bunting & Bernard, 2015, as cited by Steyn, 2019). Growth value investors believe that these shares will continue to appreciate so that upon selling they realise higher capital gains. This investment strategy is risky if growth does not happen (Chen, 2018, as documented by Steyn, 2019).

It is important to note that P/B ratio shows great prominence in company valuation analysis (Shittu et al., 2016). Shittu et al. (2016) reveal this prominence through the narration of many studies done across the world that showed a positive correlation between P/B and share returns.

The P/B ratio has several disadvantages. The main shortcoming of the ratio is that it is mainly suitable for capital-intensive companies but not suitable for service-rendering businesses and highly leveraged businesses (McClure, 2019). This is because capital-intensive firms have many assets recorded in their books and the use of these assets in producing revenue also affects the prices of shares, whereas service-rendering business revenue generation hinges on the expertise and positive culture of its employees which are not recorded as assets (Marunga, 2000). Highly leveraged firms have assets that are financed through debt and the value of the firm is eroded through high-interest payments, so any positive signal reflected by the ratio is taken away by an interest expense.

Book values are also affected by the accounting decisions of the individual firm, for example, the depreciation policies of companies might differ resulting in different

book values. So it is difficult to compare firms even if they appear similar in many aspects, (Marunga, 2000, documenting Elton and Grober's, 1981, assertion).

2.2.13.3 Price-to-Sales (P/S) Ratio

The ratio was introduced in 1984 by Kenneth Fisher in his book -*The Super Stock*. Fisher is a scholar and investor and, as a result the ratio quickly gained popularity. The notion advanced was that the ratio was an accurate indicator of a share's popularity. It was argued that the sales value in the ratio was more stable and robust compared to earnings which can fluctuate from one reporting period to the other because of a plethora of other variables (Gevers & Correia, 2014). The P/S ratio indicates how much per rand of sales an investor is willing to pay. Although shares with high P/S are popular with investors they usually do not earn higher above-average returns because of relatively higher share prices. On the other hand, low P/S shares can earn higher returns if the firm increases its performance which results in higher sales and sales (Vruwink et al. 2007).

The ratio is obtained by dividing share price by sales per share; it can also be found by dividing the market capitalisation of the firm by sales value in the most recent year (Gevers & Correia, 2014). The ratio is mainly used for companies that have good growth in sales but making losses. New companies use this ratio as they would normally be making losses (Correia et al., 2015) because of a small market share. Companies making losses would not have earnings, so the P/E cannot be used. P/S thus became popular during the 1990s during the rise in technology and internet firms (Gevers & Correia, 2014). Vruwink et al. (2007) support this assertion by saying that the ratio became useful in the last three decades because of the rise in intangible assets, such as intellectual capital, which is not reflected on company balance sheets, examples include the expertise of employees, organisational processes and all knowledge contained in the company. The effect of these intangible assets is reflected in the income statement through increased revenue and hence P/S ratio is the only ratio suitable for measuring the effect of intellectual capital. Microsoft and Cisco Systems are examples of companies that have developed considerable amounts of intangible assets and these have given these

companies business competitive advantage. They are however not allowed to record these intangible assets unless bought from other businesses (Vruwink et al. 2007).

Loss-making firms aim to increase sales to be profitable, so if the P/S continues to decrease then the company would be increasing their revenue. That is a positive metric. The ratio is used to find the value of shares of comparable companies as well as analysis of the security market performance (Bodie et al., 2002; Akhtar & Rashid, 2015).

A noted disadvantage of P/S is that a seemingly high sales amount is not an indicator of value or wealth created unless it is augmented by superior earnings and dividend values (Gevers & Correia, 2014). This is because a company can have good revenue but if it does not effectively contain its costs, for example, value is destroyed.

A modified P/S was crafted and this included the use of using the ratio with profitability because the ratio does not include earnings which is an important company valuation metric. This adjusted P/S involved decreasing or increasing (depending on each firm's circumstance) the ratio by the percentage of profitability (Vruwink et al. 2007).

Despite some demerits of the P/S, studies that compared the ratio with other ratios, indicated that it provides useful decision-making for investors, for example, a study by Barbee et al. (1996) concluded that firms with low P/S outperformed those with low P/B (Pung-fu & Kwai-Yee, 2016). This result supports the usefulness of the P/S ratio in investment decision-making.

2.2.13.4 Price-to-Cash Flow (P/CF) Ratio

Cash flow is divided into different categories viz; Free Cash Flow (FCF) and Cash flows reflected on the financial statements of a firm, which are further categorised into Operating, Investing and Financing cash flows. This study will focus on Free Cash Flow, so the theoretical exposition will only be on FCF.

Price-to-Cash Flow ratio is obtained by dividing the price of a firm's share by its cash flow per share (Pinkasovitch, 2019). As there are different types of cash flows, it is important to specify on which type the ratio is premised and consistency needs to be maintained in all analyses for meaningful comparability. A low P/CF is preferred because it indicates that a firm is generating enough cash to support its operations. In some circumstances, high P/CF can be accepted if there are prospects of growing revenue in the shorter to medium term. Meaningful analysis and a desirable conclusion are derived in context. A major strength of the metric is that it is comparatively not manipulated like the P/E and P/B ratios (Akhtar, 2020) whereas its major demerit is that it can be calculated in different ways. The analysts must know the type used and that consistency was maintained (Fatema et al. 2017).

2.2.13.5 Price-to-earnings before Interest, Taxes, Depreciation, & Amortisation (P/EBITDA) ratio

The ratio is obtained by dividing Enterprise Value (EV) (comprised of equity + debt + Preference shares – Cash) by earnings before interest, taxes depreciation and amortisation. This is similar to dividing share price by EBIDTA per share. In short, the multiple is referred to as Enterprise Multiple (EM).

The concept of enterprise value is important as it is more than just market capitalisation (Kukaj & Ahmeti, 2016). Throp (2010, cited in Kukaj & Ahmeti, 2016) notes that EV is the aggregation of all claims to security holders including but not limited to ordinary, preference and minority shareholders and debt holders. EM is thus an economic measure that reflects the true worth of the business and is commonly understood as the takeover value of a business, as it indicates the total value a buyer of a business has to pay to acquire the business (Kukaj & Ahmeti, 2016).

EM compares better than other multiples in some important aspects, for example, P/E, in that it can be used for firms with different capital structures as it includes the debt component. Another advantage is that EBITDA is not affected by non-operating income and thus accurately measures operating performance (Igrejas, da Silva, Klotzle, Carlos, Pinto & da Gama Silva, 2017). Damodara (2012), cited in Namira

and Nugroho, 2016) maintains that the merit of EM is that it is easy to understand and that different value components are found in financial statements. Another advantage of EM is that fewer companies have a negative EBITDA as compared to earnings, and also EBITDA is not affected by different depreciation methods, (Damodara, 2012, cited by Namira & Nugroho, 2016). In the P/E ratio, depreciation and amortisation would have been deducted and different methods can be used depending on a firm's discretion. In some instances, EBITDA can be negative and this can be a disadvantage of the ratio (Namira & Nugruho, 2016).

The use of EM in the relative valuation of companies must be used in comparable companies. Even companies in the same industry might have different fundamentals, for example, risk, growth, size and many other variables (McClure 2006, cited by Namira & Nugroho, 2016). Healthy companies normally have an EV/EBITDA of less than 10. Firms on the standard and S&P 500 currently have a mean ratio between 11 and 14. These are desired general guidelines as meaningful analysis is established after considering each firm's circumstances (Maverick, 2020).

2.3 Theoretical framework to be used in the study

This study will dwell predominantly on price multiples in an attempt to establish their relationship with share returns in the JSE Top 40 listed companies. Several empirical studies have been carried out throughout the world on these multiples discussed above and results have been inconclusive and vary in different economies. No studies have been done in South Africa. It is for this reason that the study aims to explore this gap in research regarding this phenomenon. The theoretical relationship between stock returns and market multiple is be presented in Figure 3**.** The nexus between stock returns and market multiples was empirically tested in this study.

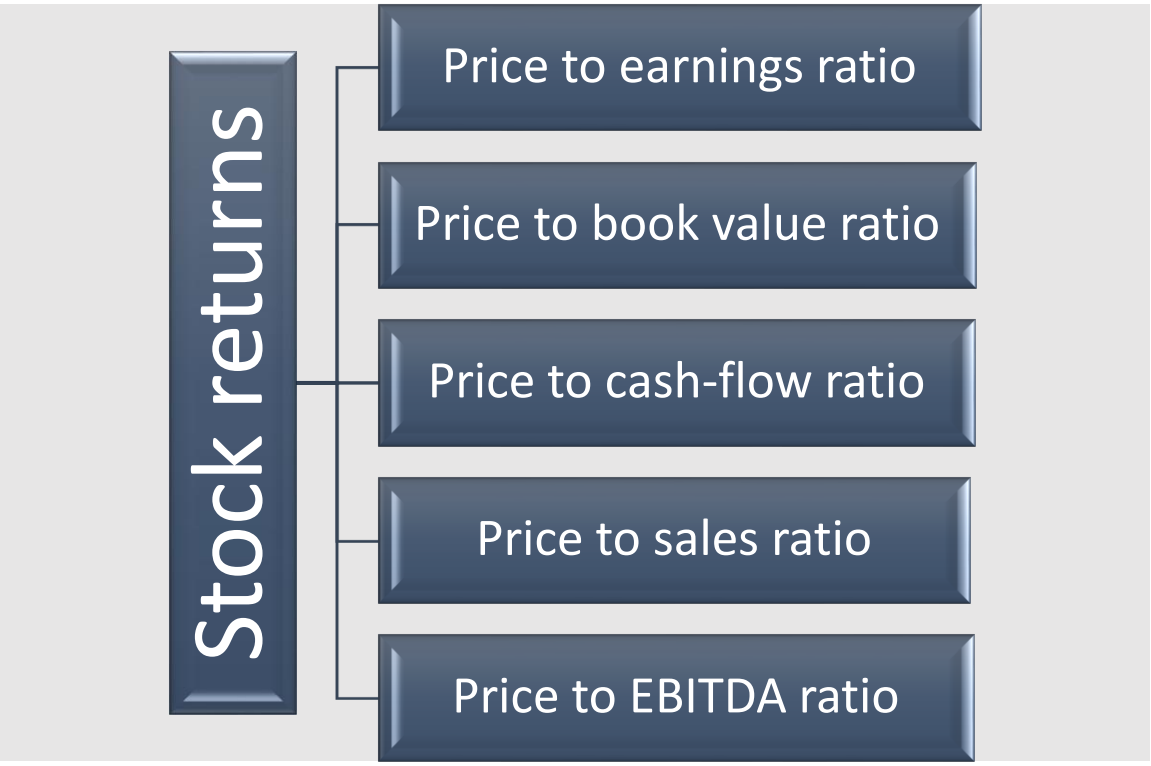

Figure 3. Conceptual framework

Source: Author's compilation

2.4 Conclusion

This theoretical literature review gives a brief exposition of the literature around the research, focusing on the definition of terms, and financial and economic theory. Chapter 3 will explore empirical literature on actual studies done by various researchers around the world and the exposition provides general guidance on how the research is to be done and an overview of expectations of the research results.

CHAPTER 3: EMPIRICAL LITERATURE REVIEW

3.1 Introduction

This chapter focuses on the actual research done on variables that influence share returns, across the world including South Africa. Variables to be explored include all those discussed in the theoretical literature review, which includes CAPM, APT, RWH, EMH and Price Multiples.

3.2 Share Risk-Related Concepts

Theory on share risk and understanding of behaviour of share prices is discussed in this chapter

3.2.1 CAPM and APT

CAPM and APT are often used to measure the potential of securities to yield returns. CAPM preceded APT and the latter is slowly gaining popularity. A single risk factor is considered in CAPM, while APT argues that a return is a linear function of several risk factors (YilmazMubben & Balut, 2015). APT was introduced because of the inadequacy of CAPM. Several pieces of research have been done to find out the effectiveness of these two variables, some comparing the two and others studying them exclusively. CAPM has been widely used a couple of decades ago, mainly in developed markets and to a limited extent developing ones (Dhankar & Singh, 2005).

Makherji and Lee (2013) carried out a study in the standard and poor 100 based on the notion that multiples of these big firms should indicate efficient prices of their shares. It was largely established from the study that expected returns are correlated to expected returns indicated by CAPM but also significantly related to other variables such as multiples (Makherji & Lee, 2013). It was further established that 31% of analysts concur with CAPM, implying that they believe that other variables

have more explanatory powers (Makherji & Lee, 2013). On the contrary, Bruner, Eades, Harris, and Higgins (1998) argue that 80% of US companies used CAPM to establish the cost of capital according to Mekherji and Lee, (2013) implying that share returns are positively correlated to the risk factor (beta) as postulated by CAPM.

Extensive research on APT was done in the US according to Dhankar and Singh (2005). Factor analysis was used by Roll and Ross where up to five factors were used. Other researchers such as Dhrymes, Friend and Gultekin indicated that risk factors increased depending on the securities being studied and that researchers used their discretion to choose the factors. Sharpe discovered that factors such as firm size, dividend yield and sector membership yielded more explanatory power (Makherji & Lee, 2013).

Yilmaz et al. (2015) narrate two studies done by Iqbal and Haider (2005) as well as Mohammad, Naqvi and Lal (2012). The former investigated the relevance of APT on 24 stocks listed on the Karachi Stock Exchange from 1997 to 2003. Factors found to have explanatory power were anticipated and unanticipated inflation, market index and dividend yield. The latter researchers investigated the reliability of APT in the same stock exchange and it was established that quasi-money related inversely with KSE 100 returns, while the gold price and inflation were insignificant. In 2006, Xi Yang and Donghui investigated the validity of CAPM in 100 companies listed on the Shanghai Stock Exchange. In agreement with CAPM, the study showed that share returns revealed a linear relationship with their betas, however, the slope and the intercept were not zero as per CAPM, contradicting the importance of market premium in the regression (Zubairi & Farooq, 2012). A similar study on the validity of CAPM was done by Grigoris and Stavros in 100 firms quoted on the Athens Stock Exchange; the results were the same as the Shanghai Stock Exchange as alluded to by Zubairi and Farooq (2012). Another study that concurred with CAPM was done by Conegarati (2008) in terms of returns, beta linearity and zero intercepts.

Dash and Rao (2009) collected data from fifty high-performing companies in India to study the validity of CAPM and APT as well as investigate the relationship between

share returns and macroeconomic variables. The results revealed that APT was superior in explaining share returns compared to CAPM.

What becomes evident in these empirical studies is that where CAPM and APT are compared for explanatory and predictive power, APT performs better.

3.2.2 Random Walk Hypothesis (RWH)

RWH is a financial theory that states that prices of shares cannot be predicted as securities move randomly responding to financial information and events. The randomness of share prices makes it difficult for market players to outperform the market and yield abnormal profits (Mehmood, Mehmood & Mutjaba, 2012).

Many studies have been carried out by many researchers to find out how various markets respond to the concept of RWH. Broadly, results indicated that developed markets are relatively efficient and compared better to the developing ones as they exhibited robust randomness, consistent with the theory.

Erdos and Ormos (2009) conducted a variance test based on non-parametric methods to investigate the extent of RWH in the art industry in the US from 1935 to 2008. Findings before 1935 did not concur with RWH but after 1935, there is a semblance of concurrence with the theory. According to Erdos and Ormos (2009), the trend after 1935 could be attributed to institutional changes in the art industry after World War 2.

In their literature review, Chitenderi et al (2014), write several studies done in both developed and developing economies. Klenman (2008) did a study on the existence of RWH in Europe, Asia and North America. Data used was from 1973 to 1997. The Phillips-Perron unit root test and Cochran variance tests were used. The outcome was that all the markets that were studied exhibited RWH and a further test they conducted using non-parametric runs had a similar result (Chitenderi et al., 2014). In another study, Hungary, Dockery and Vergari (1996) used the homoscedastic and heteroscedastic error variances of the variance ratio tests in the Budapest Stock

Exchange from 1991 to 1995 where evidence of RWH was found (Chitenderi et al. 2014). Chitenderi et al. (2014) further refer to two other investigations done in Zimbabwe and Bangladesh both of which are developing economies. Sunde and Zivanomoyo (2008) applied the DAF unit root technique to test RWH from 1986 to 2006. The findings of the study indicated that shares in the Zimbabwe stock exchange (ZSE) did not follow the random walk. The Bangladesh study was done by Sharmin and Charity (2011) and their results were also not consistent with the random walk hypothesis (Chitenderi et al., 2014).

Literature review presented by Chitenderi et al. (2014) also explores several studies done in South Africa and these studies showed mixed results. Studies that opposed the RWH include those done by Jammine and Hawkins (1974), Mabhunu (2004) and Cubbin et al. (2006), while studies undertaken by Jefferis and Okeahalam (1999), Smith et al. (2002), Hamman et al. (2006) and Smith and Rodgers (2006) concurred with the RWH.

Chitenderi et al. (2014) carried out an empirical study on the Johannesburg Stock Exchange (JSE) to investigate evidence of RWH. Autocorrelation and root unit tests were applied on data from the All Shares Index (ALSI) from 2000 to 2011. Results indicated that ALSI agrees with RWH.

Collectively all these studies show mixed outcomes and this creates further room to continue studying the concept of RWH, especially in emerging markets

3.2.3 Fama and French's three-factor model

A plethora of research has been carried out to show the effectiveness of FF3FM. Steffen (2017) highlights some studies carried out by various researchers on comparing CAPM and FF3FM in explaining average share returns in many countries across the world. Fama and French (2004) carried out a study of NYSE and NASD to establish differences in risks and returns using FF3FM. These studies revealed mixed results but largely FF3FM offered more explanatory power.

Chiu and Wei (1998) tested CAPM and FF3FM on Pacific-Basin emerging countries. It was discovered that in all these economies CAPM did not sufficiently explain returns. BE/ME equity proved to be effective in Hong Kong, Korea, Malaysia, Taiwan, and Thailand while size could not give enough explanation in Taiwan (Steffen, 2017).

In the NYSE stocks, Blanco (2012) tested CAPM and FF3FM where six different portfolios were tested according to size and BE/ME equity using time series regressions and it was noted that FF3FM outperformed CAPM. Results, however, varied depending on the portfolios created (Steffen, 2017).

Aguenaou et al. (2011) studied the Moroccan stock market in 2011 to test the effect of size and value as a measure of BE/ME equity. Data from 48 firms were collected from 2005 to 2009. It was found that high BE/ME shares performed better than low BE/EM ones which further agrees with the Fama and French model. Results on returns of firms indicated that smaller firms earned fewer returns than bigger ones and this is not in line with FF3FM. The research concluded that FF3FM does not hold in Morocco. The explanation for the contradictory results was that the Moroccan securities market is illiquid in the smaller firms, with low capitalisation.

Fama, French, Booth and Sinquefield (1993) investigated the reasons for differences in risks and returns in the NYSE and NASD. NYSE was found to have higher returns than NSAD of similar size. It was established that NYSE was compensated for higher risks. NYSE firms are distressed as measured by their BE/ME equity ratios. Analysts argued that the differences in returns were attributable to liquidity factors, as NYSE trading costs are higher than NSAD costs; hence investors sought a premium return to compensate for higher costs (Fama et al., 1993)

3.2.4 Market Multiples

3.2.4.1 Price-to-earnings (P/E)

It is believed that the association between the P/E ratio and the investment performance of shares was popularised by Basu (1977) according to Ghaeli (2017).

In the study by Basu (1977), sampled shares were categorised according to their P/E size from data extracted in 14 consecutive years. The performance of low P/E shares was compared to high P/E ones. Low P/E shares performed better than high P/E ones. Basu concluded that P/E ratios contained information to be considered when making investment decisions (Van Heerden & Van Ransburg, 2015).

Arslan, Zaman and Phil (2014) investigated the effect of the P/E ratio on KSE non-financial shares from 1998 to 2009. The outcome was that the P/E ratio affected share returns. In the study, it was recommended that investors use the P/E ratio to yield abnormal returns. In a similar study, Al-Mwalla et al. (2010) studied a long-term relationship between the P/E ratio and share prices on the Jordan Stock Market and concluded that potential investors can capitalise on a lack of informational efficiencies to earn abnormal returns (Ghaeli, 2017). Another study by San Ong et al. (2010) investigated an investment strategy of predicting stock performance in terms of a fall in share prices in Malaysia in the Kuala Lumpur Composite Index (KLCI) and P/E ratios from 1994 to 1914, where there was an Asian as well as the global financial crisis, the outcome indicated that P/E provided valuable insight in the performance of KLCI, as is documented by Ghaeli (2017).

In Pakistan, Akhtar and Rashid (2015) studied the relationship between portfolio returns and market multiples. A simple random sampling method was used to select 100 firms listed on the Karachi Stock Exchange (KSE) from 2004 to 2011. Data were collected from KSE, company financial reports and Business Recorder. The results showed that there was an inverse relationship between portfolio returns and the P/E ratio in concurrence with Basu's (1977) findings. The observation was that market multiples provided more explanatory power when combined than isolated (Arkhtar & Rashid, 2015).

Some studies dwell on finding the relationship between P/E and other fundamental factors. Whitbeck and Kisor (1963) observed that trailing earnings ratios are positively correlated to future dividend pay-out and earnings per share. Senchak and Martin (1987) reported that companies with low P/E usually have low equity value (Markherji & Lee, 2013). This is plausible as a low P/E tends to have undervalued shares.

From most of these findings, it is evident that a low P/E ratio yields higher returns when compared to a high P/E. This is attributed to the lower market value of the shares as investors would have bought low-priced shares.

3.2.4.2 Price-to-earnings (P/B) Ratio

P/B is another multiple that is extensively used in investment decision-making. It depicts the ratio of the market to the book value of the share. Some authors used its inverse written as Book-to-market (B/M) but both refer to the same concepts inversely. Various empirical studies have been carried out in both developed and developing economies regarding the relationship between the ratio and share returns.

Akhtar and Rashid (2015) wrote that in the Japanese stock market, the book-to-market ratio was found to have a significant relationship in forecasting stock return, they say this as quoted by Chan et al. (1993). On the contrary, Irfan (2009) found no relationship in the ratio by researching 30 clothing companies between 2001 and 2006, according to Akthar and Rashid (2015). The ratio was found to be positively related to stock returns in the longer term but negatively related to the beta (Harris & Marston,1994, as cited by Mukherji & Lee, 2013). Fama and French (1992) also came to the same conclusion as Harris and Marston. Heerden and Van Rensburg (2015) further emphasise the usefulness of the ratio by saying that it is an indicator of firm value. This is true in the sense that where P/B is greater than one, the implication is that the market value is more than the book value as such the shares are appreciating; the opposite is true when shares are depreciating.

Bustani, Kurniaty and Widyanti (2021) investigated the effect of P/B on share prices on the Indonesian Stock Exchange in the listed food and beverages firms from 2014 to 2018. Data were analysed with bootstrapping using statistical equation modelling (SEM). The conclusion was that P/B influenced share prices and that information on the P/B ratio can be used effectively for making investment decision making (Bustani et al., 2021).

A related study was done by Marunga (2000) on the Nairobi Stock Exchange from 1991 to 1993, this was based on the relationship between P/B and return on total assets, equity and earnings per share. The result established that there is a statistical relationship between P/B and the other stated variables. Managers need to control the return on assets, equity and earnings to influence the P/B ratio and any adverse movement in these variables will affect the P/B ratio negatively (Marunga, 2000).

3.2.4.3 Price-to-Sales (P/S) Ratio

Empirical studies have been done in many countries across the world, including South Africa, to determine the relationship between the P/S ratio and share returns including the relationship with other market multiples.

After the publication of Fisher's book *The Super Stock,* two studies were done in the USA to test the validity of the P/S ratio. Researchers in the studies were Senchack and Martin (1987) and Jacob and Levy (1988), according to Gevers and Correia (2014), thereafter various studies were conducted to test Fisher's P/S strategy claim. Senchack and Martin (1987), investigated Fisher's assertion that the P/S investing strategy compares better than the P/E strategy during the period 1976 to 1984. The sample comprised about 450 companies. Results showed that low P/S shares performed better than higher P/S shares in producing risk-adjusted returns. (Gevers & Correia, 2014).

Jacobs and Levy (1988) studied , firm size, Dividend Yield, and S/P (the inverse of P/S) from January 1978 to December 1986 using generalised least squares regression. The result indicated that the S/P strategy produced superior returns at 17% above average market returns with a correlation coefficient of 0.15 (Gevers & Correia, 2014).

A study by Barbee et al. (1996) found that low P/S portfolios performed better than low P/B stocks. The three multiples of P/B, P/E and P/S were analysed by Jansen et al. (1998) for 32 days and uncovered that the average return, as well as standard

deviation of the three multiples – P/S, P/E and P/S, were almost similar. This revealed that the P/S ratio was also useful in predicting stock returns.

Suzuki (1988) carried out a study to test if P/S was a useful tool in share selection, to result in superior returns. The study was done on the Tokyo Stock Exchange from 1982 to 1994 using a portfolio analysis approach. One hundred shares with low P/S, P/E and P/B were selected. The study concluded that another advantage of P/S was that it can be used in a variety of industries and during periods of economic recovery (Gevers & Correia, 2014). P/S thus always offers the benefit of having a sales amount, unlike P/E which cannot be used when a company is making losses.

Vruwink et al. (2007) compared the performance of P/E, P/S and P/B in non-financial companies in the USA. The study determined that shares constructed on low P/S and adjusted P/S performed better than those selected based on P/E and P/B.

In a South African study, Gevers and Correia (2014) investigated the relationship between P/S and future returns of companies listed on the JSE from 2001 to 2013. A portfolio analysis approach was used to establish if P/S was a suitable selection tool. P/S was also compared with other competing variables such as Market Value (MV) Debt/Equity and B/M ratio. Like in many similar studies, P/S was found to be superior compared to the other two studied variables. Low P/S share outperformed high ones.

3.2.4.4 Price-to-Cash Flow Ratio

Akhtar (2020) documents empirical studies that were done on the P/CF ratio. Akhtar, Chan and Chen (1991) found a positive relationship between cash flow/price ratio (CF/P ratio) in Japan. The ratio is an inverse of the P/CF ratio. A similar result was documented by Barbee et al. (2008) who indicated a negative relationship between P/FC. The result is the same as the two ratios are an inverse of each other. Another study on CF/P was done by Fatima, Waqas, Hassam, Fraz and Arif (2017) in three emerging market countries (India, Pakistan and China). It was established that high CF/P outperformed low CF/P ratio.

Based on the conducted research it can be concluded that a negative relationship predominantly exists between the P/CF ratios.

3.2.4.5 Price-to-earnings before Interest, Taxes, Depreciation & Amortisation (EV/EBITDA) ratio

Igrejas et al. (2017) carried out a monthly cross-sectional regression analysis on 96 stocks on the Brazilian Stock Exchange from January 2005 to July 2013. A negative regression was found between the EM variable and share returns. This meant that stocks with higher EM yielded lower returns as compared to those with low EM (Agrejas et al. 2017).

In a similar study, Namira and Nugroho (2016) document that Longhran and Wellman (2011) conducted a study at the NYSE. The study concluded that EM greatly affects share returns. Companies with low EM exhibited high returns on the stock. This study was carried out in the non-financial sector.

Although there have been limited studies on the relationship between enterprise value and share returns, it is evident that there seems to be unanimity in that low EM share yields higher share returns.

3.3 Conclusion

This exposition of empirical studies forms the basis of this study in terms of analysing gaps created, similarities and differences in results, market patterns as well as methods used in data collection and analysis. From the exposition of literature review it can be noted that no research on a similar study as this one was ever done in South Africa, most of the studies were done in Europe and Asian markets, Marunga (2000) did a similar study on P/B in Kenya and a study in South Africa was only on P/S ratio (Gevers and Correia, 2014),so, this study is unique because it covers more price multiples. While the focus on the study was on market multiples other studies dealt with CAPM (Markherji & Lee, 2013), RWH (Mehmood et al, 2012), FF3FM (Aguenaou et al, 2011). Similar to the study Arkhar (2021), Agrejas et al. (2017) , Bustani et al, (2021) dealt with enterprise multiple.

Methodologies used in similar studies were also varied, Jacobs and Levy (1988) used OLS , Arkthar (2021) used fixed effects , GMM was used in this study. A striking similarity established in all studies on literature review and this study was that the relationship between P/E and share returns was always negative. There were inconstancies with regards to other multiples, for example, Egrejas et al. (2017) established a negative relationship while this study yielded a positive relationship between share returns and P/EBITDA. This study showed a negative relationship with P/CF similar to Arkthar (2020, Fatema et al (2017) indicated the same results in Nairobi Stock Exchange. With regards to P/S ratio Vruwink et al. (2017), Suzuki (1988) established a negative result with P/S similar to the study.

CHAPTER 4: METHODOLOGY

4.1 Research Method

The first sections deal with the theoretical background of the research method to be used, followed by practical steps in collecting and processing data in the final sections.

4.1.1 Research Paradigm

The philosophical worldview used in this research is post-positivism, specifically finding relationships between variables. Finding relationships involves a scientific approach to establishing associations related to variables. Positivist/post-positivist research holds a traditional way of doing research and it falls more under quantitative research than qualitative research (Creswell & Creswell, 2018). The research aims to be objective in finding relationships among constructs, carried out by recording and data analysis to refute or concur with established theories through hypothesis testing (Creswell & Creswell, 2018). This study employed the quantitative design.

4.1.2 Quantitative Design

The quantitative research approach involves quantifying and analysing the results of a study by using and analysing numerical data using defined statistical techniques to find answers to specific questions about a phenomenon (Williams 2011 cited by Apuke, 2017). Aliga and Gunderson (2002) in Apuke (2017) further define quantitative research as the explaining of a problem through numerical analysis of data using mathematical methods. It is evident from both methods that this research approach mainly involves extensive use of numbers contrary to qualitative research which uses expatiation. There are several distinct differences between quantitative and qualitative research. The table below lists some of these major differences.

Table 2. Qualitative versus Quantitative Research

Criteria	Qualitative	Quantitative
Purpose	To understand and interpret social settings.	To test Hypothesis, find cause and effect and make predictions.
Group studied	Small and not randomly selected.	Large and randomly selected.
Variables	Study of whole, not variables.	Defined variables studied.
Types of data collected	Words, images and objects.	Numbers and statistics.
Type of analysis	Identify patterns features and themes.	Identify Statistical relationships.
Objectivity and Subjectivity	Subjective	Objective
Role of Researcher	Researcher's biases may be known.	Researcher's biases not known.
Results	Particular or specialised and less generalised.	Generalised and may be applied to other populations.
Nature of observation	Study behaviour in a natural environment.	Study behaviour under controlled conditions.
Nature of reality	Multiple and subjective	Single and objective
Final Report	Narrative with contextual descriptions.	Statistical report with correlations and statistical significance of findings.

Source: (Johnson & Christenson, 2008:34; Litchman, 2006:7-8; Xavier University Library, 10/12/12)

Types of quantitative research

Quantitative Research is classified into several types as follows: survey, correlational, experimental and causal-comparative (Sukamolson, 2007; cited by Apuke, 2017).

Survey

Survey research involves the utilisation of statistical methods using a scientific method with a questionnaire to establish a population's characteristics Apuke, (2017) citing Sukamolson (2007). That means a survey predominantly involves answering questions by participants, and in quantitative research, these may need short and structured answers.

Experimental

In experimentation, the research subjects the study group to treatment and then investigates the results (Apuke, 2017). There are three forms of experimentation according to Leedy and Ormrod (2001) and these are pre-experimental, true experimental and quasi-experimental. In true experimental, the independent variable does not vary or is not randomly selected. True experimental relates to using systematic mathematical models to answer and effect questions. The researcher uses a control and experimental group where treatment is given to the experimental group to establish outcomes. There is greater control by the researcher and validity is not compromised in this design (Apuke, 2017).

Causal – Comparative or Ex Post Facto

Variables are studied in retrospect in the Ex Post Facto. The dependent variable is readily observed and the work of the researcher is to investigate the causes (independent variables) that gave rise to the observed outcome (Apuke, 2017).

Correlational

This is a quantitative method used to measure the extent of relationships between variables within a sample or population (Apuke, 2017). The extent of relationships is measured through coefficients which range from +1 to -1. Stronger correlations are

closer to +1 or -1. +1 indicates a perfect positive relationship and -1 is negative (Apuke, 2017).

This study uses the correlational method as the nature of the study does not fit being true experimentation because variables cannot ordinarily be controlled. So nonexperimental design of correlation would be used.Under correlational design, two or more variables are statistically measured to establish their association (Creswell & Creswell, 2018). This research design will be used to test relationships as they are observed from numerical data. While correlation designs are useful in indicating relationships, they are not effective in showing causality (Breakwell, Hammond & Fife-Schaw, 1995).

4.1.2.1 Advantages and Disadvantages of Quantitative Research

Advantages

There are several advantages of a quantitative approach and some major ones are listed below.

- Ability to reach a higher sample size: A large sample size makes accurate generalisations to be reached because of profound statistical analysis. Big samples reduce the negative effect of heteroscedasticity (Miller, 2020)
- Quick collection of data: Research can be collected from archived sources or databases and even if it were to be collected through surveys or experiments the process is still quick (Miller, 2020).
- Efficiency in data analysis: Specialised statistical software such as SPSS, STATA, eViews and other related software makes data analysis quick and accurate (Rahman, 2016).
- Anonymity: Even where human beings are involved, it is easy for participants to remain anonymous since there is no need to provide personal information during surveys or interviews. This attribute makes participants give honest information because of the unlikelihood of being traced (Miller, 2020).

Disadvantages

Some major disadvantages of quantitative research are:

- Generalisation from sample results can be inaccurate: The application of randomised sampling does not completely eradicate bias. There is always a modicum of risk in that the result is not satisfactorily representative of the entire population. The other dimension is that if the study involves a questionnaire, answers provided by respondents might not be true, as they will be aware that they are under study and hence want to create a false impression (Miller, 2020).
- Lack of social behaviour explanation: Positivism excludes contextual social and deeper underlying social meaning (Denzin & Lincoln, 1998 cited in Rahman, 2016). Results are thus known but no further knowledge is gained regarding reasons for exhibited behaviours.
- Unnatural environments may be created: Unnatural scenarios can be created by selecting questions and approaches. Researchers can thus influence the results of the study to suit the outcome they envisage or desire (Miller, 2020).

4.2 Sampling

Sample data is taken from the FTSE/JSE Top 40 companies using a convenience sampling method. The sample size should be reasonable enough to allow for comfortable generalisation of results to the entire South African securities exchange.

4.2.1 Target population:

The study was based on the JSE-listed companies. These companies are widely traded on the securities exchange. According to Kotze (2019), the JSE has about 400 companies that fall under 39 sectors. Sampling was done from the JSE Top 40 index. This index represents about 80% of the market capitalisation of the nearly 400 listed companies (Kotze, 2019); the Top 40 is thus a fair representation of what

happens in the South African stock market. That is the reason why the research focuses on this population. The sample size should be at least 20 companies, to make it reasonably representative of the total population of companies in the securities exchange.

4.2.2 Sampling method

The method of sampling used is convenience sampling. According to Ekikan (2015), convenience sampling is a non-probability selection of subjects from the target population based on the fulfilment of wanted criteria, such as ease of accessibility, spatial proximity, and willingness to partake in the study, among others. All companies in the JSE index can be used if they meet the required criteria, for example, all required information across the period of investigation must be available.

4.2.3 Sample size

At least 20 companies of the Top 40 JSE-listed companies were sampled. The reason is that having a larger sample might be costly in terms of resources including time. The Top 40 represents about 80% of the market capitalisation of the listed South African companies (JSE website). The author aimed for a balanced panel to ensure that all sampled companies have data from the period under study, that is, from 2010 to 2021. All companies with no data were excluded as they could not be analysed. The researcher exercised judgement in cases where a large number did not meet a balanced panel framework. The researcher decided to exclude those that did not have data in more than five years. These omitted variables should be controlled by panel data analysis (Hsiao, 2006) to avoid omitted variables bias.

The above sample is based on the researcher's arbitrary judgement to balance out the Power Analysis calculator that may be used. This is to make the sample size determination more scientific. An example of an online calculator is G*Power (Faul et al., 2007, cited by Creswell & Creswell, 2018:251).

4.3 Data Collection and Variables

Data is collected from reliable web sources, for example, the South African Reserve Bank (SARB). Theoretical exposition of all variables is done to fortify understanding. Control variables as well as COVID-19 dummy variables are discussed in this section.

4.3.1 Data Collection

Data was collected from at least one of the following sources; the World Bank database, Integrated Real-time Electronic Securities System (IRESS) and the South African Reserve database for company results and macroeconomic variables over 12 years that is; from 2010 to 2021. Yearly data for individual companies was used. 12 years should be sufficient time to establish reliable relationships. Previous research has been based on an average period of five years (Lafmejani (2017). In this research market, multiples are independent variables and share returns are dependent. Market multiples as financial ratios are an important determinant of investment opportunities as well as the health of companies (Mussalam, 2018). This research aims to confirm the assertion that a relationship between market multiples and share returns exists. Data obtained is subjected to descriptive analysis to find distribution scores, measures of central tendency and variability. Obtained data is fed on STRATA (the statistical program used). Both the independent and dependent variables are subjected to descriptive statistical analysis.

Both collected data and instruments used to collect data should be reliable and valid. This is because data from reliable websites are used, such as IRESS. Data collected from these JSE top 40 companies was specifically on variables to be studied.

4.3.2 Variables

A variable is a characteristic that can change. It is a logical assembling of attributes and may include such attributes as income, temperature, weight and others (Kaur, 2013). Variables are mainly used in research to understand how they relate to or

affect each other. There are no limitations regarding the number of variables to be used in research; increasing their number also increases the complexity of the study (Kaur, 2013). In a study, variables can either be dependent or independent.

Table 3. Dependent variable

Variable	Data source	Scholars who used the variable
Share Returns	IRESS	Marunga (2000), Mekherji et al. (2013), Akthar (2020), Fatima et al. (2017) and many others

In finance, a return is a gain on investment. It is any change in the value of the initial investment (Barnes & Biktimirov, 2013). Share returns are thus any change in the value of share from one specific period to the next, as depicted by the formula below:

Equation: 4.1

$$HPR = \frac{Vf - Vi}{Vi}$$

Where HPR = Return or Holding Period Return over any single period.

V_f = Final value of a share

V_i = Initial value

Several researchers studied share returns, including Akhtar (2020) who studied emerging and developed markets. Auma(2020) studied the relationship between share returns and the price-to-earnings ratio on the Nairobi Stock Exchange.

Table 4. Independent Variables

Variable	Data Source	Anticipated Outcome	Scholars who used the variable
Price-to-Earnings ratio (P/E)	JSE, IRESS, World Bank	Negative	Githinji (2009), Fun & Basana (2012)
Price-to-Sales ratio (P/S)	IRESS	Negative	Wruwink et al. (2007), Shittu et al. (2016)
Price-to-Book ratio (P/B)	IRESS	Positive	Marunga (2000), Mekherji et al. (2013)
Price-to-Cash Flow ratio (P/CF)	IRESS	Negative	Akthar (2020), Fatima et al. (2017)
Price-to-Earnings before Interest, Taxes, Depreciation & Amortisation	IRESS	Negative	Igrejas et al. (2017), Namira & Nugroho (2016)
Control Variables			
GDP (Gross Domestic Product)	Reserve Bank	Positive	Senturk et al. (2014), Chavda et al. (2018), Shula (2017)
Inflation	Reserve Bank	Negative	Alam (2009Reddy (2012), Shula (2017)
Interest rate	Reserve Bank	Negative	Alam (2009), Hassam et al. (2022)
COVID-19 Dummy (Takes a value of 1 from COVID-19 otherwise 0)	Dept of Health (RSA)	Negative	Fan et al. (2021), Sormunen (2022), Meliana et al. (2022)

4.3.2.1 Price-to-Earnings Ratio (P/E)

Equation 4.2

The formula is P/E = $\frac{Market\ Price\ Per\ Share}{Earning\ Per\ Share}$

The P/E ratio is a financial metric that indicates how much investors are willing to pay for a firm's earnings (Githinji, 2009). The higher the P/E ratio the more investors will pay for a company's shares. Investors buy shares to recognise a return and if they need a high return then the P/E ratio has to be low. A lower P/E indicates that investors pay less for earnings and as earnings grow, the return is higher (Githinji, 2009). Fun and Basana (2012) are some of the researchers who found a negative relationship between the P/E ratio and share returns on the Nairobi Stock exchange, that is, low P/E firms tend to yield higher returns.

4.3.2.2 Price-to-Sales Ratio (P/S)

Gevers and Correia (2012) define P/S as a valuation metric that compares a company's share price to its sales. It shows the value markets place on a company's share relative to a rand of revenue. The ratio is calculated by dividing a company's share price by sales per share (Gevers & Correia, 2012). The formula is:

Equation: 4.3

Price-to-Sales = $\frac{Market\ Value\ Per\ Share}{Sales\ Per\ Share}$

Wruwink et al. (2007) and Shittu et al. (2016) are some of the researchers who studied the relationship between share returns and the P/S ratio. They came with contradictory results. Wruwink et al (2007) found that low P/S portfolios in the US yielded better returns. Research by Shittu et al. (2016) exhibited a significant positive relationship between P/S and share returns.

4.3.2.3 Price-to-Book Ratio (P/B)

Business managers and investors use P/B to compare a firm's market capitalisation to its book value. The ratio is usually used by investors who look for low-priced shares. The ratio is found by dividing the market value of the share by the book value (Fernando, 2022). The formula is:

Equation: 4.4

$$\text{P/B Ratio} = \frac{Market\ Price\ per\ Share}{Book\ Price\ per\ Share}$$

Mekherji et al. (2013) and Marunga (2000) are some of the researchers who studied the relationship between P/B and share returns in the US and Nairobi respectively. Both exhibited significant positive results.

4.3.2.4 Price-to Cash Flow Ratio (P/CF)

P/CF is a share valuation metric that measures share price relative to cash flow. The metric is useful for valuating companies' large positive operating cash flow but does not post profits because of large non-cash expenses, for example, depreciation (Hayes, 2022). It is calculated using the formula:

Equation: 4.3

$$\text{P/CF Ratio} = \frac{Share\ Price}{Cash\ Flow\ per\ Share}$$

Fatima et al. (2017) researched the Karachi Stock Exchange where it was concluded that P/CF is negatively correlated to share returns. Akthar (2020) in this study on emerging and developed markets also came to the same conclusion as Fatima et al. (2017).

4.3.2.5 Price-to-Earnings Before Depreciation, Taxes and Amortisation (P/EBIDTA)

The ratio measures the total market value of a company to its income before depreciation, taxes and amortisation (Namira & Nugroho, 2016). The formula for calculating P/EBIDTA is:

Equation: 4.4

$$\text{P/EBDTA} = \frac{Enterprise\ Value}{EBDTA}$$

A study by Igrejas et al. (2017) showed that buying stock with a low P/EBIDTA ratio and selling those with a high ratio produced abnormal results in Brazil during the period under study. In the Indonesian Stock Exchange, Namira and Nugroho (2016) also found negative regression between share returns and the P/EBDTA ratio.

All these variables are subjected to mathematical models to illustrate and explain the theoretical analysis involved in the research.

4.3.3 Control Variables

Sung (2007) defines a control variable as a variable that is held constant in research to eliminate its influence on the dependent variable. In this study, other major variables that affect share returns are as follows: interest rates, gross domestic product (GDP) inflation and the overall return of all shares listed on the JSE. These are control variables in the study, and their values are held constant in the research, for example, the value for inflation is the same for all companies while their share prices or market multiple differ.

4.3.3.1 Interest rate

Interest rates are rates paid for debt by borrowers to lenders (Faure, 2014). Alam and Uddin (2009) define interest rates as the cost of capital. Both definitions mean that interest rates are the price paid for using someone's money for some time. The

stock market is directly affected by interest rates, in that, if interest rates increase, depositors switch to investing in banks and that decreases the price of shares (because of lack of demand) leading to a reduction in share returns (Alam & Uddin, 2009). In theory, there is an inverse relationship between interest rates and share returns. In research, this relationship can be analysed using the following regression model:

Equation: 4.5

$$Y_{1it} = \beta_{0i} + \beta_{1i} X_{1i} + u_{1i}$$

Where; Y is the share return (dependent variable), X is the interest rate (independent variable) and *u* is the error term (Alam & Uddin, 2009).

Empirical research by the following researchers documented a negative relationship between interest rates and share returns: Arango (2002), Zordan (2005), and Alam and Uddin, 2009.

4.3.3.2 Gross domestic product (GDP)

According to Leamer (2009), GDP is the total market value of goods and services produced in a country, usually in a year. GDP measures the health of the economy; it is good when it is increasing and bad when slowing down. A growing economy produces more goods and services that are produced by businesses, most of which are financed by the securities market (Shula, 2017). GDP, therefore; has a direct impact on share returns. The implication is that if the economy is healthy the share market develops, leading to an increase in the price of shares and a subsequent increase in share returns. Several empirical investigations have been done to establish the relationship between GDP and share returns.

Senturk, Ozkan, and Akbas (2014) document that Davis et al. (2010) investigated the correlation between economic growth and stock returns and it was established that there was a positive correlation. Senturk et al. (2014) studied the same relationship and established that there was a positive correlation between stock

returns and GDP in Turkey. A study by Shula (2017) in Zambia also resulted in a positive regression between these two variables.

4.3.3.3 Inflation

Inflation is a sustained long-term increase in the prices of goods and services because of the weakening of a currency (Ibrahim, 2019). While inflation might be beneficial to businesses, it becomes a concern when it occurs unexpectedly (Ibrahim, 2019). Problems of inflation include erosion of the buying power of money, dissuasion of investment and reduction of the value of real wages (Sathyanarayana & Gargesa, 2018). These problems of inflation mean that share returns are affected. Extensive studies have been carried out to investigate the relationship between inflation and stock returns and results had been mixed, that is, it can be positive, negative or neutral (Sathyanarayana & Gargesa, 2018).

Sathyanaraya and Gargesa (2018) used the following simplified linear regression model for measuring the relationship between inflation and share returns:

Equation: 4.6

$Y=\alpha+b_1X_1+\varepsilon$

Where; Y= Stock return.

α = constant intercept of the model

b_1= coefficient of the model

X_1= inflation rate`

ε = the error term

Sathyanarayana and Gargesa (2018) and Reddy (2012) are some of the researchers who found a negative association between inflation and share returns.

4.3.3.4 COVID-19

The pandemic was first noticed towards the end of 2019 and in 2020, the World Health Organisation recommended all countries of the world lock down economic activity, which harmed all world economies (Alzyadat & Asfoura, 2021). This study

includes this period of restricted economic activity and as a result, COVID-19 is included in the regression models as a dummy variable because it is also likely to affect share returns. Specific models that incorporated COVID-19 are indicated in subsequent sections.

The following researcher did studies on the effect of COVID-19 on stock returns: Takyi and Bentum-Ennim (2021), Alzyadat and Asfoura (2021), United Nations Development Programme (UNDP), and the Regional Bureau of Africa among others and concluded with mixed results.

4.4 Data Modelling Techniques

The type of data used is panel data and Generalised Methods of Moments (GMM) is used for processing data in the relevant statistical software.

4.4.1 Model Specification

In this research, panel data regression analysis will be used to establish the relationship between price multiples and share returns as well as between Enterprise Value multiples and share returns. Panel data deals with observations of the same subjects over time (Hauser, 2019). In the study, share returns are regressed against independent variables for different companies over 12 years. Generalised Methods of Moments (GMM) will be used to run regression models using STRATA statistical software as it is suitable for both time series and panel data analysis (Ou, Liu, Li & Chen, 2013).

The following researchers and academics used panel data regression model: Marozva (2017), Yartey(2007), Luvuno 2018 and Akhtar (2020) among others.

4.4.1.1 Panel data analysis

Panel data regression analysis is a quantitative relationship model that uses observations from multiple subjects over several periods. The model has numerous

advantages compared to other models that use only cross-sectional or time series data (Chen et al., 2011, cited by Ou et al., 2013). Panel data enhances the efficiency of estimates as it uses more sample variability and degrees of freedom, it also lessens the effects of multicollinearity and statistical estimate disturbance (Ou et al., 2013).

In the study, company information from selected Top 40 JSE companies was collected. The collected data included market multiples under study as well as the returns of shares of each company from 2010 to 2021. Balanced panel data was used to ensure all company variable observations were included in the model at every time to reduce errors caused by individual company heterogeneity.

In panel data analysis, two techniques are employed to get the best results of a relationship and these are the fixed effects and random effect model (Williams, 2018:1). Fixed effects (FE) are constant across individuals whereas random variables vary. In fixed effects, variables can be related to unobserved variables. In random effects (RE) models, on the other hand, the unobserved variables need to be independent of the observed variables (Williams, 2018). The use of these two models – FE and RE – is mutually exclusive. To determine the best model, a Hausman Test is used in STRATA, Eviews or any statistical software. If the p-value>0.05 which is H0, then the random effect is used, the p-value is < 0.05, fixed effects are used (Zulfikar, 2018:10). Fixed effects and random effects were not suitable models in this research because they do not resolve the problem of endogeneity, whereas GMM solves this problem, hence GMM was the preferred method (Cheng & Bang, 2019).

4.4.1.2 The generalised method of moments (GMM)

GMM provides effective ways of obtaining consistent and normally distributed parameters of statistical data (Hall, 2009). In this research, the Arellano-Bond – the first difference generalised method is used to control any potential endogeneity in the variables and controls heterogeneity in the other variables. GMM also offers researchers various customisable implementation approaches that enable users to have various choices of estimation. GMM is, however, sensitive to the choice of

estimation and this has to be reported to allow for the replication of results, for example, using a different set of instruments may result in different coefficient estimates and *p*-values (Cheng & Bang, 2019). It is thus important to detail the specific model, and double-check results with different model specifications to strengthen the validity of estimates. There is an added problem of instruments that should be reported on, where Sargan/Hansen tests were used. The instruments problem occurs if many instruments are leading to biased results shown by weakened Sargan/Hansen tests. If instruments are too many compared to the individuals studied, p-values can reach 1.00, which is not acceptable – the reason why p-values have to be indicated in Sargan/Hansen tests (Cheng & Bang, 2019). As the GMM estimator is sensitive to the choice of the estimation procedure, the robustness of the model has to be checked and a variety of ways are employed to perform the check, for example, using lagged dependant variables (Cheng & Bang, 2019).

The equation for GMM dynamic model is as follows: (Marozva, 2017)

Equation: 4.7

$$\Delta Y_{i,t}, = \alpha Y_{i,t-1} + \beta_0 X_{i,t} + \beta_1 CV_t + \mu_i + \varepsilon_{i,t} \qquad (1)$$

Where:

$Y_{i,t}$, – represents the return of company *i* in time *t*.

$Y_{i,t-1}$ – represents lagged return of company *i* in time *t*.

$X_{i,t}$, - stands for an independent variable for the company *i* in time *t,* the independent variable being a market multiple.

CV_t– represents the control variables

α -is the slope of the lagged dependent variable (share return)

β – is the coefficient of the explanatory variable and control variables.

μ_i - Represents fixed effects in company *i*

$\varepsilon_{i,t}$, – is the disturbance in the model.

i - Stands for the cross-section and *t* the time series.

To remove company-specific effects the following equation is used:
Equation: 4.8

$$\Delta Y_{i,t}, = (1-\alpha)\Delta Y_{i,t-1} + \beta_0 \Delta X_{i,t} + \beta_1 \Delta CV_t + \Delta \varepsilon_{i,t} \quad (2)$$

The differenced model is not effective because it does not remove the correlation between the error part and the lagged variables because $Y_{i,t-1}$ and $\varepsilon_{i,t}$ remain correlated. To improve on the weakness of the differenced model, the study used a one-step GMM system estimation: Arellano and Bond's (1991) GMM estimation technique (see, for example, Marozva, 2017). A dynamic estimation model is adopted in line with Opler et al. (1999) as cited by Marozva (2017) who maintains that the current share return depends on the previous share return, as a result, the lagged share return independent variables are persistent over time.

4.4.1.3 Specific Model

The specific model to be used to estimate the regression between the market multiples and share returns is that of Akthar (2020), Rashid (2015) and Barbee et al. (2008). The analysis was done stepwise, where Equation 3 examined the impact of market multiples on share returns without other control variables. Equation 4 was put into perspective with the return of the market as a control variable (see for example, Ping-fu & Kwai-yee, 2016; Markherji et al. 2013; Auma, 2012). Lastly, the final Equation 5, over and above the return of the market accounts for other macroeconomic variables, including GDP, INT, and INFL.

Equation: 4.9

$$\Delta HPR_{i,t}, = \alpha \Delta HPR_{i,t-1} + \beta_0 \Delta PE_{i,t} + \beta_2 \Delta PS_{i,t} + \beta_3 \Delta PB_{i,t} + \beta_4 \Delta PCF_{i,t} + \beta_5 \Delta PEBDTA_{i,t} + \Delta \varepsilon_{i,t}$$

Equation: 4.10

$$\Delta HPR_{i,t}, = \alpha \Delta HPR_{i,t-1} + \beta_0 \Delta PE_{i,t} + \beta_2 \Delta PS_{i,t} + \beta_3 \Delta PB_{i,t} + \beta_4 \Delta PCF_{i,t} + \beta_5 \Delta PEBDTA_{i,t} + \beta_6 \Delta RM_t + \Delta \varepsilon_{i,t}$$

Equation: 4.11

$$\Delta HPR_{i,t}, = \alpha \Delta HPR_{i,t-1} + \beta_0 \Delta PE_{i,t} + \beta_2 \Delta PS_{i,t} + \beta_3 \Delta PB_{i,t} + \beta_4 \Delta PCF_{i,t} + \beta_5 \Delta PEBDTA_{i,t} + \beta_6 \Delta RM_t + \beta_7 \Delta GDP_t + \beta_8 \Delta INT_t + \beta_9 \Delta INFL_t + \Delta \varepsilon_{i,t}$$

Since the period of analysis coincides with the period of the COVID-19 pandemic, to control for the effects of COVID-19, a dummy variable was incorporated (Onyele & Nwakide, 2020; Hassan et al. 2022, Azlayadat & Asfoura, 2021) and the equations were transformed to:

Equation 4.12

$$\Delta HPR_{i,t}, = \alpha \Delta HPR_{i,t-1} + \beta_0 \Delta PE_{i,t} + \beta_2 \Delta PS_{i,t} + \beta_3 \Delta PB_{i,t} + \beta_4 \Delta PCF_{i,t} + \beta_5 \Delta PEBDTA_{i,t} + \beta_6 \Delta COVID\_19_t + \Delta \varepsilon_{i,t}$$

Equation: 4.13

$$\Delta HPR_{i,t}, = \alpha \Delta HPR_{i,t-1} + \beta_0 \Delta PE_{i,t} + \beta_2 \Delta PS_{i,t} + \beta_3 \Delta PB_{i,t} + \beta_4 \Delta PCF_{i,t} + \beta_5 \Delta PEBDTA_{i,t} + + \beta_6 \Delta RM_t + \beta_7 \Delta COVID\_19_t + \Delta \varepsilon_{i,t}$$

Equation: 4.14

$$\Delta HPR_{i,t}, = \alpha \Delta HPR_{i,t-1} + \beta_0 \Delta PE_{i,t} + \beta_2 \Delta PS_{i,t} + \beta_3 \Delta PB_{i,t} + \beta_4 \Delta PCF_{i,t} + \beta_5 \Delta PEBDTA_{i,t} + \beta_6 \Delta RM_t + \beta_7 \Delta GDP_t + \beta_8 \Delta INT_t + \beta_9 \Delta INFL_t + \beta_{10} \Delta COVID\_19_t + \Delta \varepsilon_{i,t}$$

Where;

α is a constant

i represent the firm

β_1 to β_6 are coefficients

t represents the Years

PE is the P/E ratio

PS is the P/S ratio

PB is the P/B ratio

PCF is P/CF Ratio

$PEBDTA$ is P/EBDTA Ratio

4.5 Data Diagnostic Techniques

GMM deals with econometrics issues that emanate from regression analysis, where several variables are under study (Luvuno, 2018). Some of these problems are multicollinearity, heteroscedasticity, autocorrelation, and cross-sectional dependence endogeneity, among others. All these issues are tested in STRATA statistical software as diagnostics tests before the final processing of data on GMM is done.

4.5.1 Multicollinearity

Multicollinearity exists when two or more variables are correlated not only with the dependent variable but with each other as well (Shresta, 2020). The existence of multicollinearity distorts the results of the study as it makes some variables to be statistically insignificant (Shresta, 2020).

Luvuno (2018) cites Gurati (2004) indicating that multicollinearity should be detected. The main techniques for detecting multicollinearity are Correlation Coefficients and Variance Inflation Factor (VIF), according to Shresta (2020). If the Pearson correlation coefficient among variables is close to 0.8, multicollinearity exists. Variation Inflation measures the extent variance of the estimated regression coefficient is inflated (Shresta, 2020).

Equation 4.15

$$VIF = \frac{1}{1- r^2}$$

Where;

VIF =1 indicates that independent variables are not correlated to each other, and VIF > 5 indicates a greater correlation (Shresta, 2020).

4.5.2 Heteroscedasticity

According to Rosopa et al. (2013), heteroscedasticity refers to a phenomenon where data is not consistent with statistical assumption, which is noted as Var$(u_i\ X_i\ ) = \sigma^2$ .Luvuno (2018) says that Choon et al. (2013) write that heteroscedasticity occurs when the variance of the error term is not consistent across observations.

Reasons for heteroscedasticity (Ullah, 2018)
Some reasons why the variance of the error term changes are as follows:

1. As people gain experience and improve their error behaviours the variance of the error term decreases. This is true for learning models
2. For expenditure behaviour models, as people's salaries increase, there is more discretionary income and so the variance of the error term increases.

If heteroscedasticity is not detected, resolved results of regression testing will be incorrect. Heteroscedasticity can be detected by visual inspection of scatter diagrams and, also the Goldfeld-Quandt Test (Rosopa et al. 2013). It is also detected by the Breusch-Pagan test, and this is the test to be used in this research.

4.5.3 Autocorrelation

Autocorrelation happens in a time series because of the importance of the sequence of the period (Luvuno, 2018). The error term in time *t* will be correlated to the error in the period preceding time *t.* Autocorrelation is important because it affects the validity of inferences related to hypothesis testing and confidence intervals (Huitema, 2006). The most usual way of measuring autocorrelation is by calculating a single coefficient referred to as the Log-1 autocorrelation coefficient (Huitema, 2006).

4.5.4 Cross-sectional Dependence

This refers to where time series cross-sectional units are correlated from unobserved factors or spillover effects (Persaran, 2004). This is one of the most important diagnostic tests a researcher does before doing a panel analysis (Persaran, 2004). It is detected by performing the Persaran (2004) CD test, if the result is less than 5, then there is no cross-sectional dependence.This is one of the tests to be performed on STRATA before data is subjected to panel data analysis on GMM.

All the theoretical expositions in this chapter were applied in the data collection, processing and analysis. It thus forms a framework for a practical and systemic approach to the study. Finally, all results are tabulated, discussed and conclusions reached.

4.6 Chapter Summary

The methodology chapter covers a comprehensive and detailed procedure on how the study is to be done. An exposition of the research paradigm is done at the beginning sections of the chapter. Theoretical background regarding different research techniques as well as sampling methods is discussed. Mention is made of the research technique and sampling method to be employed. All variables; independent, dependent, control and dummy, are discussed with a detailed theoretical exposition as well as previous research done on them. GMM as well as specific models used are fully discussed. Related concepts of multicollinearity, heteroscedasticity and autocorrelation are also exposed at the end of the chapter. The next chapter covers data collection, processing and analysis, as well as results discussions, conclusions and recommendations.

CHAPTER: 5 DATA ANALYSIS, RESULTS AND SUMMARY

5.1 Introduction

In Chapter 4, research methodology was discussed, and that entailed mainly defining the sample source and size, data collection and cleaning before being fed to STRATA (the software used for data processing). Chapter 5 focuses on the analysis of data obtained from STRATA processing. Data were for the dependent variable (share returns), independent variables (market multiples) and control variables. These data related to the period 2010 to 2021 from 21 companies listed on the JSE Top 40; all banks were excluded as they did not have revenue data in all the years under study. This chapter will also comprehensively discuss the results.

The rest of the chapter is structured as follows: Section 5.2 elaborates on descriptive statistics which include diagnostic tests performed on data to establish statistical problems on data and remedy thereof, as well as measures of central tendency and a correlation matrix of variables. A discussion of results and conclusions is dealt with in section 5.3 and its respective subsections. Finally, Section 5.5 gives a summary of the chapter.

5.2 Descriptive statistics

This section presents tests that were done to identify statistical problems of heteroscedasticity, cross-sectional interdependence and multicollinearity as well as the summary statistics of the variables in the estimation of the entire sample of the JSE Top 40 companies under study. Descriptive statistics are meant to provide brief information on the coefficients that summarise variables under investigation. These statistics are broken down into measures of central tendency and measures of variability. In this study, the measures of central tendency include the mean, median, and mode, while measures of variability include standard deviation, variance, minimum & maximum, normality test, kurtosis, and skewness.

Several tests were conducted on the pooled OLS, fixed-effects (FE) and random-effects (RE) models. These included heteroscedasticity tests, cross-sectional

interdependence and test for multicollinearity. The first test was to test heteroscedasticity and the results showed that three of the models which include models 1, 2 and 4 suffered from the non-constant variance of errors. Secondly, the model was tested for cross-sectional interdependence and the results confirmed the existence of cross–sectional interdependence in models 1, 3 and 4. The GMM model with Driscoll and Kraay Standard Errors estimator was used as the solution to heteroscedasticity and cross-section interdependence problems (Hoechle, 2007). The third test was the test for multicollinearity and results showed that all independent variables have a VIF of less than 5, implying that the model does not suffer from the problem of multicollinearity. The generalised method of moments (GMM) is adopted instead of FE to address the problems of endogeneity and specification errors.

The GMM was introduced by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991) to address endogeneity and specification errors in panel data that could not be solved by the OLS or FE method. The study, therefore, adopts the dynamic panel GMM estimator, which creates a matrix of internal instruments to capture the endogeneity of the lagged dependent variable and the independent variables of this study (see Arellano & Bond, 1991; Arellano & Bover, 1995; and Blundell & Bond, 1998). The generalised method of moments (GMM) is adopted instead of OLS or FE to address the problems of endogeneity and specification errors. Elaborate results of these diagnostic tests are tabulated in the appendix section. These descriptive statistics are presented in Table 5.

Table 5.Summary of descriptive statistics of variables

Variables	Mean	Median	Maximum	Minimum	Std, Dev,	Skewness	Kurtosis	Jarque-Bera	Observe
R	0,17	0,11	3,73	- 0,85	0,45	2,71	19,26	3 037,59	248
PS	6 953,60	2 520,28	135 050,90	367,20	16 588,04	4,88	29,44	8 211,08	248
PE	23,61	16,19	434,54	155,60	50,04	5,53	42,65	17 505,80	248
PCF	9,31	9,13	39,76	- 210,78	17,70	- 8,89	04,45	109 616,10	248
PC	31,04	14,44	561,51	0,86	58,36	6,48	55,27	29 966,51	248
PBV	2,71	2,35	15,31	0,36	1,70	4,10	24,15	5 318,03	248
P__EBITDA	9,41	8,90	176,96	- 696,39	50,85	- 10,48	152,01	233 986,70	248
RM	0,08	0,06	0,24	- 0,04	0,08	0,49	2,10	18,28	248
INTR	8,42	8,38	9,75	7,00	0,79	- 0,05	2,07	9,00	248
INFL	4,96	4,85	6,40	3,30	0,85	- 0,10	2,34	4,91	248
GDP 'Millions	4 579 817	4 590 174	6 192 498	3 055 613	965 886	- 0,01	1,78	15,43	248
SP	28 600,64	15 270,00	351 445,00	1 454,00	46 993,76	4,53	26,44	6 524,41	248

Source: Author's computation

The total observations were 248 and these were from each of the independent and dependent variables. The mean, median, maximum, standard deviation, skewness, kurtosis and Jarque-Bera of each variable are recorded. P/CF and P/EBIDTA are negatively skewed while the rest of the price multiples are positively skewed. All variables are not normally distributed as none have had a skewness of zero, however, all the control variables (RM, INTR, INFL and GDP) have a skewness of between -0.10 to 0.49, which is close to normal distribution. The kurtosis of all the control variables is less than 3, implying that they are normally distributed; this almost concurs with the skewness even though the skewness was not zero, but so close to zero to fit the description of normal distribution. All other variables with a kurtosis of more than 3 are, therefore, not normally distributed. Jarque-Bera measures the goodness-of-fit test and indicates how normally distributed the sample data is and is supported by skewness and kurtosis. The null hypothesis of normality is rejected if Jarque-Bera > $x^{2(2)}$. The 0.05 critical value for the Jarque-Bera test is 5.99 (Njuguna, 2015). Virtually all variables have a Jarque-Bera of more than 5.99 meaning that they are not normally distributed, except for inflation which has a figure of 4.91. It can be concluded from these statistics that all the variables are not normally distributed.

Above is a concise overview of descriptive statistics results, detailed narration of results is done below:

The mean return (R) of the sample at 0.17 is higher than the usual average of 0.1, the median at 0.11 is satisfactory and the maximum at 3.73 is an abnormal return according to Kupiec (1991).

The P/S ratio has a median of 2 520.28, a mean of 6 953.60 and a maximum of 135 050.90. Individual values of the companies are thus overly spread, with a range of 134 683.70. A median of 2 520.28 and a maximum of 135 050.90 indicates that there are big outliers. The companies thus have big differences in their revenue values. Sample data is not normally distributed as all the values of skewness, kurtosis and Juarqu-Bera are beyond the normality threshold of zero (0), 3 and 5.99 respectively.

The P/E ratio is in the normal ranges of values to many previous studies, for example, Makherji and Lee (2013) and Dayag and Trinidad (2019) have average ratios lowers than 50. With a median of 16.19 and a mean of 23.61, most companies thus have P/E ratios close to each other. The maximum of 434.54 indicates a value far from the mean implying there are a few companies in this extreme range. The measures of normality being skewness of 5.53, kurtosis of 42.65 and Jarque-Bera above 17 000 implies that sample data is not normally distributed. The standard deviation of 50 relatives to the mean of 26.61 shows that values are spread a bit far from the mean.

The P/CF ratio has a mean and median of both about 9. The extreme values are towards the minimum with a value of -210.78. There are, however, very few of these values from the closeness of the median and mean values. The standard deviation of about 194% from the mean shows that most data do not lie very close to the mean. P/CF data are thus not normally distributed as they are above the acceptable threshold as measured by skewness, kurtosis and Juarque-Bera.

For P/B, a mean of 2.71 and a median of 2.35 shows that data values are close to each other. These statistics also reveal that the market share values are more than twice their book values, which is a signal of healthy appreciation of shares; however, this assertion has to hold in the context of prevailing economic conditions. This might not be viewed as good in a hyperinflationary economy. The standard deviation of 72% from the mean compares better than the other multiples which have standard deviations of more than 100% from the mean. Data also fails the normality test as the skewness, kurtosis and Jarque-Bera are all more than the normality values.

The P/EBIDTA ratio has a mean and median of about 9. The maximum and minimum both show big outliers at 176.96 and -696.39 respectively. It can be deduced from the mean and median values that there are a few of these outliers. The standard deviation of 50.85 indicates a spread of 572% around the mean, which is a big spread. The range is very large as well at 873.35, showing a big difference between the minimum and maximum values. Data is negatively skewed at -10.48. Like all the other price multiples, the ratio is not normally distributed.

Market return (RM) at 0.8 is closer to the expected return which is 10%, according to Kupiec (1991). The median of 0.6 is also closer to the mean. The standard deviation of the market ratio is also large at 0.08. The normality test is almost satisfied with a kurtosis of 2.10 which is the acceptable range, and skewness of 0.24 is almost close to normality but the value of Jarque-Bera at 18.28 is too far from normality. It can thus be concluded that market return is not normally distributed.

The interest rate mean and median are both almost 8.4, and the maximum and minimum are 9.75 and 7.00 - all an indication of their value proximity. The standard deviation is at 0.79, which is close to the mean of 9%. All this indicates that the interest values do not fluctuate a lot during the period under study. Skewness and kurtosis at 0.05 and 0.27 respectively conform to a normal distribution, but Jarque-Bera at 9 is more than 5.99 which shows that the values are not perfectly normally distributed.

Concerning inflation, the mean and median are very close to each other. However, the range is large at 3.10 which is a difference between a maximum and minimum of about 50%. Although all values seem concentrated around the mean they have a standard deviation of about 18% around the mean. Jarque-Bera of 15.43 puts the data off normal distribution although the skewness and kurtosis are within the normality range.

The mean and median of GDP are about R4.5 billion. The maximum and mean are 6.1 billion and 3.0 billion respectively. These ranges of about 50% indicate a big gap in the GDP values during the period under study. Skewness and kurtosis both indicate normal distribution but Jarque-Bera is off, therefore, there is no normal distribution.

In the share prices; the median and mean at 152 and 186 indicate a big gap. The maximum and minimum as well at 1 314 and 14 respectively show a big range. The standard is thus 308% from the mean due to the spread of these values. This shows that shares of the companies have very extremely different values. All the normality statistics indicate that the sample data of share prices are not normally distributed.

5.3 Variables Correlation Analysis

Below is a correlation matrix table of relation coefficients of all the variables to be used in the study. If the correlation between the variables is more than 0.7, it means the two variables are highly correlated, so they cannot be used in the same regression model, which means one of them has to be excluded from the study.

Table 6. Correlation matrix

Variables	R	PS	PE	PCF	PC	PBV	P/EBITDA	RM	INTR	INFL	GDP
R	1,0000										
PS	0,0028	1,0000									
PE	- 0,0393	- 0,0270	1,0000								
PCF	0,0822	0,0567	0,1414**	1,0000							
PC	- 0,0118	- 0,0079	- 0,0139	0,0685	1,0000						
PBV	0,0940	0,5983	0,0591	0,1590	0,0046	1,0000					
P/EBITDA	0,1086*	- 0,0174	0,0634	0,0415	0,0230	0,1048*	1,0000				
RM	0,0970	- 0,0014	- 0,0617	- 0,0224	0,0616	0,0693	0,1258*	1,0000			
INTR	0,0567	0,0246	0,0272	-0,1225*	-0,14466**	- 0,0479	0,0596	0,0028	1,0000		
INFL	0,0814	0,0282	0,0021	0,0578	0,1252**	0,1390**	0,1648***	0,3870	- 0,0116	1,0000	
GDP	- 0,0207	0,0246	0,0236	-0,1601**	-0,1791***	- 0,1446	- 0,0713	- 0,1159	0,6601***	-0,3803***	1,0000

Where: R is stock return, PS is the Price-to-Sales ratio, PE is the Price-to-Earnings ratio, PCF is the Price-to-Cash Flow ratio, BV is the price-to-book ratio, P_ EBIDTA is the price to EBIDTA ratio RM is market rate, INTR is the interest rate, INFL is inflation, GDP is the gross domestic product and SP is the share price.

Table 6 above shows the correlation matrix in which all variables are arranged in an orderly manner on both sides of the table. The matrix indicates how the variables under study are correlated to each other. In correlation analysis, a perfect positive relationship that exists between variables is represented by a correlation coefficient equal to +1. Perfect negative relationships that exist between variables are represented by a correlation coefficient equal to -1. The generally accepted correlation to prove the non-existence of correlation between variables is 0.7 (70%) and below (Mukaka, 2012). Any correlation coefficient above 0.7 implies that the regression coefficients are not uniquely determined and have influences on others; therefore, these independent variables cannot be used in the same equation.

From the above correlation analysis, it is evident that virtually all independent variables are weakly correlated to each other, except for EXR and GDP which are highly correlated at 0.9365. This high correlation implies that the two variables cannot be used together in a regression model; as a result, the exchange rate (EXR) was excluded as a control variable in the study. The other variables are either negatively correlated or positively at acceptable levels. Further analysis of the relationship between share returns and market multiple was done in two phases; one without including COVID-19 dummy and the other that includes the dummy variable.

5.4 Data analysis and results

The study aims to establish the relationship between market multiples and share returns. Over and above multiple data collected, data for some control variables were collected to eliminate their possible effect on the study. Current HPR was also regressed against lagged HPR. Results are tabulated in Table 7. In this section, the results of models 1, 2 and 3 are discussed.

Firstly, the analysis focused on the effects of market multiples on share returns without controlling for the COVID-19 period. The second phase of the analysis relooked at the same nexus by controlling for the pandemic period that is, COVID-19. For robustness, each phase of analysis presents three models: i) the first model captures the relationship between market multiples and share returns in the absence of control variables.

Table 7. Effects of price multiples on stock returns

	Model 1 System GMM	Model 2 System GMM	Model 3 System GMM
Variables	**HPR**	**HPR**	**HPR**
L.HPR	0.0625**	0.111***	0.177***
	(0.0218)	(0.0298)	(0.0223)
PE	-0.00152***	-0.000792***	-0.000631***
	(0.000136)	(0.000147)	(0.0000788)
PBV	0.0362***	-0.0613	0.0550***
	(0.00498)	(0.0594)	(0.00945)
PCF	-0.0000197	0.00416***	0.00640***
	(0.00111)	(0.000527)	(0.000531)
PS	-0.00000226*	0.0000240	-0.00000456**
	(0.000000911)	(0.0000193)	(0.00000159)
P_EBITDA	0.00159**	0.00130**	0.000406
	(0.000540)	(0.000441)	(0.000354)
RM		0.726***	0.909***
		(0.156)	(0.135)
GDP			1.656**
			(0.555)
INTR			0.00804
			(0.0303)
INFL			0.0908**
			(0.0333)
N	206	206	206
Groups	21	21	21
Instruments	20	20	20
AR(1)	-1.36	-1.19	-1.29
AR(2)	-0.66	-0.67	-0.71
Sargan	4.00	31.35	0.85
Hansen	19.24	16.77	10.01

Robust standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

ii) the second model captures the relationship between market multiples and share returns while controlling for the market movement, that is, the return of the market in line with the capital asset pricing model - CAPM (Sharpe, 1964; Lintner, 1965), iii) the third model captures the relationship between market multiples and share returns while controlling for the market return and selected macroeconomic fundamentals.

In model 1, market multiples alone were regressed against market returns. Several researchers did empirical studies on market multiples and these include; Arkthar (2020) in Asian and European markets, Lafmejani (2017) on the Tehran Stock Exchange and Ping-fu (2016) on the Hong Kong Stock Exchange. In addition to all the variables used in model 1, model 2 includes market return (RM) to establish the effect of this possible regressor. Several scholars postulated the effect of market return on share returns. RM is used as a control variable in the model. Mukhacheva (2012), Zubairi and (Yilmaz et al. (2015) and Sun (2001) among others used the market to return to establish stock returns. Model 3 added macroeconomic variables namely; GDP, interest rates and inflation on model 2 variables. These macroeconomic factors were used as control variables. Critics of CAPM used macroeconomic factors as additional variables that can affect share returns, through the use of Arbitrage Pricing Theory (APT). The following authorities focused on macroeconomic variables and their effect on share returns: Zubairi (2011), Alam (2022) and Szczygielski (2018).

The models are not weakened by many instruments since instruments are less than the number of groups, they are robust since the Sargan and Hensen tests are insignificant. The models are also free from autocorrelation as AR (1) and AR (2) are not significant.

5.4.1 Discussion of results

This discussion is based on models 1, 2 and 3, where analysis is based on all variables except the COVID-19 dummy, which is discussed in Section 5.5.

5.4.1.1 Lagged HPR (L HPR)

The lagged HPR has a significant positive relationship with share returns confirming that the share market returns are persistent. This is confirmed in literature by Marozva (2021; 2022) who argues that the current share returns are positively influenced by the previous period's share returns. This phenomenon is referred to as the momentum effect. Zoghlami (2013) also documented the momentum theory in the results of the Tunisian Stock Exchange where share returns maintained a positive trajectory in tandem with the previous period. Jugadeesh and Titman (2001) and Chan et al.(1999) are the first authors of the momentum effect and strategies. In this study, Lagged HPR is positively significant in all three models, thus fully confirming the momentum effect.

5.4.1.2 Price Earnings Ratio (P/E)

Results show that there is a negative and significant relationship between the P/E ratio and stock returns. Weigand (2005) also asserts that both investors and academics are aware of the negative relationship between the P/E ratio and share returns. This implies that the higher the P/E ratio the lower the share returns. The mispricing view holds that there exists a converse relationship between the P/E ratio and share returns, implying that an investor can earn higher returns by investing in low P/E stocks (Fun & Basana, 2012).

The P/E ratio plays an important role and is used extensively by scholars and investment managers as it is associated with future market earnings growth (Wu, 2014). The ratio is used to establish the cost of capital (Eston, 2004, cited by Wu, 2014) and is also used for share purchase recommendations (Wu, 2014).

Several studies have been undertaken by researchers to establish the relationship between the P/E ratio and share returns. Among the authors who found a negative relationship between the P/E ratio and share returns are Arkthar (2020) in Asia, et al. (2013), and Nayag and Trinidad (2019) who found contradictory results with banks in the Philippines; in the study, only one out of 11 banks showed negative and significant results.

These results imply that if P/E is increasing, managers are recommended to sell shares as this is likely to result in less share return shortly. In the same vein in Indonesia, investors use low P/E as an investment strategy, according to Fun and Basana (2012). Low P/E shares are perceived as low priced with the potential of realising higher returns in subsequent years (Fun & Basana, 2012). This means that business leaders must always find ways of ensuring that their metrics have low P/E ratios to boost market confidence in their shares.

5.4.1.3 Price-to-book ratio (PBV)

There is a predominantly significant positive correlation between the P/B ratio and share returns. It is stronger in model 3, with a value of 0.0550, compared with 0.0362 in model 1. This positive relationship implies high book value shares yield better returns relative to those with low value and in the same vein low book value stock yields low returns. In signalling theory, a high P/B ratio indicates confidence in the company and shows that it has good growth prospects (Bustani et al. 2021). Shittu et al. (2016) also say that the ratio is important in

forecasting share returns. A high P/B ratio is an indication of appreciation of the market value of a share, and this yields high returns as the investor would have bought the shares at a lower price.

Shittu et al. (2016) Mwai (2012) and Arthar (2015) also found a positive association between P/B and share returns. The price-to-book value ratio can be used to make decisions about prospects of yielding positive returns from target firms. Therefore, investment professionals can take a long position in the shares that exhibit high price-to-book value ratios as their prices are anticipated to increase.

5.4.1.4 Price-to-Sales ratio (PS)

A significant negative association between the P/S ratio and share returns is evident in the results, especially in models 1 and 3. The implication is that if a company's revenue is increasing by a higher margin relative to the share appreciation, it will yield higher returns. Companies with low P/S ratios have great growth potential. Gevers and Correia (2014) document that Kenneth Fisher who was an academic and investor recommended the P/S ratio as a dependable share screening tool and postulated that it was more stable than other ratios that mainly use earnings which are subjected to a variety of different manipulations (Gevers & Correia, 2014).

In the USA, two major studies were done by Senchak and Martin (1987) and Jacobs and Levy (1988) and in both studies, the P/S ratio showed positive regression with stock returns. In Senchack and Martin's (1987) study, low P/S shares yielded excess returns of 7.1% (Gevers & Correia, 2014). Wruwink et al., 2007) documented a negative relationship, concurring with the Fisher P/S ratio investment strategy.

Business managers and investors can use Fisher's P/S ratio investment strategy in their stock selection (Gevers & Correia, 2014). The ratio is easy to use with both numbers needed in the computation of the ratio readily available. It will also be easy to monitor the growth of revenue as a guarantee of company growth and subsequent returns. Firms that do not make profits can still use the ratio successfully (Gevers & Correia, 2014). This is because every operating firm has at least some sales, which is a figure before the cost of sales and operating expenses. A

firm with more costs and expenses than sales would have negative earnings and in this situation, such ratios as P/E cannot be calculated.

5.4.1.5 Price-to-Cash Flow (PCF)

A significant positive association between P/CF and share returns is established in the results of this study and this is evident in models 2 and 3. From this result, it follows that when the P/CF ratio increases share returns also increase. The use of the ratio should bring dependable insights into the performance of firms. The ratio is a good indicator of a company generating cash to be used in R&D, marketing, capital purchases and many other essential activities of the business. It compares better than P/E as it adjusts for non-cash expenses such as depreciation (Fatima et al., 2017). Arkthar (2020) also maintains that the ratio is not susceptible to manipulation like the P/E one.

Chan and Chen (1991) found a positive effect between P/CF and share returns in Japan (Arkthar, 2020) while a significant negative relationship between P/CF and share returns was documented by Barbie et al. (2008) and Arkthar and Rashid (2015). These contradictory empirical findings made Arkthar (2020) develop a hypothesis that states that the relationship between P/CF and stock returns is ambiguous. However, this study resulted in a positive relationship between market multiples and share returns; if this result holds for the JSE, then investors should view a high P/CF ratio as signalling good company performance.

5.4.1.6 Price-to-EBIDTA ratio (P/EBIDTA)

Although seemingly not popular in research and academia, the P/EBIDTA ratio has become the second in popularity after P/E in stock valuation; it is positioned at about 33% in usage, with P/E at 52% and the rest below 30%, according to Morgan Stanley Dean Witter Research (Fernandez, 2002). The classic definition P/EBIDTA ratio is found by dividing market equity plus market debt by earnings before interest, taxes and depreciation. This makes the ratio attractive to use because even firms making net losses can use it and it shows the strength of cash from operations that can be used to support debt at least in the short term (Namira, 2016).

This study established that there is a significant positive relationship between P/EBIDTA and share returns and this is evident in models 1 and 2. The theory argues that ordinarily P/EBIDTA

ratio should be negatively associated with share returns, and there is an assertion that enterprise multiple should be lower than P/E (Fitch 2002). This is because the enterprise multiple (P/EBIDTA) has a cost of the debt component. If these results are found to be plausible at least in the JSE, then South African investors would find it an important alternative decision-making tool. Contrary to the finding of this study, empirical research by Namira et al. (2016) and Ingrejas et al. (2017) resulted in a negative relationship.

There is a need to do more research on the multiple to reach a comfortable conclusion. Fitch (2002) argues that the P/EBIDTA ratio is industry dependent as some industries have higher ratios. A high P/EBIDTA ratio is found in high-growth industries with lower expenses such as depreciation, low P/EBIDTA ratio in low growth and high maintenance costs for infrastructure (Fitch, 2002). So, the positive association, in this study might mean that most of the industries are in a high growth phase with lesser capital maintenance expenses.

5.4.1.7 Control Variables (RM, GDP, interest rates and inflation)

The use of control variables should be one of the considerations of all research students if the results of a study are to be dependable. Control variables used are market risk, GDP, inflation and interest rate. These are incorporated in the regression model to eliminate their influence as potential regressors. Yilma et al. (2015) and Dhankar and Singh (2005) are some of the scholars who investigated the effect of macroeconomic factors on share returns using APT models.

Market risk (RM) was popularised by Sharpe and Lintner in the 1960s and was introduced through CAPM, which recognised that the required rate of return can only be explained by market risk (Sun & Zhang, 2001). Results of this study show that there is a significant positive regression between market risk and positive returns; this is indicated by the values 0.726 and 0.909, implying that if market returns increase so does individual share returns. This simplified version of the risk-return relationship was criticised and that formed the impetus of Arbitrage Pricing Theory that included other risk factors like inflation, GDP and interest rate (Alam, 2022).

All the other control variables viz; GDP, inflation and interest rate show a significant positive relationship with stock returns as well, although interest rates do not show a significant regression, the correlation is positive. All these factors were used as control variables as they

would ordinarily affect the level of risk and returns of assets (Alam, 2022). The thrust of this research is on market multiples but controls for these macroeconomic factors as possible extenuating regressors.

The first phase of analysis was done without controlling for the pandemic period. The second phase of the analysis presented in Section 5.5, accounts for the COVID-19 period.

5.5 Effects of market multiples on stock returns while controlling for COVID-19

COVID-19 was detected around the world at the end of 2019. It negatively affected the performance of businesses. This research period covers about two years of the COVID-19 pandemic, that is, from March 2020 to December 2021; as a result, COVID-19 was included as a dummy variable in addition to market return and macroeconomic control variables used in models 1 to 3. Several studies have shown that COVID-19 harmed global stock markets, including South Africa (Takyi & Bentum-Ennin, 2020; Kusumahadi & Permana, 2021). Onyele and Nwakide (2020) support this by saying that COVID-19 affected the efficient functioning of global stock markets, especially during periods of lockdown restrictions. However, Marozva and Magwedere (2021) on the contrary found out that the COVID-19 pandemic interacted positively with share market returns in emerging markets. They argue that emerging market governments were proactive and pragmatic in dealing with the pandemic as the effects of adopted economic policies thwarted the negative impact of the pandemic. Table 8 shows results of the study taking into account the COVID 19 dummy variable.

Table 8. Effects of price multiples on stock returns while controlling for COVID-19

Variables	Model 4 System GMM HPR	Model 5 System GMM HPR	Model 6 System GMM HPR
L.HPR	0.0492	0.107***	0.175***
	(0.0341)	(0.0287)	(0.0253)
PE	-0.00138***	-0.000909***	-0.000687***
	(0.000147)	(0.000178)	(0.0000883)
PBV	0.0486***	-0.00559	0.0519***
	(0.00482)	(0.0516)	(0.00867)
PCF	-0.000531	0.00415***	0.00627***
	(0.00102)	(0.000602)	(0.000594)
PS	-0.00000342***	0.0000115	-0.00000443**
	(0.000000760)	(0.0000160)	(0.00000150)
P_EBITDA	0.00165	0.00187***	0.000529
	(0.00105)	(0.000459)	(0.000578)
COVID_19	0.124***	0.103***	0.0636*
	(0.0103)	(0.0231)	(0.0319)
RM		0.593***	0.743***
		(0.151)	(0.159)
GDP			1.386**
			(0.514)
INTR			0.0141
			(0.0284)
INFL			0.105**
			(0.0331)
N	206	206	206
Groups	21	21	21
Instruments	20	20	20
AR(1)	-1.35	-1.38	-1.35
AR(2)	-0.64	-0.62	-0.68
Sargan	12.14	31.74	1.38
Hansen	18.84	18.42	0.58

Standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.5.1 Discussion of results

Models 4,5 and 6 are also not weakened by many instruments since instruments are less than the number of groups. The models are also robust since the Sargan and Hensen tests are insignificant. The models are also free from autocorrelation as AR (1) and AR (2) are not significant.A discussion of results while controlling for the COVID-19 variable is discussed in the next sub-sections.

5.5.1.1 COVID-19

The COVID-19 variable has a significant positive relationship with share returns in all three models 4, 5 and 6, with 4 and 6 recording higher coefficients at 0.124 and 0.103 respectively. The results confirm Marozva and Magwedere's (2021) findings that share returns improved with the intensity of the pandemic. Alzyadat and Asfoura (2021) also carried out a similar study in Saudi Arabia but documented the negative effect of COVID-19 on stock returns with the highest impact being pre-lockdown restrictions. This contradicts the result of this study, possibly caused by policies implemented by authorities in different economic jurisdictions.

However, according to Onyele and Nakide (2020), literature holds that unexpected events such as natural disasters and acts of terrorism affect securities markets through two fundamental theories namely informational diffusion theory and price pressure theory. Information theory causes persistent price changes while price pressure results in short- and long-buying which causes fluctuations in share prices (Onyele & Nwakide, 2020). These theories imply that crisis periods negatively affect share returns. The result of this study contradicts the results of Onyele and Nwakide (2020) as the relationship between market multiples and share returns were not affected by the inclusion of the COVID-19 dummy variable.

Knowledge of how natural disasters can affect the stock market provides a useful insight for investors to realise that it is important to diversify investments and not only rely on securities markets which can hugely and immediately be affected by unexpected natural and man-made events. Policymakers and investors would also understand how the securities market can be affected by governments' directives during outbreaks of pandemics (Alzyadat & Asfoura, 2021). Moreover, the investment horizon is a key determinant of share returns as studies that focused

on shorter periods found negative effects of crises but those that looked at a much longer period found a positive effect (Alzyadat & Asfoura, 2021).

5.5.1.2 Price-to-Earnings ratio (PE)

The P/E ratio continues to be significantly negatively related to stock returns albeit with mainly diminishing strength across the models, for example, models 1 to 3 were -0.00152, -0.000792, -0.000631, while models 4 to 6 were -0.00138, -0.000909, -0.000687. This pattern is evident in other price multiples. The deduction from this trend is that COVID-19 brought higher risks to earnings than to the share price. However, it can be noted that COVID-19 did not affect the direction of the relationship as it remained negative similar to results without the COVID-19 pandemic being taken into consideration.

Fan et al. (2021) did a study on value investment during the COVID-19 pandemic from March 2020 to December 2021 and the results revealed that even if profitability was severely affected, the P/E ratios were less affected. This outcome is similar to the results of the study. The authors attributed the outcome of the P/E ratio to the large capitalisations of the firms studied namely, Coca-Cola, Pepsi and Costa. Sun and Shi (2021) investigated investor sentiment and share reactions to COVID-19 and the result showed the expected negative relationship.

These results imply that as much as the momentum investor is affected by the sudden crush of shares the overall P/E ratio stability is minimally affected, and this could be because the pandemic restrictions affect both the share price and earnings in almost the same magnitude, hence the consistency and persistence of the relationship. Restrictions only lasted a few months, so, this could be another reason why the effect of the pandemic was insignificant.

5.5.1.3 Price-to-book ratio (PBV)

The P/B ratio under COVID-19 conditions continues to have a positive relationship with stock returns in a similar pattern to non-COVID-19 conditions. The strength of relationship is stronger under COVID-19 conditions. This means that as the ratio decreased due to the depreciation of shares the share return decreased as well. COVID-19 had harmful consequences on global securities markets in line with the theory of behavioural finance which maintains that emergency events negatively affect the value of shares as well as the psychological and behavioural

responses of investors, subsequently affecting the prices of shares (Dospatliev, Ivanova & Varbanovu, 2022).

Yan investigated the effect of COVID-19 on Chinese stock markets with the lockdown of Wuhan city and documented that share prices fell sharply (Dospatliev et al., 2022). An empirical investigation by Dospatliev et al.(2022) in the Bulgarian securities market showed a positive relationship between the P/B ratio and stock returns. This finding concurs with the results of this study. The results inform investors that even under conditions of crisis such as trade restrictions aimed at curbing the spread of a pandemic, the P/B ratio will still maintain the positive relationship, perhaps only so in the short term.

5.5.1.4 Price-to-Sales ratio (PS)

The P/S ratio shows a significant negative relationship with share returns under COVID-19 conditions which is the same as in models 1 to 3. Similar to the P/E ratio, this implies that as the ratio decreases share returns increase. The author did not find studies that investigated the effect of COVID-19 on the P/S ratio, and subsequent relationship with share returns. However, a study by Verick and Islam (2010) exhibited a negative relationship between the securities market during the 2008 great depression. This recession crisis can be used as a proxy for the COVID-19 condition, and thus it can be inferred that researching for the same ratio under COVID-19 would yield the same result.

5.5.1.5 Price-to-Cash Flow ratio (PCF)

The results of this study indicate that COVID-19 did not alter the relationship in any significant way. The relationship remained significantly positive as the results of this study were without COVID-19. The COVID-19 pandemic is an unexpected event that caused investors to panic and subsequently led to a drastic drop in the prices of shares (Meliana, Kesuma, Enjelina, Rijanto and Saraswati, 2022). Cash flow also dropped during the pandemic as businesses were not making a lot of cash. The drop in share returns and the corresponding drop in cash flows made the relationship between cash flow and share returns remain the same as when the pandemic was not taken into consideration.

Meliana et al. (2022) investigated the relationship between cash flow growth and share returns and the results indicated that cash flow growth had no effect on stock returns during the COVID-19 period. The result of Melina et al. (2022) concurs with the results of the study as there was no significant change to the results of the models without COVID-19. COVID-19 caused investors to lose confidence in the securities market and cash flows dropped as well (Meliana et al. 2022). The reason there is no effect in this study with the inclusion of the COVID-19 dummy is that both the cash flow and share prices dropped resulting in a negligible effect on both variables

5.5.1.6 Price to EBIDTA

Similar to all the other studied price multiples, COVID-19 did not affect the P/EBIDTA ratio, as it maintained the same positive relationship as in models 1 to 3. Kaoutopis, Blelesis and Kaumporis (2022) found a negative correlation between the EBIDTA ratio and stock performance in the hotel industry in some European countries. This result profoundly contradicts the results of the author because the severity of COVID-19 was intense in the hospitality industry because of the total closure of operations. This study focused on all industries hence the difference in the results.

5.5.1.7 Control Variables (Market return, GDP, interest rates and inflation)

From the analysis of results from tables 7 and 8, it can be deduced that there is no significant difference in the results of control variables as they all maintain a substantial positive relationship to share returns similar to non-COVID-19 conditions.

Market return can be understood in the context of portfolio and market theories that use CAPM to establish the relationship between risks and returns (Xiao, 2022). COVID-19 posed a market risk in the world economies and as a result, researchers assumed that it will affect securities markets' performances.

To establish risk based on CAPM, market beta is regressed against share returns (Xiao, 2022). Xiao (2022) documents that Basu and Chawla found that the global 2008 recession negatively affected share returns, indicating a negative relationship between market return and share returns. Xiao (2022) and Airian (2021) documented a negative relationship between market

returns and share returns during COVID-19. Although these results contradict the results of this study, it is evident that COVID-19 had an impact on the study done by the author because, although the relationship was maintained positive the strength of the relationship during COVID-19 was less than the results without the COVID-19 dummy, as evidenced by smaller coefficients.

Results of this study still maintain a positive relationship between share returns and GDP, inflation and exchange rate. The relationship though still positive is slightly weaker than, when COVID-19 is excluded, implying that COVID-19 has a slight effect in aggravating the relationship.

Hassan, Romli and Aljoefry (2022) carried out a study to establish the effect of macroeconomic factors during the pandemic. Results were not entirely consistent with the results of this study. GDP showed a significant positive relationship with share returns during the pandemic; exchange rate had a significant negative relationship; interest rates had a negative and insignificant relationship; and inflation had a positive but insignificant relationship. In Nigeria, a study by Emenyi and Effiong (2020) found mixed results about the effect of exchange rates during COVID-19, though, in the researchers' empirical literature review, positive regression is documented. Bhama (2022) recorded a negative relationship between share returns and exchange rate in the period during COVID-19 and attributes this to the erosion of the Indian currency because of exposure to the pandemic. Inflation is closely linked to exchange rate, because when a currency is weaker relative to its trading partners, inflation creeps in because expensive imports (Hassan et al., 2022)

From these results, investors must watch closely the volatility of exchange rates and inflation in different economic jurisdictions as well as the industries in which they intend to invest in. Investors should also diversify their investments so that all their investments are not affected by unexpected events like pandemics (Bhama, 2020). This study, as well as studies by other researchers, will help investors speculate the effects of macroeconomic factors during pandemics and academics can use these studies as a reference to postulate new hypotheses and improve approaches in related studies in the future.

5.6 Chapter Summary

The chapter dealt with data processing and results analysis as well as diagnostic testing to establish statistical problems and corrective measures to fix the issues. All this precedes the final data processing on the statistical application. Results of all models run on STRATA are tabulated and these models incorporate results on price multiples, control variables as well as a COVID-19 dummy variable as part of sample data falls in the period affected by the pandemic.

Results of descriptive statistics are tabulated, as well as the variables correlation matrix. Most market multiply data are found to have extreme data outliers, as evidenced by large standard deviations and sample ranges. The entire data samples are not normally distributed as indicated by measures of normality. Control variables, which include the market return, GDP, inflation and interest rate all exhibit data with small deviations and ranges. They are also almost normally distributed as the measures of skewness and kurtosis are within normality except the Jarque-Bera which predominantly fell outside the acceptable 5.99 thresholds.

A detailed and comprehensive discussion of the results is done. P/E and P/S ratios both show a significant negative relationship with share returns in all model specifications. P/B, P/CF and P/EBIDTA mainly exhibit significant positive associations with share returns. All control variables are positively correlated with share returns. The inclusion of the COVID-19 dummy did not produce any significant change in the relationship although the strengths of the positive relationship weakened as indicated by small coefficients. This insignificant effect of the pandemic could be attributable to the fact that its greatest impact only lasted for one and a half years whereas the study stretches over 12 years. The other reason could be effective government intervention policies that reduced the effects of COVID -19.

The next chapter deals with the conclusion, study limitations and recommendations. This is where a concise narration of results, shortcomings and proposed future improvements on similar studies is expounded.

CHAPTER: 6. CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The study was based on finding relationships between price multiples and share returns for companies in the JSE Top 40 index. The investigation used previous empirical studies as impetus and guidelines. The objectives were to find out if there are relationships between the multiples and share returns regarding the strength and direction of the relationship. The research is juxtaposed against previous studies and gaps found in previous studies are exploited. It was noted that there are no previous studies that dealt with finding relationships between various market multiples and share returns in South Africa. Most investors in South Africa rely on technical analysis of the securities market as a share selection tool; establishing a reliable use of metrics such as multiples would bring about another strategy to complement investment decisions.

The specific objectives of the study are to find if there are statistical relationships between, P/E, P/S, P/B, P/CF, P/EBIDTA and share returns in the FTSE/JSE Top 40 group of companies. The objectives are listed as follows:

- To examine the relationship between the price-earnings ratio and share returns of JSE-listed shares.
- To examine the relationship between price sales ratio and share returns of JSE-listed shares.
- To examine the relationship between price book value ratio and share returns of JSE-listed shares.
- To examine the relationship between price cash flow ratio and share returns of JSE-listed shares.
- To examine the relationship between enterprise value multiples and share returns of JSE-listed shares.

The relationship was investigated on the companies that were selected from the JSE Top 40 and the size threshold was put at 20, however, 21 companies were investigated. Excluded companies did not have the complete data needed. Data were extracted from IRESS and reserve bank databases. These data were processed through the STRATA statistical software. The nature of the data set and outcome requirement required that a two-step system GMM be used.

The rest of the chapter is outlined as follows: Section 6.2 briefly outlines a summary of research results. Section 6.3 focuses on the implication of results in the broader socio-economic context in South Africa in particular and the world in general. The contribution of the study follows in Section 6.4. This entails narrating all aspects of the study concerning the benefit to broader society, business and academia. 6.5 is the next section that deals with the limitations of the study from a broader perspective. Finally, 6.6 provides a conclusion and recommendations on the study in the author's opinion.

6.2 Summary of results

Descriptive statistics results focused on measures of central tendency and variables correlation matrix. All price multiples indicated big ranges and standard deviations implying that data mostly fell away from the mean. Measures of normality viz; skewness, kurtosis and Jarque-Bera all fell far from the thresholds of zero, (0) ≤ 3, <5.99 respectively. These are the acceptable ranges for the measures of normal distribution (Brown, 2011). Results of the correlation matrix showed that all variables can be used together in a multivariate regression model, except the exchange rate which was 0.9 against GDP; hence it was excluded from the models.

Results of the study for all the variables viz; market multiples, control variables and the COVID-19 dummy variable were not entirely in line with previous studies. This discrepancy could be a result of the sample data, economic jurisdiction as well as research methods used in other investigations, but predominantly, there was a profound congruence.

The P/E ratio showed a significant negative relationship with share returns. This result is consistent with the literature and theory which holds that low P/E shares yield high returns (Fun & Basana, 2012). The other price multiple that exhibited a negative relationship is P/S, and this result is in line with what Gevers and Correia (2014) and Wruwink (2007) documented in their findings. Jacobs and Levy (1988) documented a positive relationship. A significant positive association was shown between the P/B ratio and share returns in this study. This result concurs with most previous studies, for example, Bustani et al. (2021), Marangu (2000), and Shittu et al. (2016). The P/CF ratio showed a significant positive relationship with share returns. Previous studies on this ratio document mixed results; for example, Bala (2017) indicated no significant relationship while Akthar (2020) revealed a significant positive relationship between the P/CF ratio and share returns. This study resulted in a positive relationship between the P/EBIDTA ratio and share returns contrary to the findings of Namira et al. (2016) and Ingrejas et al.(2017) who both document a negative relationship.

All control variables are positively associated with share returns. This is in line with Arbitrage Pricing Theory postulated by Roll and Ross, which included macroeconomic factors as explanatory variables for share returns (Dhankar & Singh, 2005). This was after CAPM was criticised for its simplicity and that share returns cannot be influenced by the (CAPM) model alone.

COVID-19 restrictions posed a major economic threat, so this study included the pandemic as a dummy variable. Contrary to the expected outcome, the results show a positive relationship between COVID-19 and share returns. Results are 0.124, 0.103, and 0.0636 for models 4 to 6 respectively. A study by Marozva and Magwedere (2021) established stock returns improved with the intensity of the pandemic and the researchers attribute this to the effective interventions by authorities in mitigating the negative impact of the pandemic.

The relationship between all price multiples and stock returns remained mainly the same without the inclusion of the COVID-19 dummy. P/E and P/S indicated a negative association, while, P/B, P/CF and P/EBIDTA also maintained a positive association. It was, however, noted that the strength of the relationship weakened as evidenced by weaker correlation coefficients.

All control variables that include market return, GDP, inflation and interest rate regressed positively with share returns even with the inclusion COVID-19 dummy variable, implying that the pandemic did affect the macroeconomic factors concerning their relationship with share returns.

6.3 Implications of the results

The study is based on establishing the relationship between market multiples and share returns using South African data. Sample data were taken from the JSE top 40 companies and at least 20 companies were needed to form the threshold for the sample, and this number is presumed to be representative of the general South African securities exchange.

While the main focus of the study was on market multiples, it was necessary to include control variables such as GPD, inflation and interest rate as it was established through the Arbitrage Price Theory that these factors influence share prices and returns (Zubairi & Farooq, 2008). COVID-19 was also included as a dummy variable to capture the effect caused by the pandemic crisis.

Results of the study indicate that low P/E and P/S ratios yield high returns while high P/B, P/EBIDTA and P/CF result in high returns in the South African securities market. Control

variables regressed positively with stock returns and COVID-19 had insignificant effects on stock returns.

Based on the results of the study it is important for investment professionals to closely look at the market multiples that mainly drive share returns. If, for example, the market uses the P/E ratio as a decision-making tool, then it means managers have to focus on improving the earnings potential of the enterprise. Increasing the earnings will bring down the P/E ratio and that signals confidence in the company's performance. Even if the share price increases (which is the objective) the earnings should increase by a higher magnitude.

As the P/S resulted in a negative relationship with share returns in this study, firm managers need to focus on building strong sales growth to signal positive sentiments in the market. Potential investors would use this ratio as an additional decision-making tool when they invest in businesses that have low P/S ratios.

A positive relationship between the P/B ratio and share returns implies that managers have to aim to ensure that the information that the markets get is positive to ensure constant growth of the market prices of shares. Any potential negative news has to be carefully communicated to all stakeholders to alleviate disastrous perception that is likely to affect share prices negatively.

The P/CF ratio regressed positively with share returns in this study. If managers are to use this result as a decision-making tool then the focus has to be on share prices to appreciate to levels that will continue to attract potential investors. In this way, the positive relationship between C/CF and share returns will be maintained to further signal positive market sentiments.

P/EBIDTA showed a significant positive relationship with share returns. Using this result will imply that the share price is kept at optimally high levels to send a positive market perception. However, based on further analyses of most previous studies showed a negative relationship between the ratio and share returns implies that business leaders must use this ratio to complement results of other ratios and any relevant information when making investment decisions.

As the results of this study and other similar studies indicate that macroeconomic factors influence share returns, the government must facilitate the growth of GDP in a direction that favours the securities markets. The same applies to the central bank that focuses on monetary policies. Inflation and interest rate should be at levels that promote company growth and subsequent investment returns.

COVID-19 did not significantly affect the securities markets in South Africa. This could be a result of proper and timeous government interventions (Marozva & Magwedere, 2021). It follows, therefore, that governments must institute proper measures to mitigate the negative effect of crises on the economy.

All these implications are relevant at least in the South African context, on which the results are based. It should be noted that these implications can apply to other African or emerging economies as they have similar circumstances to South Africa.

6.4 Contribution of the study

The study contributed valuable knowledge for academia and investors alike. Results of the study fortified the already common phenomenon, for example, that the P/E ratio is negatively related to stock returns. If reasonably many investigators arrive to the same conclusion, the phenomenon can be furthered to a theory. Where there are contradictory results in the case of P/S, for example, this can be used as an impetus for further studies.

Contrary to expectation, the study revealed that share returns may not be significantly affected by a crisis, for example, a pandemic. Marozva and Magwedere (2021) argue that the government policy interventions resulted in the desired goal of stabilising the South African economy thereby boosting confidence in the market. South Africa, like other emerging markets governments, was proactive and pragmatic in dealing with the pandemic as the effects of adopted economic policies outweighed/thwarted the negative impact of the witnessed spike in COVID-19 cases. Nevertheless, this raises interesting curiosity as some previous studies showed that COVID-19 negatively affected share returns, an example being a study by Kusumahadi and Permana (2021). The contradictory results raise a further impetus for studies to further explore similar studies.

According to the author, no such study was done in South Africa, where various price multiples were regressed against share returns. While results are similar in some aspects to results of similar studies in other economies there are differences in some areas, therefore, similar studies are necessary for South Africa to establish if the country has a unique feature concerning how multiples can be used to make investment decisions.

Unlike other studies that investigated one multiple, the study studied five multiples following multiples; P/E, P/S, P/B, P/CF and P/EBIDTA and so the research is more comprehensive compared to others that only used a single variable. A researcher who also studied many

multiples was Arkthar (2020). This research was also unique in that it used the following as control variables: GDP, inflation and interest rate to eliminate their effect on variables of interest. A detailed and comprehensive analysis of the result of each variable was done; some studies only do a summary of the results. This unique analysis makes the outcome of the study to be fully understood.

6.4 Limitations of the study

The study had several shortcomings, some of which are enunciated below.

There are no studies that investigated the relationship between various market multiples and share returns in South Africa according to the author's knowledge. This was a handicap as the author could not have a point of view from a South African perspective. Most of the empirical literature review referenced European and Asian countries. The socio-political and economic landscape of South Africa greatly differs from developed and Asian emerging countries.

Twenty-one of the JSE Top 40 companies were studied. According to the author's view although this number was reasonable and compensated by a lengthy period of the study (12 years) the number should have been more than 75% of the Top 40 to bring about a proper representation of the South African Securities Exchange. This number was brought down by the exclusion of all banks which did not have revenue data. The inclusion of banks might have resulted in a different outcome.

A very important control variable, the exchange rate, could not be used as it correlated highly with GDP. So, the two could not be used together in a regression model. The inclusion of the exchange rate factor might have yielded a different result.

The period under study had several crises which include COVID-19, economic downturn, and power supply cuts. The study only included COVID-19 as a dummy, to the exclusion of others which could not be practically included in the models because of their complexity. If the period of the study did not have all these local crises the outcome of the study might have been different.

6.5 Conclusion

The study aimed to find the relationship between price multiples and share returns in the JSE Top 40 companies from 2010 to 2021. Although results were mixed, it was predominantly established that P/E and P/S ratios displayed a significant negative relationship while P/B, P/CF and P/EBIDTA had a significant positive relationship. P/E is the only multiple that invariably produces the same outcome as other empirical studies both in developed and emerging markets. This phenomenon is likely to be developed to being a theory in finance. The other ratios have mixed results from different studies and economic jurisdictions.

COVID-19 dummy variable had to be included because the period of the research that is, 2010 to 2021 includes some years that were affected by the pandemic. The dummy was included to eliminate its effect on the study. The inclusion of the COVID-19 dummy did not result in any significant results concerning the price multiples. Possibly the South African authorities instituted effective measures to curb the dire effect of the pandemic on the securities market as opined by Marozva and Chigwedere (2020).

Carrying such a study in the South African market is a breakthrough; however, several recommendations can be articulated for future studies of this nature on the South African market as well as other African countries. More such studies should be done in South Africa to firmly establish how price multiples can be used to facilitate stock selection decision-making and predict share returns. South Africa has a paucity of such research. Having several studies done would also assist other investigators with helpful areas of reference.

It would also be beneficial if all industry sectors are selected. In this study, there was no balance in the sectors; for example, the entire banking sector was excluded. A method that would enable all sectors to be represented has to be mooted. Similar research should also be done on some other African countries using this research as a model but adjusting for country-specific circumstances; for example, in Nigeria, the price of oil can be used as one of the control variables.

6.6 Summary

This chapter documented the summary of results, conclusion, contribution, limitations as well as recommendations. The conclusion presents succinctly major areas of the results. Limitations involve a concise exposition of shortcomings of the study while recommendations build on limitations of the study through suggestions for improvements in future research.

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Appendix 1

Table 9. Diagnostic statistics for Model 1

Test	Test Statistic	P - Value	Inference
Heteroscedasticity ***H0:*** $\delta_i^2 = \delta$ ***for all i H0:*** $\delta_i^2 \neq \delta$ ***for all i***	Chi2 = 25.63	0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) =$ $HA: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test** **Frees (1995) CD test**	CD= 4.360 F= 1.643	0.0000 α= 0.10: 0.3583 α = 0.05: 0.4923 α = 0.01: 0.7678	Cross sections are interdependent.
VIF – Test for multicollinearity		Variable VIF 1/VIF PBV 1.69 0.591759 PS 1.62 0.617410 PCF 1.06 0.943227 PE 1.04 0.962337 L.R 1.04 0.964864 P_EBITDA 1.03 0.973106 **Mean VIF 1.25**	Independent variables are not highly correlated using a threshold of 5 (see for example Dodge, 2008)

Table 10. Diagnostic statistics for Model 2

Test	Test Statistic	P - Value	Inference
Heteroscedasticity ***H0:*** $\delta_i^2 = \delta$ ***for all i H0:*** $\delta_i^2 \neq \delta$ ***for all i***	Chi2 = 55.56	0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) =$ $HA: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test** **Frees (1995) CD test**	CD= 1.442 F= 1.476	0.1494 α = 0.10: 0.3583 α = 0.05: 0.4923 α = 0.01: 0.7678	Cross sections are independent.
VIF – Test for multicollinearity		Variable VIF 1/VIF PBV 1.70 0.586521 PS 1.63 0.614867 PCF 1.06 0.942900 PE 1.05 0.955268 P_EBITDA 1.04 0.958692 L.R 1.04 0.964824 RM 1.03 0.967974 Mean VIF | 1.22	Independent variables are not highly correlated using a threshold of 5 (see for example Dodge, 2008)

Table 11. Diagnostic statistics for Model 3

Test	Test Statistic	P - Value	Inference
Heteroscedasticity ***H0:*** $\delta_i^2 = \delta$ ***for all i H0:*** $\delta_i^2 \neq \delta$ ***for all i***	Chi2 = 3.12	0.0774	The variance of the error term is constant. Heteroscedasticity is not present.
Cross-sectional dependence tests $H0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) =$ $HA: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test** **Frees (1995) CD test**	CD= 1.980 F= 1.394	0.0477 α = 0.10: 0.3583 α = 0.05: 0.4923 α = 0.01: 0.7678	Cross sections are interdependent.
VIF – Test for multicollinearity		Variable | VIF 1/VIF GDP 3.77 0.264918 INTR 2.59 0.385862 INFL 2.07 0.483307 PBV 1.75 0.570650 PS 1.65 0.607776 RM 1.19 0.843686 PCF 1.08 0.927479 P_EBITDA 1.07 0.937132 L.R 1.07 0.938363 PE 1.05 0.954076 **Mean VIF 1.73**	Independent variables are not highly correlated using a threshold of 5 (see for example Dodge, 2008)

Table 12. Diagnostic statistics for Model 4

Test	Test Statistic	P - Value	Inference
Heteroscedasticity ***H0:*** $\delta_i^2 = \delta$ ***for all i H0:*** $\delta_i^2 \neq \delta$ ***for all i***	Chi2 = 28.15	0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) =$ $HA: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test** **Frees (1995) CD test**	CD= 4.026 F= 1.698	0.0001 α = 0.10: 0.3583 α = 0.05: 0.4923 α = 0.01: 0.7678	Cross sections are interdependent.
VIF – Test for multicollinearity		Variable | VIF 1/VIF PBV 1.71 0.586117 PS 1.62 0.615721 PCF 1.07 0.936793 P_EBITDA 1.04 0.960128 COVID_19 1.04 0.960773 PE 1.04 0.962066 L.R 1.04 0.964753 **Mean VIF | 1.22**	Independent variables are not highly correlated using a threshold of 5 (see for example Dodge, 2008)

Table 13. Diagnostic statistics for Model 5

Test	Test Statistic	P - Value	Inference
Heteroscedasticity ***H0:*** $\delta_i^2 = \delta$ ***for all i H0:*** $\delta_i^2 \neq \delta$ ***for all i***	Chi2 = 59.02	0.0000	The variance of the error term is not constant. Heteroscedasticity is present.
Cross-sectional dependence tests $H0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) =$ $HA: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test** **Frees (1995) CD test**	CD= 1.593 F= 1.616	0.1113 α = 0.10: 0.3583 α = 0.05: 0.4923 α = 0.01: 0.7678	Cross sections are independent.
VIF – Test for multicollinearity		Variable | VIF 1/VIF PBV 1.73 0.579441 PS 1.63 0.612593 PCF 1.07 0.936731 P_EBITDA 1.06 0.942285 COVID_19 1.06 0.945228 RM 1.05 0.952312 PE 1.05 0.955235 L.M 1.04 0.964728 **Mean VIF | 1.21**	Independent variables are not highly correlated using a threshold of 5 (see for example Dodge, 2008)

Table 14. Diagnostic statistics for Model 6

Test	Test Statistic	P - Value	Inference
Heteroscedasticity ***H0:*** $\delta_i^2 = \delta$ ***for all i H0:*** $\delta_i^2 \neq \delta$ ***for all i***	Chi2 = 0.85	0.3557	The variance of the error term is constant. Heteroscedasticity is not present.
Cross-sectional dependence tests $H0: \rho_{ij} = \rho_{ji} = cor(\mu_{it}, \mu_{jt}) =$ $HA: \rho_{ij} \neq \rho_{ji} = 0$ **Pesaran (2004) CD test** **Frees (1995) CD test**	CD= 1.794 F= 1.306	0.0728 α = 0.10: 0.3583 α = 0.05: 0.4923 α = 0.01: 0.7678	Cross sections are independent.
VIF – Test for multicollinearity		Variable | VIF 1/VIF GDP 4.90 0.204116 INTR 2.79 0.358774 COVID_19 2.75 0.363020 INFL 2.57 0.388733 PBV 1.75 0.570175 RM 1.67 0.599563 PS 1.65 0.607459 PCF 1.08 0.927414 P_EBITDA 1.08 0.930148 L.R 1.07 0.938345 PE 1.05 0.953331 **Mean VIF 2.03**	Independent variables are not highly correlated using a threshold of 5 (see for example Dodge, 2008)