MACRO AND MICRO-ECONOMIC DETERMINANTS OF THE MINING COMPANIES' SHARE RETURNS

by

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I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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ABSTRACT

The study examined the macro and micro-economic determinants of the mining companies' share returns. The system-driven generalised methods of moments was employed to analyse panel data comprising ten listed mining companies on Johannesburg Securities Exchange (JSE) covering the period from 2013 to 2021. The empirical findings using ROA as a performance measure depicts a positive and significant correlation between share price (SP) and the independent variables which include ROA, gross domestic product growth (GDPG) and interest (INT). On the same note, SP have a negative and significant correlation with lagged share price (LSP), return on market (RM) and current ratio (CR). Also, the findings review that RM, debt to equity (DTE) and inflation (INFL) were found to have a positive and significant correlation with return (R). The results also show that there is a negative and significant correlation between R, GDPG and INT. The results also show that DTE and INFL have a positive and significant correlation with total returns (TR) while GDPG, RM and INT have a negative and significant correlation with TR. When ROE was used as a performance measure result show that SP has a positive and significant correlation with ROE, GDPG and INT. It was further noted that there is a negative and significant correlation between SP and the variables which include RM and price to earnings (PE). It was further found that R has a positive and significant correlation with RM, DTE, PE, and INFL. Also, the results show that there is a negative and significant relationship between R and INT. The results showed that TR has a negative and significant correlation with CR and INFL while it is a positively and significantly related with GDPG and INT. Future studies must investigate other macro and micro-economic determinants of the mining companies' stock returns.

Keywords: Share price; arbitrage pricing theory; micro-economic determinants; macro-economic determinants; total returns; return on assets; return on equity.

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LIST OF ABBREVIATIONS

ALSI	All Share Index
AMEX	American Stock Exchange
ANOVA	Analysis Of Variance
APT	Arbitrage Pricing Theory
AR-GARCH	Augmented Autoregressive General Autoregressive Conditional Heteroscedasticity
CAPM	Capital Asset Pricing Model
CF	Cash Flow
CR	Current Ratio
DER	Debt to Equity Ratio
DTA	Debt to Asset
DTE	Debt to Equity
DY	Dividend Yield
EMH	Efficient Market Hypothesis
EPS	Earnings per Share
EXCH	Exchange
FE	Fixed Effects
FF3FM	Fama and French's 3-Factor Model
FF5FM	Fama and French's 5-Factor Model
FGLS	Feasible Generalised Least Squares
GARCH	General Conditional Heteroscedasticity
GDP	Gross Domestic Product
GDPG	Gross Domestic Product Growth
GLS	Generalised Least Squares
GMM	Generalised Method of Moments
INFL	Inflation
INT	Interest
IRF	Impulse Response Function
JSE	Johannesburg Stock Exchange
LCAPM	Liquidity Capital Asset Pricing Model
LM	Lagrange Multiplier

LSDV	Least Square Dummy Variable
LSP	Lagged Share Price
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
PB	Price to Book
PER	Price Earnings Ratio
R	Return
RGDP	Real Gross Domestic Product
RM	Return on Market
ROA	Return on Assets
ROE	Return on Equity
S&P	Standards and Poor
SP	Share Price
STR	Smooth Transition Regression
TAT	Total Asset Turnover
TR	Total Returns
UK	United Kingdom
UNEM	Unemployment
US	United States
USD	United States Dollar
VAR	Value at Risk
VD	Variance Decomposition
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
ZAR	South African Rand

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The main driving force behind the history, development and growth of most of the advanced and powerful African economies is mining. In 2019 alone, South Africa was the largest producer of platinum, chromium and manganese in global terms, and this is a true reflection of how the mining sector has influenced global economies (Johannesburg Securities Exchange (JSE), 2022). According to Hakim and Kusmanto (2020), the mining sector forms one of the core players within any given economy from an economic juncture. The development of this sector is of paramount importance owing to the vast contribution it has to the local and global economies.

There are 16 listed mining companies at the JSE with a total market capitalisation of R1.5 trillion as of 2 June 2022, with total earnings of R245.5 billion, and total revenue of R932.9 billion as of that date (JSE, 2022). All industries' total market capitalisation is R6.7 trillion while total earnings are R791.7 billion with a total revenue of R5.2 trillion as of 2 June 2022 (JSE, 2022). This shows the composition the mining sector has within the total market capitalisation of all listed companies at the JSE, and this equates to 22.39%.

The mining sector experienced a drop in market share of 5.9% from a period ranging from March to June 2022, and this was mainly as a result of the decline in the earnings of Anglo-American Platinum with 6.6% in its share price. This has resulted in a total decline in the industry's share price of 9.3% and it is expected to have a gradual decline in total earnings of 5.5% annually in the next few years (JSE, 2022).

It is evident from the JSE industry and valuation performance that over the past three years, the earnings for the various companies listed under the metals and mining industry have had a growth of 91%. This was a result of a 28% per annum growth in the revenues of the listed companies' (JSE, 2022). As a result, the trend shows that there has been a huge sales base generated by the mining and metals companies' overall, and it has led to a vehement increase in profits too.

The mining sector is of notable importance to both the local and global economies in that South Africa constitutes one of the leading mining and mineral processing countries across the globe (Gusnawan, Mulyantini & Arieftiara, 2021). In doing so, the mining sector contributes 60% of South Africa's net exports, which makes it the main source of the much-needed foreign currency for the effective and efficient operation of any given economy (JSE, 2022). Yusop, Alhyari and Bekhet (2021) opine that the exported minerals are vital at the global economy level in that they act as inputs in the manufacturing industries.

According to the World Bank (2021), the mining sector of South Africa contributed 21% in 1970 towards the country's gross domestic product (GDP) even if it dropped to 8% in 2016. Despite these statistics, the industry still represents 60% of the total exports (JSE, 2022). The mining sector also equates to 9% of value added to the South African economy (Gusnawan et al., 2021). In addition, the mining sector has contributed immensely to the national employment statistics in South Africa, and the industry had 760,000 individuals in 1987 (World Bank, 2021). Even if in recent times the sector has lost its momentum in terms of economic contribution owing to aspects related to a decline in the gold price and production, exchange rate variations, high cost of production, and a decline in demand, the mining sector still stands as an important employer. In 2021 alone, the size of the employment level was over 1.3 million, which is more than a 71% increase since 1987 thereby showing how important the sector is to the welfare of individuals (World Bank, 2021). It is also imperative to know that for every ten people in South Africa, there are dependents on every wage that is paid by the mining sector. This equated to a contribution of R480.9 billion to the nation's GDP in the 2021 financial year (JSE, 2022).

JSE (2022) further asserts that a quarter of the total annual investments comes from the mining sector within South Africa. In doing so, the financial and legal services that were established to act as a supporting structure to the mining sector contribute 20% of the GDP which is a multiplier effect of the mining sector to the economy of South Africa (World Bank, 2021). The total mining shares account for 29% of the total value of the JSE. Furthermore, the mining sector constitutes a major income earner to the government through taxes and in the 2021 fiscal year, the mining sector contributed 17.2% in total towards corporate taxes.

The mining sector is an energy-oriented industry that survives solely on the use of energy to extract the various minerals underground. The mines are powered by electricity, diesel, gas, petrol, solar power, and many more sources of energy. South Africa has of late been exposed to an energy crisis where the utility provider (Eskom) is faced with operational problems which have led to the implementation of rolling blackouts as a way to relieve the under-capacitated electricity grids (JSE, 2022). The rolling blackouts have a devastating impact on the mining sector, and it led to mines looking for alternative energy sources, which tends to be costly. As a result, this has immensely affected the profitability of the sector at large. During rolling blackouts, several mines suffer from infrastructural damage as a result of cable theft by the residents in areas such as Mpumalanga Province where coal mining is taking place (World Bank, 2021).

It is, therefore, necessary to identify the various micro and macro-economic determinants of share returns in the context of South Africa. Since very few studies were conducted, when the two distinct categories of share returns determinants were examined together, there is an inadequate level of literature. In doing so, the studies undertaken mainly focused on developed economies while neglecting emerging ones. The available studies such as the one undertaken by Hakim and Kusmanto (2020) and Shanaev and Ghimire (2019) examine the entire stock exchange when determining either the micro or macro-economic indicators of share prices as opposed to focusing on the sectorial view as in the case of this study.

Also, the available studies tackled micro and macro-economic determinants separately and this study contributes to the literature by looking at both determinants in one study from a developing economy point of view. This comes after considering the various contributions made by the mining sector to the economy and it helps in ensuring that the returns remain lucrative to investors so that they keep on investing in this sector. The investment managers will have the expertise on what to look for when contemplating a lucrative investment destination within the mining sector. The study will help the various officials from a micro to macro-economic view to put in place policies that ensure that the investors in the mining sector get the best return on their share investment and that they invest rightfully from an informed point of view.

The study specifically looks at all mining companies that are listed on JSE. These mining companies must have been listed since 2013 and they are still trading for them to be considered in this study. In addition, the listed companies considered in this study are limited to those companies that are actively trading and listed in South Africa.

1.2 Research Problem

The current focus is on the mining sector at large as it is comprised a wide array of mining companies that permit the widening of the results from the study. Looking at the entire mining sector is in support of the diversification theory at the sectorial level (Bilson et al., 2021). Focusing on one mineral or mining company will not be of importance in that investors would want to look at the best-performing mining companies and invest in them as part of their portfolio investment. One would have an opportunity to check the correlation in share returns between one mining company and the other as a risk minimisation strategy and look at the fair stock valuation of different mining companies within the mining sector (Hakim & Kusmanto, 2020). It will also permit investors to look at the stocks that are either overvalued or undervalued for them to make effective investment decisions. This study will help to ensure that investors have the right information needed to analyse the nature of stock returns in any given mining company and make diversification decisions from an informed point of view.

Conducting this study from an emerging market juncture will be of huge importance in that taking into account the determinants of share returns from developed economies might not depict accurate results as there are differences in terms of development and the trading volumes per session (Ayee, Soreide, Shukla, & Le, 2011; Hakim & Kusmanto, 2020; Widagdo et al., 2020). For example, the JSE trading volumes are way smaller than the NYSE. The market capitalisation of the JSE is approximately US$950 billion which is a notable figure though very smaller than the NYSE which approximately has US$23 trillion in market capitalisation as of May 2019 (World Bank, 2021). This makes the JSE to be 4.13% of the NYSE in terms of market capitalisation.

Moreover, from an emerging market viewpoint, it has not been investigated concerning the determinants of the share return in a global pandemic situation. COVID-19 emerged and brought political, economic, financial, and social structures globally to a

standstill. The commodity market was negatively affected and this came as a result of isolated outbreaks of the pandemic and the introduction of government policies which resulted in the shutdown of the entire economy as in the case of South Africa and Peru (World Bank, 2021). Moreover, the demand for minerals fell vehemently such as iron ore, copper and zinc. The insurgence of the pandemic resulted in limited communication, trade and access to products, and it led to a total halt in the tourism sector. This resulted in a lower demand for and the sales of goods which led to a total economic shutdown, and the mining sector is not an exception in this regard (Yusop et al., 2021). This is an unprecedented phenomenon that has affected environmental sustainability and economic development in global terms. Most of the governments have eased some of the pandemic restrictions and the majority of the measures were abandoned after April 2020 in a bid to reduce the severity since it harmed the industrial production.

However, by looking at the role played by the mining sector towards the economy of South Africa and the rest of the world, it is worthwhile to ensure that the sector attracts investment to the maximum. This can only be done when there is a rise in the share returns since shareholders' main goal in investing in shares is to maximise their wealth (Widagdo et al., 2020). In doing so, the study sought to identify the various macro and micro-economic determinants of the mining companies' share returns as an extension to the very few studies that were conducted in this regard such as Antono, Jaharadak, and Khatibi (2019). This is done to help the management of mining companies and national policymakers know where to put their main focus to enhance the share price of their mining companies and the overall mining sector.

1.3 Research Objectives

The primary objective of the study is to investigate the macro and micro determinants of mining company share returns. Therefore, the secondary objectives of the study are outlined as follows:

- To examine the macro-economic determinants of the mining companies' share returns; and
- To examine the micro-economic determinants of the mining companies' share returns.

- To provide recommendations to the management of mining companies and investors on the factors that determine the mining companies' share returns.

1.4 Significance of the Study

The study will be of notable importance especially on the body of knowledge as a result of the identification of various factors from both micro and macro-economic dimensions on how they affect the share returns. Though the study solely focused on the mining sector organisations, the results can still apply to all sector organisations. As a result, the framework of the study will be used as a point of reference in future studies in the form of a literature review. Additionally, the financial management body of knowledge as the focal point of the study will benefit portfolio management through the identification of the fundamental variables that have an impact on the industrial shares.

The study will also be beneficial to the investors since they will be aware of the various factors that affect their share returns and how they affect them. In doing so, the investors will be in a position to find out exactly what to look at when making investment decisions, and this will be undertaken from an informed viewpoint through the results of this study. Also, the quantitative methodology to be employed in this study, together with the results and recommendations, will be of notable importance to the academics in that they can use all the information provided for comparison sake with the previous studies when embarking on their studies.

1.5 Research Structure

The research is sub-divided into six different chapters and they are outlined in brief as follows:

- **Chapter 1: Introduction**

This chapter gives an outline of the introductory remarks to the study and this is followed by an articulation of the background to the study. A problem statement is also presented and the research objectives were outlined before stating the significance of the study and the research structure.

- **Chapter 2: Stock returns: Theories**

The various theories underpinning the study are discussed in this chapter and these include the theories that are in line with the stock returns. The various theories include Efficient Market Hypothesis (EMH), Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), Random Walk Theory, and Fama French's three and five-factor theories to mention a few. The best theory that aligns with the study is APT since it consolidates both macro and micro-economic determinants of stock returns.

- **Chapter 3: Empirical literature**

The empirical literature based on the objectives of the study is discussed in this chapter. The empirical literature in this case is first discussed based on the various macro-economic determinants of stock returns and it is followed by the empirical literature based on the micro-economic determinants of stock returns.

- **Chapter 4: Methodology**

This chapter proceeds by describing the research methodology of the study which is a pathway followed to address the objectives as outlined in Chapter 1. The chapter starts by outlining and describing both the research paradigm and approach which are the core pillars of the research design. Population and sample follow thereafter by outlining how the sample was obtained from the population. Data and variables are also described by recapping the research objectives and outlining the independent and dependent variables. The model is also specified and explained in this chapter before concluding remarks.

- **Chapter 5: Data analysis and discussion of results**

This chapter outlines the descriptive statistics on both independent and dependant variables. It is followed by an outline of the correlation analysis between the variables as identified in the study. Empirical results are also presented and discussed where the results are captured and interpreted, as well as a theory outline which supports the relationship and interpretation in line with the literature consulted. Empirical results are displayed based on mining companies' two performance measures, namely, ROA and ROE.

- **Chapter 6: Summary, conclusions and recommendations**

This chapter presents the concluding remarks to the study which was based on macro and micro-economic determinants of the mining companies' share returns. In doing so, a summary of the main objectives of the study is given followed by a summary of the results obtained from the primary findings. The contributions of the study as well as the policy implications are also presented. A discussion of the limitations of the study and further recommendations for further research is also made. The next chapter presents literature on stock returns theories.

CHAPTER TWO: STOCK RETURNS: THEORIES

2.1 Introduction

This chapter outlines an overview of the South African mining sector as well as a discussion on the numerous theories underpinning the stock returns concept. The various theories to be discussed in this chapter include but are not limited to the Random Walk Theory, EMH, APT, CAPM, and Fama and French 3-factor model. This is with the main reference to the macro- and micro-economic determinants of the mining companies' share returns. Presentation and analysis of the stock returns are based on the various core aspects which include criticisms, how and who tested it within the context of the South African market and contextualisation of the identified theories in South African market terms.

2.2 Overview of the South African Mining Sector

The main objective of the minerals council of South Africa is centred on repositioning the mining industry as the chief industrial sector and this is possible through the enhancement of a two-fold increase in the real investment by year 2030 (Chinzara et al., 2020). The target will be made possible through an establishment of council partnerships with the major stakeholders who will enhance valuable policy formulation and implementation, legislative administration and enactment of a conducive operating environment (Gatua, 2019). The objective is in support of the broad National Development Plan which focuses on promoting the South African economic growth. The mining sector of South Africa has had considerable contribution towards the nation's GDP where it reached 7.53% in 2022 while it was 7.56% in 2021 (Al Hamdooni, 2023). However, this contribution is lower than the 1993 which was at 10%. A decline over the years can be seen on mining sector GDP contribution, however, South Africa remains one of the top mining destinations in global terms.

South Africa is known for its richness in mineral deposits which accounts for a notable share in global reserves as well as production. The common mineral reserves are coal, diamond, gold and platinum while other minerals which are common in South Africa include vanadium, titanium and chrome (Jefferis & Okeahalam, 2019). The main players within the mining sector include Royal Bafokeng Platinum, Kumba Iron ore,

Gold Fields, Exxaro Resources, Anglo American Platinum, Impala Platinum, Harmony Gold, Sibanye Stillwater, and Northan Platinum.

The mining sector of South Africa has had considerable growth in terms of production as shown by R1.18 trillion in 2022 alone which is slightly higher than the 2021 production levels valued at R1.1 trillion. In 2021 and 2022, the mining sector managed to topple the R1 trillion Rand mark. Immense production within the sector was spearheaded by enhanced commodity prices which boosted the economy through higher taxes thereby bolstering fiscus, improvement in both employment and salaries. The taxes collected by the government from the mining sector shielded the nation from entering into global debt due to economic contraction which emanated from the COVID-19 lockdown. A total of R74 billion was collected from the sector in 2022 while in 2021 it was R81 billion and the royalties rose to R14 billion in 2022 fiscal year. The export value in 2022 was R878 billion which rose from R856 billion in 2021 and the main cause for this increase can be traced to an increase in commodity prices which improved by 70% year on year.

The mining sector of South Africa is known for its positive impact towards the national economic activity, employment creation as well as the foreign currency exchange earnings (JSE, 2022). In 2018, the mining sector of South Africa alone accounted for $22.5 billion of the national GDP while employment level in the sector was 456 000 employees. Mining industry stands to be one of the few sectors that has the capacity of adding jobs even in dire economic conditions and this can be supported by the 2022 employment statistics where the sector created 15 500 more jobs thereby making a total of 475 560 employees falling directly under the mining industry. This shows how relevant the mining industry is to the economy of South Africa and the welfare of the general citizens.

It can be noted that there is a deficiency in the mining investment level and this can directly be linked to constrained future growth as well as a decline in the production levels within the mining sector (Malhotra & Tandon, 2022). Despite an increase in the commodity prices, this has not led to any increase in the fixed investment within the mining sector and this can be traced to local structural constraints (Rjoub, 2022). In essence, this has led to a zero net investment especially in new projects. The negative

investment climate emanates from various sources such as structural constraints, delayed structural reforms by the government as well as a negative perception towards South Africa as viable mining investment destination.

2.3 Theories of Stock Returns

Various theories were developed by different authors which specifically address stock returns. In this case, the stock returns and stock prices are used interchangeably for the sake of this study. The various theories to be discussed in this chapter include but are not limited to the Random Walk Theory, EMH, APT, CAPM, and Fama and French 3-factor model. Emphasis is placed much on the APT because of its ability to combine both the macro- and micro-economic variables as determinants of share returns which makes it close to the aim of the current study.

2.3.1 Random Walk Theory

The Random Walk Theory was conceptualised by Kendall (1953) after discovering that successive stock price changes are bound to be independent over time and it shows that the stock prices follow the random walk. The theory postulates that the share prices of any given company react instantly as new information arises (Chhatwani, 2022; Fabozzi & Fabozzi, 2021). New information is bound to arise on a random basis; so is the share price movement as a reaction to the new information. This scenario makes it impossible to predict the share price movement in the future through the use of historical information (Trofimov, 2020). Furthermore, the Random Walk Theory uses information as the determinant of stock returns. The theory has led to the development of the efficient market hypothesis.

According to Chen, Sauerwald, Zhong, and Duran (2023), the Random Walk Theory is based on the notion that the markets are efficient and it reflects the characteristic features of a perfect market. Moreover, the Random Walk Theory is built around various principles and these include the absence of transaction costs and if they are there, they will be very low, close to zero. In addition, there are no investment restrictions, there is no single investor that has monopoly power to influence the share price, and all investors have equal access to public information. Also, according to Cerkovskis, Gajdosikova, and Ciurlau (2022), the share price is a true reflection of the market consensus.

The price behaviour of the stock market plays a significant role in the share of the seldom monetary resources (Marozva, 2020). The relationship that exists between the readily available information accessible by the public and the stock prices within the financial markets is best explained by market efficiency, that is, whether the proceeds from the market follow the random walk process or not (Cubbin, Eidne, Firer, & Gilbert, 2020). Any change in information directly affects the stock prices under the random walk theory.

There are considerable developments that took place within the JSE since its inception in 1887 and it is important to edify the literature at hand regarding the randomness of the All Share Index (ALSI) (Cubbin et al., 2020) and this can be achieved through incorporating the current and latest information to see if the results are still the same or they have changed overtime (Hamman et al., 2016). In doing so, this has been the cause of concern to financial analysts to derive theories and models that best explain how the stock prices behave and how they can be determined through information relating to the past performance of the share as a determinant of the stock prices. One of the models points out the Random Walk Theory which falls under the economic theories category in finance (Mabhunu, 2017). The theory outlines that stock prices exist in a randomised procedure which leads to a failure to foretell the future prices of the stocks (Mobarek, Mollah & Bhuyan, 2018).

The Random Walk Theory can be defined as a theory that alludes that every follow-up in the time series, for example, share price trends, is directly dependent on historical observations (Mwamba, 2021). In essence, the theory outlines that the price patterns do not give a predictive and easy-to-follow-up sequence over a given period and this best describes it as a random walk (Smith & Jefferis, 2015). A lack of visible correlation between the historical and the current prevailing stock prices is highly visible under the Random Walk Theory (Okpara, 2019). This means that in a case where there is a share price increase within a particular time, a partaker cannot predict or see that it will rise again tomorrow. In essence, no amount of historical information can be used to predict future stock prices.

On the contrary, the potential earnings reside on important factors. These include management quality, trade position and the financial system (Cubbin et al., 2020).

Once the shareholder follows the Random Walk Theory, it gives one room to undertake a watchful study on the fundamental factors for the sake of making a comparison between the real and the intrinsic value of the share price (Marozva, 2020). Any difference can, therefore, be used to make a profit out of the market if the real price is higher or lower than the intrinsic value. Moreover, the Random Walk Theory posits that the securities market is a perfect example of an efficient market and it is characterised by competing players who have the aim of earning normal profits while trying to predict the stock prices (Bonga-Bonga, 2021). This results in the actual prices showing all the information about a specific security thereby resulting in the security's fine estimates of the intrinsic value. The self-determination aspect within the Random Walk Theory will exist as long as the historical performance information about the price sequence of a given security cannot be used to influence gains in the future (Trofimov, 2020).

Past price information cannot be used to predict future price movements, therefore, affirming the randomness element embedded in the Random Walk Theory. The investors who believe in the Random Walk Theory know that they cannot overturn the market to their advantage unless they incur an additional risk (Chitenderu et al., 2020).

- **Criticisms of the Random Walk Theory**

One of the main criticisms aligned with the Random Walk Theory is the presence of a wide variety of investors who specialise in capital investment (Butler & Malaikah, 2019). As such, this would mean a high possibility within the securities price of a trend emergence in the short run and this would mean that an intelligent investor can strategically be involved in an activity of buying low and selling high within a short space of time and make a profit (Chhatwani, 2022).

Hamman et al. (2016) identified some flaws within the theory by outlining that the theory postulates that there are patterns that are followed by stock prices and this can even take place in the long run. One can follow the patterns and be able to make abnormal gains. Various factors affect the stock prices and these can be either macro- or micro-economic factors or others that cannot be classified as such. As a result, it is impractical to find a price pattern followed by a security (Dockery & Vergari, 2016).

Also, there is an argument that there is a possibility that past information about a security's price can be a useful tool concerning its future prices (Mwamba, 2021). This is against the assertion from the theory that historical prices are not informative. Investors such as Warren Buffet have outperformed the market by merely studying the company fundamentals (Mishkin, 2019).

One of the criticisms by Okeahalam (2019) is that the Random Walk Theory has a problem of oversimplifying the financial markets' complexity by undermining the behaviour of the market participants and their actions thereof, which poses a huge effect on the prices of securities and their outcomes (Trofimov, 2020). Many factors influence the price and these include non-random elements such as changes in government laws and the interest rate, while some emanate from unethical practices which include the manipulation of the market as well as insider trading activities (Dahel & Laabas, 2019).

Cubbin et al. (2020) assert that the Random Walk Theory possesses an assumption that all the participants have access to identical information yet in a real-world setup not everyone has access to the same type of information. Other investors have access to more and better-quality information. For example, institutional and very large investors cannot be compared to individual investors in terms of information access (Okpara, 2019). Information differentials are the main cause of market inefficiency.

- **Theory application**

Chitenderu, Maredza and Sibanda (2020) undertook a study which was focused on investigating the Random Walk Theory on JSE price trends. It can also be noted that where the Random Walk Theory holds, the weak form of efficiency also does and not vice versa (Mishkin, 2019). However, it must be set clear that the abuse of the Random Walk Theory cannot be used as proof of market inefficiencies within the weak form.
It can be acknowledged that the financial markets existing within developed countries are weak form efficient and this makes the share prices within developed markets follow the random walk process as opposed to the emerging markets (Butler & Malaikah, 2019). The empirical evidence from the South African market shows mixed results on the status of the Random Walk Theory. The studies undertaken were mainly based on the traditional method application which includes the autocorrelation and the

unit root tests (Okeahalam, 2019). The studies outline that the behaviour of the South African financial sector with specific reference to the stock market prices might have significantly been influenced by the notorious 2008/2009 global financial crisis.

The studies that are against the Random Walk Theory on the JSE include the ones that were conducted by Mabhunu (2017) and Cubbin et al. (2020) whereas those that were in support include but are not limited to the studies by Okeahalam (2019), Smith and Jefferis (2015) and Hamman et al. (2016).

The Random Walk Theory could not form the basis of this study since it only considers one variable, information, as the determinant of the stock returns. Information is one of the micro-economic determinants of stock returns. It is encompassed within the Random Walk Theory since the information considered pertains to the share's past performance. This study is broad in that it looks at both macro- and micro-economic determinants of the stock returns and Random Walk Theory only focuses on one micro-economic variable. Therefore, it was excluded as the core theory for this study.

2.3.2 Efficient Market Hypothesis (EMH)

The EMH was propounded by Eugene Fama (1963) who stated that the prices instantly change as a result of the arrival of new information. A market can be termed efficient if the changes in the information within the market of a given financial security are reflected in the price of the financial asset and no one would make an abnormal profit (Santoso, Sidharta & Wardini, 2020). Abnormal profits are impossible to earn since security information is readily available and accessible to the public. The EMH postulates that no investor can use readily available information to speculate on future share price movements before anyone else and be able to make a profit (Ding, Mazouz & Wang, 2019). The EMH encourages policymakers to devise macro-economic policies and make the information publicly available and there must not be fear that it will influence the share price (Butler & Malaikah, 2019). In this case, the EMH as an extension of the Random Walk Theory uses information as the determinant of the stock returns.

The EMH has been the centre of attention in the financial services industry since the early 1970s and within the social sciences, it has been one of the most controversial

areas of study which drew considerable attention from scholars in finance (Mishkin, 2019). However, there has been little consensus among financial economists regarding the EMH application's validity despite the vast improvements in quantity and the quality of data, the edifications in statistical analysis as well and the advancements in the theoretical models. This is evident as shown by the results from the study undertaken by Al Hamdooni (2023) where more than half of the reviewed papers were in support of the market efficiency.

An efficient market in the field of finance is one with an information set that reflects fully that information set (Fama & French, 2015), that is, the price of a security would not be affected by revealing the information set to the participants within the market (Malkiel, 2021). The core mandate of the capital markets is to ensure a smooth flow of resources from the surplus units to the deficit ones, that is, from lenders to borrowers in an efficient manner (Ding et al., 2019). The efficient market also entails that one cannot influence stock returns through the use of publicly held information. Therefore, the Fisher separation theorem is the one followed in investment which outlines that the lending rate information is the one used by each producer in accepting the project up to a point where the rate of return on the least project is equal to the external funds' opportunity cost (Hamman et al., 2016).

In a market that efficiently allocates its resources, the available savings are put into productive investments so that they can benefit all stakeholders involved (Adnan & Isma'eel, 2021). An efficient stock market is characterised by participants who are price takers, not price makers and the information efficiency maintains that the accessibility and movement of information is costless and has to be received by all stakeholders involved simultaneously (Cakici & Zaremba, 2022). In addition, the capital markets are operationally efficient if the intermediaries involved in the channelling of the financial resources from the savers to borrowers do so at the least cost which gives them a fair return on the services rendered (Marozva, 2020).

The hypothesis behind the demonstration of efficiency within capital markets is based on the notion that the level of competition existing among the profit-seeking market participants permits asset prices to adjust continuously while reflecting all the price influential information (Zhao, Ye & Han, 2020). This viewpoint further leads to the

realisation that one of the main characteristic features of an efficient capital market is that the securities prices are a summation of the readily available information and the price should consist of all the new information as it arrives (Okeahalam, 2019). The result of EMH states that the available information within the market must be a factor of the stock prices such that no investor can be able to reap abnormal profits through the use of historically, privately, or publicly held information (Puspitaningtyas, 2019). As such, it makes it impossible for the investors to embark on forecasting future price variations since the prevailing stock prices would have integrated the futuristic anticipated events. As a determinant of the stock prices, the arrival of any new information results in an instant change in the stock price and this discourages earning of abnormal gains by the market participants (Cakini & Zaremba, 2022).

There are three forms of EMH and these include the weak form, semi-strong and the strong form market efficiency (Mishkin, 2019). Each form of EMH has its characteristics which distinguishes it from the other.

- **Weak form**

Salisu, Gupta and Ogbonna (2022) assert that the weak form of EMH entails that the prevailing financial asset's price fully shows all the readily available share data in the market. As a result, historical information about the share prices cannot be used to predict the future direction of the financial asset's price since the price changes are independent between periods. Under the weak form of EMH, the investors cannot be in a position to make positive returns through the use of technical analysis (Puspitaningtyas, 2019). The weak form of EMH articulates that only information about the history of the prices is included fully in the current stock prices (Marozva & Makina, 2020). As such, the theory is in full support of the notion that it is impossible to earn excess profits through investment in such financial securities, and under no circumstances would any investor be able to beat the market through the analysis of historical prices in trying to gain biased returns or profits (Cakini & Zaremba, 2022). In this case, it shows that the historical information is a determinant of the stock prices under the weak form.

- **Semi-strong**

The semi-strong form of EMH is similar to the ordinary EMH which entails that the share price is a summation of the publicly available information which has to be considered by the policymakers and the market participants (Adnan & Isma'eel, 2021). The public information is not only limited to the past price information but also encompasses the data found within the company's financial statements, released information about merging plans, earnings as well as dividends declarations, major rivals' financial positions, anticipations within the macro-economic events such as monetary policy adjustments, rate of inflation to mention but a few (Chitenderu et al., 2020).

What it means under the semi-strong form of efficiency is that no investor can achieve positive risk-adjusted returns through the use of fundamental analysis (Al-Nasseri, Ali & Tucker, 2021). The semi-strong form of the market hypothesis carries the same assumptions as that of the weak form but it extends way beyond the weak form by considering the publicly held information and it is much stronger (Ahmed & Hla, 2019). In semi-strong efficiency, both technical and fundamental analysts cannot be able to tell how the investors invest their finances and this acts as a barrier to these investors from making abnormal gains in comparison to other investors who would have invested in random portfolios (Hillier & Loncan, 2019). In the case of a market that is in the semi-strong form of market efficiency, investors are advised to invest passively in the tradable index which falls under the market index (Shanaev & Ghimire, 2022).

- **Strong form**

The strong form of market hypothesis entails that the share price includes all the information that is in the hands of public and private sources (Dumrongwong, 2020). The strong form of market hypothesis is a summation of all forms of information and this includes historical information relating to the share price, and material and non-material insider information (Hillier & Loncan, 2019). What it means is that in the case of a strong form of market efficiency, no group of investors has monopolistic access to information that might be of use to attain positive risk-adjusted returns. Therefore, the determinant of the share prices under this form of EMH is both public and privately held information which includes insider information.

The strong form of EMH is its epitome (Fabozzi & Fabozzi, 2021). The EMH shows that an individual investor in a financial market can earn returns equal to that of a qualified investor. However, there are many instances where the share price in the market has been unable to encompass all the available information and this has always made qualified traders to beat the market by earning higher returns than the rest of the various classes of traders (Zhao et al., 2020). Hakim and Kusmanto (2020) assert that all forms of information pose either direct or indirect influence on the share returns and this takes place by affecting the share prices either positively or negatively. Additionally, the investors under EMH can only in the short run be able to attain abnormal risk-adjusted returns since the macro-and micro-economic variables in various sectors affect the intrinsic values of shares in the long run (Chhatwani, 2022).

However, the EMH cannot be used as the basis of this study since it is only focused on information that is in the hands of both public and private spheres which falls out of the aim of this study. This study dwells on the macro- and micro-economic determinants of the stock returns. As such, it fails to qualify for this study.

- **Criticisms of EMH**

According to Hearn and Pieces (2020), the EMH assumes that all investors have the same viewpoint concerning readily available and accessible information. This assumption has a problem in that there is a wide range of ways and means to analyse and value stocks worldwide. Several models were developed by stock valuation researchers which can be used by different investors in determining the value of the stock such as the Gordon Growth Model (Chitenderu et al., 2020). In the same vein, Shanaev and Ghimire (2022) concur that one investor might focus on looking at the market opportunities from an undervaluation perspective while the other investor makes a stock evaluation from the growth potential basis as a way of determining the stock returns. Essentially, these two investors will reach different conclusions concerning the fair market value of the stock under consideration. In this case, it can be concluded that it is practically impossible under efficient market conditions to predict the exact worth of a given stock and this proposition is against the propositions of the EMH (Smith & Jefferis, 2015). One of the propositions stipulates that the investors are capable of profiteering from putting their money in low-cost and passive portfolios (Fabozzi & Fabozzi, 2021).

According to Puspitaningtyas (2019), the other criticism emanates from another assumption of EMH which states that, given the same amount of invested funds, there is no investor with the capacity to be more profitable than the other. This is based on the notion that investors have access to the same information and this guarantees that they can have equal returns. One must consider the investment returns earned by all global investors and the investment funds, if indeed there was no advantage, in the mutual fund sector there was not going to be a range of annual returns. This industry makes slight losses to above 50% returns per annum. Mishkin (2019) accentuates that if the EMH's proposition stands which depicts that every investor is profitable, if one makes a profit, this would mean that the entire world of investors would make profits daily and this is very far from the truth.

Also, under EMH, there is a proposition that suggests that no one is capable of beating the market (Al Hamdooni, 2023). It also goes on to imply that even when one uses the best efforts in the market, no one would be able to attain above-average annual returns from all investors and funds (Cakici & Zaremba, 2022). This technically means that the best strategy will be to place all investments into an index fund as this would move in line with the level of corporate profitability (Malkiel, 2018). However, this notion is rendered invalid according to Marozva (2020) since there are individual investors who have beaten the market constantly such as Warren Buffet who have managed to obtain the above average annual returns. Determination of the stock returns would be fair if it is viewed from a macro- and micro-economic determinants viewpoint rather than the information efficiency dimension only. It gives inconclusive results on the factors determining the stock returns.

- **Theory application**

Several studies were undertaken by Fama and French (2015), Okpara (2019), and Malkiel (2021) on various stock markets in trying to evaluate the weak form efficiency. The specific studies that were undertaken concerning the JSE include but are not limited to Bonga-Bonga (2021), Mishkin (2019) and Smith and Jefferis (2015).

In another study that was undertaken by Okeahalam (2019), it can be noted from the results that 50% of listed shares on JSE are found to be in line with the EMH. Smith and Jefferis (2015) undertook a panel study concerning the African share markets and

a multiple variance test was applied. The results show that the random walk is followed by the JSE stock index and this affirms the weak form of efficiency. Al-Nasseri et al. (2021) undertook a study where JSE's efficiency was investigated through the use of time-varying and fixed effects GARCH model and it was noted that JSE falls under the weak form of efficiency.

2.3.3 CAPM

CAPM as a theoretical model was developed by Sharpe in 1964 in a bid to determine the expected return on a given share and this is done through the help of the market expected return, the beta coefficient associated with the shares and the risk-free rate which is represented by the Treasury bill rate (Marozva, 2020). CAPM seeks to determine the impact of risk on the expected return of an individual share relative to the market portfolio. It means that the market risk is the determinant of the stock returns under CAPM.

The formula to get the expected return using the CAPM is as follows:

$$E(R_i)=RF+\beta_i[RM-RF] \quad 2.1$$

Where:
$E(R_i)$ is the asset's expected return
R_f is the risk-free rate of return
β_i is the stock market's beta
R_m is the market return of the portfolio

It is a simple exercise to come up with a relationship between the risk and return in deriving efficient market strategies if CAPM can provide an exact description of the capital markets (Hillier & Loncan, 2019). The relationship is best described by the CAPM equation where the expected return is a function of the summation of the risk-free rate and the beta factor of the market risk premium (Mishkin, 2019). As shown in the CAPM equation, the model makes use of the non-diversifiable risk which is measured through beta, and the return obtained from risk-free financial assets such as the Treasury bill plus a risk premium as the expected return. In this case, it shows

that the market risk premium equates to the return on the market which is more than the Treasury bill rate multiplied by the beta of the portfolio. This means that the difference existing between various share returns or portfolios is best described by beta (Hamman et al., 2016).

CAPM is famous for its simplicity when determining the expected return on a given financial asset (Zhao et al., 2020). As such, this has exposed the theoretical concept of spotlight which resulted in its analysis to see if it suits best in equity return calculation. There has been a debate on whether the CAPM is the best model to be employed when determining the equity-required return. It is clear that the CAPM only considers a single source of risk which is a macro-economic variable (Mabhunu, 2017). Also, investors and analysts use different inputs when calculating CAPM which makes the model result in different solutions thereby making it have no single correct number (Puspitaningtyas, 2019). According to Adnan and Isma'eel (2021), the assumptions according to Al-Nasseri et al. (2021) are quite unrealistic regarding investor behaviour.

CAPM is one of the equilibrium models that serves to strike a balance between risk and return (Chen et al., 2023). The CAPM's underlying principle is that there is a linear relationship existing between the systematic risk and the anticipated returns. Systematic risk is well known as undiversifiable risk, and it is measured through beta (Ahmed & Hla, 2019). The relationship existing between risk and return in the case of CAPM is best defined through the security market line (SML). The SML compares the systematic risk of a share with both the market return and risk together with the risk-free rate to estimate the expected return of a given share (Trofimov, 2020).

- **Criticisms of the CAPM**

CAPM is found to have notable criticisms and these criticisms are of great importance in that they validate or invalidate the conclusions reached by some researchers who employed the model in measuring the risk-return relationship within the financial assets and portfolios in their diversification exercise (Shanaev & Ghimire, 2022). The criticisms are outlined as follows:

- **The assumptions in CAPM are unrealistic**

There are various assumptions within CAPM and it can be noted that the assumptions are greatly unrealistic in real-world situations (Cakici & Zaremba, 2022). This has been a cause of concern to various researchers and it has been a source of argument within the research field on the model's application. The unrealistic assumptions are the cause of flaws in CAPM (Marozva, 2020). There have been intense criticisms of the assumptions underlying the CAPM. For example, the model assumes that there are no taxes and transaction costs which is far from being real in the normal functional world. Also, the other assumption of homogeneous expectations among the investors is prone to considerable doubt since the investors are different in terms of their expectations, their investment holding period and decision-making to mention but a few (Zhao et al., 2020).

There are assumptions that there is normal distribution in share returns or it is symmetrically distributed and the investors are concerned with the mean and the variance of returns which means that the investors are not interested in either the upside potential or downside risk. These assumptions are unsatisfactory since there is an asymmetric distribution in portfolio returns in general terms and risk is not viewed as only mean and variance of returns by investors, there is more to that (Puspitaningtyas, 2019). This makes beta to be an incomplete measure of risk. As a result, the model cannot be used as the basis of this study since the study is broad by considering both specific macro- and micro-economic determinants of stock returns.

- **CAPM captures incomplete factors**

It is argued that the factors captured by CAPM that are deemed to affect the share returns are insufficient (Marozva & Makina, 2020). CAPM gives a wrong description concerning expected returns and this makes the model to be rendered incorrect which leaves multi-factor models such as APT to give a correct and supported description of returns as argued by various researchers (Chitenderu et al., 2020). According to the APT, share returns are affected by a myriad of both micro- and macro-economic factors, not by only beta as per the propositions of CAPM (Sonenshine & Da, 2022).

❖ **CAPM has limited practical value**

It is argued that CAPM is difficult to test in a case where there is no existence of a true market portfolio and this makes it have limited practical value. In a study undertaken by Roll (1977), CAPM was tested in terms of its validity and usefulness in application on issues about its reliance on the presence of a market portfolio. The criticism in this regard is centred upon the notion that in the case where measures of a market portfolio are employed as proxies, there is a possibility of having wrong predictions in share returns. Consequently, wrongly measured beta will emerge (Okeahalam, 2019).

In another view, the notion put across by Reilly and Brown (2017) in extending the arguments made by Ross (1976) was that CAPM is a meaningless exercise for there is no true market portfolio as per the model's assumptions. The CAPM validity's empirical testing and its use in evaluating the performance of the investment is also not meaningful and, hence, cannot be used in this study.

- **Theory application**

The outcomes from the various empirical investigations undertaken on JSE concerning the relevance of CAPM are found to be of the same nature as the ones obtained from international studies. In a case where the thin trading effect at JSE is removed, it is evident that the extent of beta stability can be the same as the ones on UK and US markets (Chhatwani, 2022). The share returns are not in congruence with CAPM's assumptions. Even if the results are in support of the CAPM, the findings from empirical studies are, however, still inconclusive. Fabozzi et al. (2021) articulate that from the studies undertaken, the beta is unstable with time and this poses a negative impact on beta's usefulness as well as CAPM in the South African context. CAPM was rendered valid by Trofimov (2020) and it was also concluded that the model must be embraced and is highly acceptable in the context of JSE. Chen et al. (2023) outline that the CAPM is a suitable model for use in both industrial and mining shares on the JSE. However, it was further found that a better explanation comes from the APT in explaining the JSE stock returns than the one from CAPM.

CAPM cannot be employed in this study because of its lack of broadness in application. The model only focuses on the market risk as a determinant of the stock returns which is far below the aim of this study. This study is different because it

considers ALSI regarding all mining companies that are listed on the JSE which are used to determine the factors affecting the stock returns. Specifically selected macro- and micro-economic determinants will be tested to see their real effect on stock returns thereby making the APT to be the closest best theory for this study.

2.3.4 Liquidity Capital Asset Pricing Model (LCAPM)

The four distinct dimensions of liquidity are aligned with the rate at which trading is facilitated and they include the quantity, speed, cost, and price impact (Al-Nasseri, et al., 2021). In doing so, there has not been enough research that was undertaken on trading speed as one of the liquidity dimensions in equity valuation. The liquidity factor in a given financial asset is fundamental especially when looking at huge institutional investors as well as the portfolio managers (Shanaev & Ghimire, 2022). Liquidity is defined as the easiness of transforming financial security into monetary form without any loss of value (Dumrongwong, 2020). The studies undertaken did not capture the four liquidity dimensions adequately and few of them incorporated the liquidity risk aspect into the pricing model or were able to explain the anomalies from a liquidity risk point of view (Marozva, 2020).

The Liquidity Capital Asset Pricing Model (LCAPM) measures liquidity by considering liquidity when pricing assets, and it goes on the relate liquidity to anomalies (Hillier & Loncan, 2019). The LCAPM incorporates the turnover adjustment which views the stocks with a huge turnover as being more liquid than those with lower turnovers. In addition, the liquidity measure also considers the trading cost dimension of liquidity. Evidence shows that the least liquid stocks under the LCAPM are characterised by ‘small size, value-oriented, low turnover, large bid-ask spreads, and large absolute return to volume ratios’ (Hakim & Kusmanto, 2020). As such, this makes liquidity to be the determinant of the stock returns under the LCAPM.

According to Fama and French (2015) in Marozva (2020), the LCAPM formula is represented as follows:

$$R_{it} - RF_t = \propto_i + \beta_1 \ (RM_t - RF_t) + \beta_2 \ LIQ_t + \varepsilon_{it} \qquad 2.2$$

R_{it} represents the portfolio return *i* in time *t*

RF_t represents the risk-free asset's return in time *t*

RM_t represents the market portfolio's return in time *t*

LIQ_t represents the liquidity of portfolio *i* in time *t*

β_1 and $\beta_2$represents the coefficients

Liquidity, according to Cerkovskis et al. (2022), can be seen as an indefinable concept in finance since it cannot be directly identified. However, it has a myriad of aspects that are within which makes it impossible to capture in a single measure. This makes the term liquidity to not have a universally acceptable definition. The lack of definition of liquidity comes from the notion that the concept itself emanates from various economic perspectives (Ahmed & Hla, 2019). Liquidity may be defined in terms of how easy it is to convert an asset into liquid cash without losing the monetary value and this comes from the perspective of market liquidity (Marozva & Makina, 2020). In a different view, liquidity can also be seen as an extent to which one can secure funding to facilitate security trading and this is called funding liquidity (Okeahalam, 2019). So, this automatically shows that the definition of liquidity is driven depending on the angle one is at any given juncture. However, for the sake of this study, the market liquidity is the one that will be followed since the focus is on the stock returns with specific reference to the mining companies in the context of South Africa.

- **Theory application**

According to Bonga-Bonga (2021), stock returns are heavily affected by the liquidity concept for it is a norm that at some point in the future the investors are bound to sell their stocks and this exposes them to transaction costs. As a result, this makes the investors discount more on stocks that are associated with high transaction costs as opposed to their low transaction cost counterparts. Cubbin et al. (2020) assert that illiquidity and share market return have a negative correlation. Different market conditions make the liquidity risk assume differing characteristic features that suit well with the prevailing market state (Dahel & Laabas, 2019), and the LCAPM stands a better chance of suiting well with the real data than the CAPM regardless of the period under consideration. One of the main factors that is crucial in the determination of the

stock price after the size factor is liquidity and this was tested on the Chinese stock market (Hamman et al., 2016).

Mobarek et al. (2018) undertook a study on the Australian stock market and a conclusion was made that liquidity is a vital tool in the determination of the stock returns. Chung and Wei (2005) concur with the outcome from the Australian markets but now from the perspective of the Chinese market by stating that there is a direct and positive relationship between liquidity and stock returns which is accounted for by the bid-ask spreads in the case of the Chinese stock. Studies at hand confirmed a positive return illiquidity connection from the viewpoint of the emerging and developing markets (Okpara, 2019).

The LCAPM focuses on the liquidity aspect as well as the size to some extent which makes it irrelevant in application to this study. This study is aimed at looking at both macro- and micro-economic determinants of the stock returns which makes it broader than what LCAPM measures. The result is that it makes APT the best closest model to use in this study since it focuses on the two broad variables. This has been the motive for undertaking this study within the spectrum of JSE since it is the biggest and most complex stock market within the African continent to see the relationship existing between the stock returns and the selected macro- and micro-economic variables.

2.3.5 Arbitrage Pricing Theory (APT)

Stephen Ross (1976) developed the APT which is an alternative to the CAPM. The APT, therefore, links micro- and macro-economic variables to the share returns in a given market and the given returns are defined by multiple risk factors. The APT checks if the risk associated with a given micro- or macro-economic variable is also included in the financial asset's expected returns and this is achieved by measuring the risk premiums in both the macro- and micro-economic variables (Chen et al., 2023). The APT checks the significance of the risk premiums on the micro- and macro-economic variables that influence the share returns (Malkiel, 2021).

It also checks if the risk premiums are also priced in the stock market returns (Cerkovskis et al., 2022). According to Sonenshine and Da (2022), the risk in stock can either be systematic or non-systematic where systematic risk is the risk that is

inherent to the overall market and cannot be mitigated through diversification. On the contrary, the non-systematic risk is a risk that is found in a uniquely specific asset and it can be diversified away through portfolio diversification (Cakini & Zaremba, 2022). It can be noted that the APT considers the non-market factors that make the shares move in tandem (Ahmed & Hla, 2019).

In the early stages of APT, it only focused on individual share returns and later applied to the overall market framework (Santoso et al., 2020). The studies that made use of the APT were mainly focused on modelling the short-run relationships of the micro- and macro-economic variables and the stock returns by looking at the differences. The assumptions of the APT include the notion that borrowing and lending are done at a risk-free rate; the borrowed or lent interest is tax-free; there is no risk associated with the short selling of the financial instruments; investors are risk averse; and no-systematic risk can be diversified away (Ding et al., 2019).

The APT model is as follows:

$$ER_{it} = \lambda_0 + \lambda_{1bij} \ldots \lambda_{ibij} + \varepsilon_{it} \qquad 2.3$$

ER_{it} - it is the expected return of an asset i at time t
λ_0 - it is the risk-free rate of return
λ_1 - it is the asset's return sensitivity to factor j
ε - it is the error term

The APT is centred on the common variability of asset returns intuition which also applies to the CAPM (Chen et al., 2023). The CAPM is more complicated than the APT and it is mostly viewed by most researchers as a testable alternative model to the CAPM. Furthermore, the APT entails that the investor's expectations from a share investment are related to the time value of money which is shown by the risk-free rate as well as other related factors as opposed to only the market return as postulated by the CAPM (Cakici & Zaremba, 2022). Also, it should be noted that the derivation of APT is formulated upon the absence of the arbitrage chances not the existence of the market equilibrium. The missing arbitrage opportunities are a requirement; however, it gives an insufficient condition for the market equilibrium (Ahmed & Hla, 2019).

The empirical research outlines that the main advantage of the APT is that there is no need to identify the market portfolio as mean variant efficient (Adnan & Isma'eel, 2021). What it means is that there is no need for one to measure all the assets but that can be done through undertaking empirical research on a subset of risky assets selected by the researcher. It shows that the market portfolio is not an effective player in APT as it does with CAPM (Ding et al., 2019).

One of the conditions for deriving the APT is that there is a need to strategically choose a well-diversified arbitrage portfolio (Trofimov, 2020). During the construction of the arbitrage portfolio, there is a need to ensure that it is free from unsystematic risk and this can be done under the notion that:

- The markets are frictionless which means that they are perfectly competitive,
- The investors are risk averse, and
- The players have beliefs that are homogeneous in that a set of assets' random returns under consideration must be derived by a linear *k*-factor model (Shanaev & Ghimire, 2022).

The foregoing assumptions can be outlined in the mathematical form that in the absence of arbitrage opportunities, any arbitrage portfolio constructed should equate to zero return (Chen et al., 2023). As such, the *i*th's asset expected return should be a linear function of a given constant vector and the asset returns must be sensitive to the *k* factors.

- **Criticisms of APT**

According to Ding et al. (2019) and Santoso et al. (2020), there are various shortfalls of the APT and these include its inability to identify the risk factors and it is descriptive model outlining what is as opposed to what should be. There is also a possibility that the risk factors are prone to a rapid change at any given juncture as well as their effects on the share returns (Al Hamdooni, 2023). Moreover, the APT is only meant to explain the current prevailing market conditions. It can further be noted that the APT does not give a clear specification on the systematic factors affecting the share price which can only be found by the analysts (Ahmed & Hla, 2019). In addition, the APT lacks specifics in that the given theory does not outline the factors that are aligned to a certain stock

(Cerkovskis et al., 2022). This calls for the investors to undertake an estimation of the factor sensitiveness and they have to recognise the risk sources on their own. Also, the other weakness is that it is a one-size-fits-all theory whereas, in the real world, one stock might be more sensitive to a given factor than the other (Chen et al., 2023).

- **Large data generation**

The amount of data generated under the APT is massive such that it requires someone familiar with the model to fully understand it (Santoso et al., 2020). In case someone is not well vested in the model, a need to sort out the data is needed and the process might be overwhelming. The information comes from an analysis that is done by encompassing many factors available to create a trend that shows growth or loss thereby permitting the identifiable qualities to be the source of the portfolio's decisions (Trofimov, 2020). To someone who is not well vested in data, one might not be able to understand the meaning of the results generated from the APT and this makes the APT a useless tool (Sonenshine & Da, 2022).

- **Accuracy in risk sources**

It is evident that in every portfolio there is some sort of risk within and for the APT to be worthwhile, there is a need for investors to have extensive knowledge about risk with much emphasis placed on the source of that risk (Malkiel, 2021). Once this is fulfilled, the APT will then be able to consider reasonable assumptions while considering the sensitiveness at a higher accuracy rate. In the case where the risk source definition is unclear, there will be a higher chance of reducing the effectiveness of the predictive qualities that come with the APT (Cakici & Zaremba, 2022).

- **Single examination of a portfolio**

The APT works effectively only when undertaking a risk examination on a single item (Hakim & Kusmanto, 2020). As a result of this distinct feature, it is virtually impossible to examine a portfolio with a wide range of investments (Mancini & Sala, 2018). This is the reason APT is used to examine the entire portfolio at large. Since the APT cannot take account of each account but the portfolio, a need to make certain assumptions is a necessity when making evaluations. As a result, this leads to the birth of uncertainty factors thereby compromising the accuracy of the results under analysis (Cerkovskis et al., 2022).

❖ **It gives no guarantee of the results**

One fact is that there is no guarantee of making profits under the APT because of the reasons associated with the involvement of factors that are outside the scope of the model (Shanaev & Ghimire, 2022). For example, there are some undervalued securities on the market as a result of reasons that are beyond what the APT considers. Some risks are classified as unreal risks since they originate from the investors through the pricing mechanisms (Hillier & Loncan, 2019). These investors might be afraid of some of the securities within a given market condition.

- **Theory application**

Under the APT, empirical research was undertaken in the United States of America (USA). However, there is little evidence of such research in the context of South Africa. Hearn and Piesse (2020) undertook an empirical study that was centred on the examination of the APT. The results from the study show that between the periods from 1962 to 1972, a minimum of three priced factors were found to exist within the return generation process. Another investigation was undertaken by Reinganum (1981) in Hakim and Kusmanto (2020) where small firm effect was examined on both the NYSE and the American Stock Exchanges (AMEX). It was concluded that no need was found to implement the complex APT in replacement of the CAPM since the APT completely failed to give an account of the differences in the average returns. Hearn and Piesse (2020) undertake an empirical study of the APT by using the two-factor model on JSE. The results from the empirical study outline that, as a result of the influence the international environment has on the mining sector, various underlying factors directly influence the mining shares' returns to the industrial shares (Mishkin, 2019).

The justification for the use of APT in this study is that it is one of the major theories that explain the equilibrium pricing of financial securities. The APT, according to Ross (1976), is not confined to the market risk but it considers various micro and macro factors since they can affect the stock returns. The theoretical studies further outline that there is a variability relationship between expected return and the intertemporal varieties that exist within the macro-economic variables. This makes the APT to be the best option in justifying returns as opposed to other market proxies. Therefore, APT is the closest theory that can be considered for this study though it does not give the

specifics as in what are the exact macro- and micro-economic variables to look at which determines the stock returns. This study looks at specific macro- and micro-economic variables that determine the stock returns. APT was also chosen based on its broadness in terms of approach towards the determinants of the stock returns as opposed to the rest of the theories which focused on individual elements such as information or market risk.

2.3.6 Fama and French's Three Factor Model (FF3FM)

The CAPM, APT and LCAPM are the various models that have tackled various factors affecting stock return which range from micro- to macro-economic and other variables (Sonenshine & Da, 2022). However, the factors are not enough. CAPM went through testing and it was found that the beta in CAPM explains 70% of the market return and the 30% remains unexplained (Fabozzi & Fabozzi, 2021). As such, Eugene Fama and Kenneth French expanded the CAPM in trying to explain the unexplained stock return of 30% and this led to the derivation of the Fama and French model which had an additional two factors on the traditional CAPM. In doing so, the Fama and French model was used to assess the returns on stocks and bonds.

It came to light that the stock returns are explained by three factors, namely, an overall market factor, the size of the firm and the book-to-market equity (Marozva, 2020). In the scientific studies undertaken by Fama and French, it was noted that the two classes of stocks which are value and growth stocks are better than the rest of the stocks. In comparison, the value stocks have a better return than the growth stocks and this resulted in the conclusion that high book-to-market ratio stocks and small stocks have higher returns than the large stocks in the overall market (Trofimov, 2020). The additional two factors in the traditional CAPM resulted in the following formula when determining the stock returns:

$$E(R_i)=RF+\beta_i[RM-RF]+ bs*SMB + bv*HML \quad 2.4$$

Where:

$E(R_i)$ is the asset *i*'s expected return

RF is the risk-free rate of return

β_i is the stock market's beta
RM is the market return of the portfolio
SMB being the small market capitalisation less big market capitalisation
HML has a high book-to-market ratio minus a low
bs is the coefficient of the SMB
bv is the coefficient of the HML

According to Fama and French (2015) cited in Marozva (2020), CAPM as a single-factor model was found to be insufficient in giving a conclusive explanation concerning the relationship existing between risk and return as core concepts in investment. Various models were propositioned in trying to counter the shortfalls of the CAPM. However, no model has surpassed the extensive use of the FF3FM (Fama & French, 2015). The FF3FM entails that the cross-sectional variation that is embedded in the assets' expected returns is a function of the combined three priced factors. In a study that was undertaken by Okeahalam (2019) within the US economy where 25 equity portfolios from a period ranging from July 1963 to December 1991 were analysed, it was found that only three factors can explain the average return on the US stocks. These include size factor, value factor which is denoted by the book to market value, and the excess market returns.

Two distinct classes of stock outperform the market and these are small capped and value stocks (Malkiel, 2021). The stocks with high-to-market ratios are well-known as value stocks (Marozva & Makina, 2020). As such, the size and value effected as the core aspects within the model as viewed as risk *premia* which means an investor's reward for having the less profitable but more volatile stocks.

The FF3FM has its opponents and these include Ding et al. (2019) and Zhao et al. (2020) who went on to air out their views on the book-to-market effect as an aspect that came into being because of the investors' ability to deduce past portfolio performance to extreme conditions in the future. As such, this automatically results in the value of the stock being under-priced while the growth of stocks is overpriced, as opposed to it being compensation for the risk-bearing investors (Ahmed & Hla, 2019). In response to the aspects surrounding the data mining concerns, Fama and French (2015) in their response used other sets of data to apply the FF3FM ranging between

different periods and the results show the same outcome between the variables under observation. It is imperative to know that the FF3FM was specifically developed for the US market and the US data were used to test the model. The stocks employed were inclusive of the industrial-intensive stocks and it should be noted that the conclusions reached may apply to markets with an identical or related set of characteristics.

- **Criticisms of the FF3FM**

Trofimov (2020) has had doubts in terms of the application of the FF3FM in that the model is not appropriate for use in erratic economic conditions. This can only be found when one grasps the fundamental details of the model to figure out the inherent flaws encapsulated in them. The FF3FM was derived from the CAPM which was introduced by Sharpe, Lintner and Mossin (1960). The CAPM which is the basis of FF3FM has had extreme criticisms in terms of real model applicability because of the presence of unrealistic assumptions such as the aspect of a linear relationship in any given stock market risk factor and expected return (Bonga-Bonga, 2021).

According to Fabozzi and Fabozzi (2021), it is not possible to determine the market portfolio component within FF3FM and this renders the model impossible to test. In addition, Marozva (2020) found that the FF3FM could not address the specific issues surrounding the model which makes it flawed in its fundamental setup.

Al Hamdooni (2023) recently undertook a study where the FF3FM was applied to the effect of the COVID-19 pandemic on company and country specifics and the results proved the model's poor performance which was contrary to the expectations. This was proof that the FF3FM cannot perform in turbulent conditions as expected. As a result, this has raised many questions worldwide on whether the model is valid in its stock return calculation application. In addition, Hearn and Piesse (2020) contend that the fact that FF3FM is applicable in any given circumstance raises many questions. This comes because of the issues surrounding the model's validity which is strongly limited.

- **Theory application**

The FF3FM was first applied to the JSE by Auret and Sinclair (2006) where data sets from all sector stocks between the periods 1990 to 2000 were assembled. All the obtained data were adjusted in terms of both dividends and capital gains and a thin trading filter was employed to ensure that all shares included exceeded one per period of trading. Regression equations were then used to test the variables' significance which are used to estimate the stock returns. In line with Fama and French (2015), there was a positive and significant relationship observed between the book-to-market value factor and the expected returns on the stock.

The liquidity factor has been a hindrance in the use of FF3FM within the South African market (Reilly & Brown, 2017). This is mainly owing to the overwhelming evidence which suggests that FF3FM may not be able to give dependable results in illiquid markets for it results in biased estimated returns which emanates from the wrong measurements in the risk parameters. In a study that was undertaken by Hearn and Piesse (2020) on the JSE and Nairobi Stock Exchange, the findings state that the portfolio return estimation would significantly be improved by the liquidity factor. Both markets were also found to be consistent in illiquidity and it was priced. Even if the size factor was found to be prevalent within developing markets just as it is in developed markets, illiquidity is a core and primary risk aspect that is common within emerging markets.

Nevertheless, FF3FM cannot be applied to this study because of its limitation in scope. The model as an extension of the CAPM considers the firm size and the book-to-market value in addition to the market return factor. These factors are mainly micro-economic determinants of the stock returns which are also known as the firm-specific variables. These variables are limited after all and it renders the model inapplicable to the study since it considers known macro- and micro-economic determinants of stock return on JSE mining listed companies.

2.3.7 Fama and French's Five Factor Model (FF5FM)

According to Chhatwani (2022), research and discussion have long been focusing on the establishment of the relationship between risk and return. Investment managers and investors are always on the look for financial models that help them quantify risk

into expected return on equity (ROE) (Chen et al., 2023). Over the years, various models and methods were developed and improved and these methods are meant to help in pricing financial securities so that expected returns on capital investments can be determined (Marozva, 2020).

In 1964, a single-factor model widely known as CAPM was developed with beta as the single factor which shows the stock movement rate concerning the market (Cerkovskis et al., 2022). In 1993, the one-factor model was developed by Fama and French into a three-factor factor one where the two factors, namely, size and value were added to the beta. The three-factor model brought in adjustments toward the outperformance tendency (Ahmed & Hla, 2019). However, the model has its drawbacks in that it lacks some explanations on certain anomalies in profitability and investment as well as a lack of explanation on the cross-sectional variations in investment expected returns.

The Fama and French five-factor model was, therefore, developed which brought in two more factors which are profitability and investment to the three-factor model. This came out as a result of the inadequacy in the model, Fama, and French three-factor model, for expected returns as it looked much at the variation in the average return which is related to profitability and investment (Sonenshine & Da, 2022). The Fama and French five-factor model is built on the dividend discount model and the stock value is derived from the future dividends. The model is meant to explain portfolios' average return which are formed to come up with large spreads in ‘size, book to market value, profitability and investment’ (Santoso et al., 2020).

The Fama and French five-factor model is as follows:

$$R_{it} - R_{ft} = a_i + b_i (RM_t - RF_t) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad 2.5$$

Where:

R_{ft} is one of the portfolios return in month t

RF_t is the risk-free rate

$RM_t - RF_t$ is the capitalisation-weighted stock market and cash return spread

SMB is the return spread of small less large stocks

HML is the return spreads of cheap less expensive stocks

RMW is the spread as a result of the most profitable firms less the least profitable ones CMA shows the return spreads on firms that invest conservatively are less than the aggressive ones.

Financial models are a vital tool in finance owing to their ability to explain in full the stock returns (Reilly & Brown, 2017). This is enhanced through the model's ability to forecast the futuristic returns on stock and this is mainly based on the use of historical data as well as other relevant information relating to the specific stock in question. The predictive proficiency of the financial models is an important feature as it aids in both risk management and determination of investment choices (Fabozzi & Fabozzi, 2021). The models also play a pivotal role as they help in understanding the core factors that pose an effect on the stock returns and these include but are not limited to macro-economic trends, the organisation's data specifics, as well as the risk associated with the market (Cubbin et al., 2020). As a result, it allows investors to critically analyse the risk and return aspects of any given investment of choice. Models are also important in that they offer an avenue for the investors to critically analyse the various investing methods, which helps one to undertake rational decisions when undertaking investment while being granted an opportunity to figure out the likely risks and the opportunities hidden within the stock market (Mobarek et al., 2018).

According to Marozva (2020), the FF5FM was built from the FF3FM by simply adding two more variables which include profitability and investment. This was meant to address the weaknesses of the FF3FM as well as widening the explanation of the contents of the stock returns more effectively than it used to be in the preceding models. The FF5FM gives a deeper explanation of the concept of stock returns than the FF3FM does and this is supported by the empirical data outlining that both components profitability and investment directly pose an influence on stock returns (Ding et al., 2019). In addition, Marozva and Makina (2020), in an analysis of the FF5FM, articulate that the model establishes a worthwhile connection between risk and expected return, and portfolio efficiency can be enhanced through increasing the exposure to the profitability and the investment components. However, the validity of the FF5FM and its application in various industries and the global markets is still unclear.

- **Theory application**

The FF5FM was empirically tested by Chen et al. (2023) to explain returns using Australian equities and the study covered the period between 1982 and 2013. A comparison was made between the FF5FM and the FF3FM under the Australian market conditions. It was found that FF5FM was better in capturing the results concerning the FF3FM and the model has a better position in explaining the asset pricing anomalies. It was, however, discovered and concluded that the model is unable to clearly explain the variation in time series that exists within the portfolio returns. The FF5FM was further tested in the global market arena by Fama and French (2015) with a focus on global stock returns. The results showed and proved that the FF5FM was far much better than the FF3FM.

A study was also undertaken in the case of South Africa where the FF3FM and the FF5FM were investigated to see if they can explain the JSE momentum and this study was undertaken by Cakici and Zaremba (2022). It was found that there was evidence showing a considerable pricing error improvement in explaining the momentum in comparison with the other models such as CAPM, FF3FM and the Carhart model which proved that there were still some significant errors in their use. The results also depicted that a positive correlation was evident between the stock returns and profitability which concurred with the previous studies' results.

- **Criticisms of the FF5FM**

It can be noted that the FF5FM is not immune to criticisms which makes it an imperfect model to strike a balance between risk and return within a given portfolio. Analysis of the model by Chhatwani (2022) shows that the model does not consider the momentum and the low volatility in its application. This means that the FF5FM is not capable of including the two irregularities that are widely considered and they are responsible for the generation of considerable returns.

Several researchers including Al Hamdooni (2023), Cubbin et al. (2020), Marozva (2020), and Zhao et al. (2020) raised a concern about the application of the FF5FM by outlining that the results from the model lack robustness. This means that the

investment factor within Fama and French (2015) proves not to be robust and this entails that it is weakly priced.

The results show that the FF5FM is rendered invalid just as its precedent model, FF3FM, which is simply an extension of the CAPM (Chiah et al., 2016). The FF5FM inherited the flaws within the CAPM which include unrealistic assumptions being put across in the model. In addition to the flaws, Marozva (2020) notes that the additional factors lying within the FF5FM have nothing to do with risk but they are based on quality-specific points.

The FF5FM does not qualify to be applied to this study because of its lack of capacity under this study. The model is simply an extension of the FF3FM where profitability and investment were also added on the micro-economic variables. FF5FM does not consider the macro-economic variables and it has its flaws as outlined under the model criticisms. The model fails to explain the returns of small stocks. This study is broad in that it considers both macro- and micro-economic variables in determining the factors that affect stock returns.

2.4 Conclusion

In undertaking a study on the macro and micro-economic determinants of the mining companies' share returns, it was found worthwhile to outline and review the theories aligned to the stock returns. These theories include the Random Walk Theory, EMH, APT, CAPM, LCAPM, FF3FM, and FF5FM.

The Random Walk Theory asserts that successive stock prices are bound to be independent and this confirms that the stock prices follow a random walk. In addition, EMH postulates that the market prices should factor in the readily available information and the market prices must instantly change with the arrival of new information. There are three forms of EMH and these include the weak, semi-strong, and strong form. The JSE is in weak form efficiency of EMH though there is no conclusive proof.

CAPM is meant to determine the impact of risk on the expected return of an individual share relative to the market portfolio. It was found that a better explanation comes from the APT in explaining the JSE stock returns than the one from CAPM. The

LCAPM measures liquidity by considering the liquidity aspect when pricing assets, and it goes on the relate liquidity to anomalies.

FF3FM stock returns are explained by three factors, namely, an overall market factor, the size of the firm, and the book-to-market equity. The FF5FM was driven from the drawbacks of the FF3FM which was meant to address the weaknesses of the CAPM. The FF5FM was developed which brought in two more factors, namely, profitability and investment to the three-factor model.

The APT uses both macro- and micro-economic variables in determining the stock returns. The APT checks the significance of the risk premiums on the micro- and macro-economic variables that influence the share returns. The APT forms the basis of this study because of its ability to encompass both micro and macro-economic variables in the determination of the share returns.

The next chapter presents the empirical literature on stock returns.

CHAPTER THREE: EMPIRICAL LITERATURE ON STOCK RETURNS

3.1 Introduction

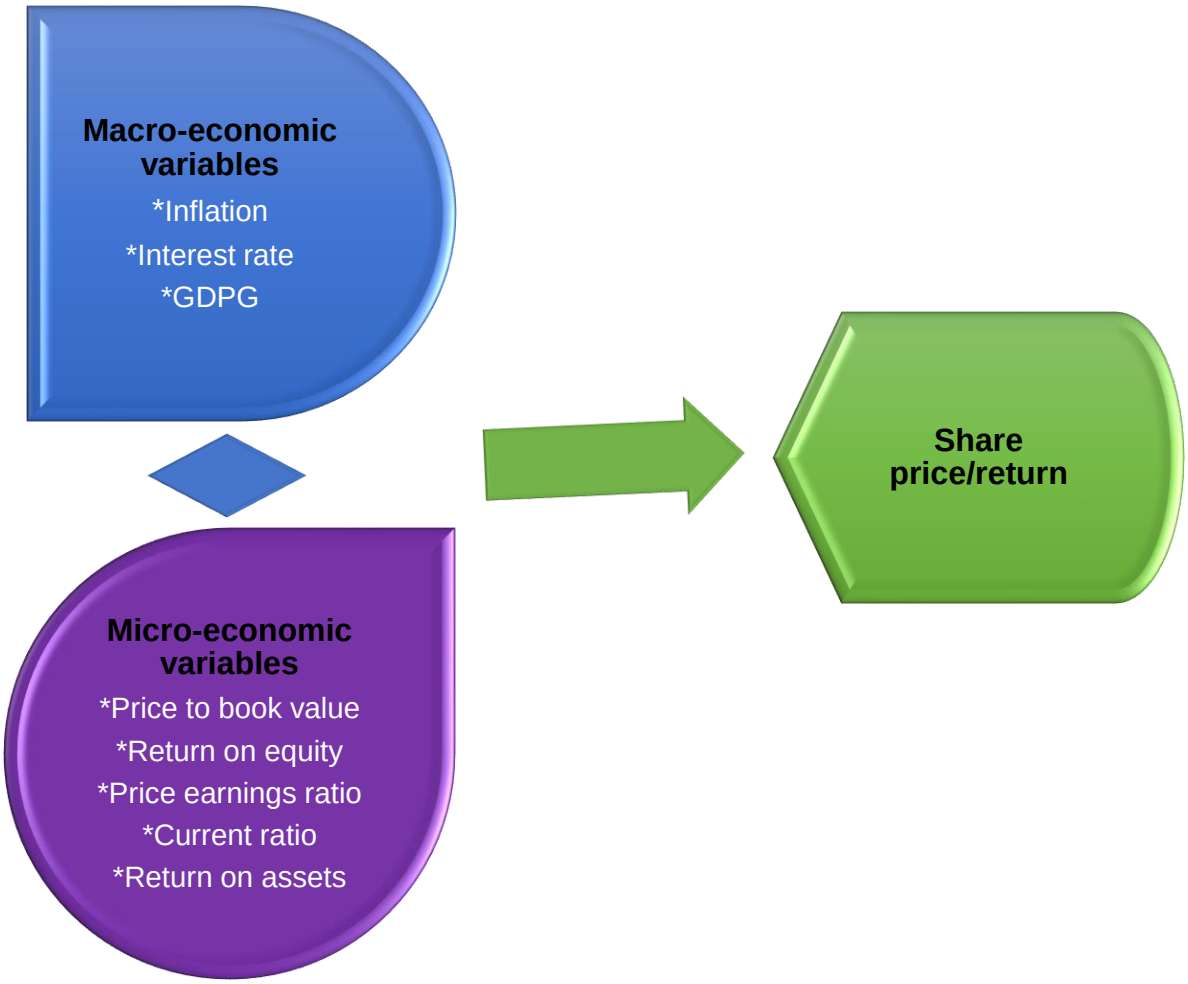
The previous chapter discussed some of the theories of stock returns and the aim was to link the theories to the objectives of the study. It can be noted that amongst all the theories discussed, only APT was found to be close to the study as it consists of both macro- and micro-economic factors though it could not outline the exact factors that determine the stock returns. This is in line with the current study since it is aimed at identifying both macro- and micro-economic determinants of stock returns.

This chapter goes on to outline and discuss the empirical literature on the macro- and micro-economic determinants of stock returns. This is done through reviewing what earlier researchers found during their investigations around the topic under study. The specific macro-economic determinants are discussed concerning how they affect the stock returns and these include inflation, interest rate, and gross domestic product growth (GDPG). There will also be an outline of the micro-economic determinants of the stock returns by looking specifically at debt to equity ratio, price-to-book value, return on equity, current ratio, dividend policy, price-to-equity ratio, and the size of the company. The other determinants will also be outlined that are not qualified as either macro- or micro-economic variables from a literature review viewpoint.

3.2 Conceptual Framework

A conceptual framework explains the anticipated or expected relationship between the variables within a given study. The conceptual framework goes on to describe the relevant objectives for the research process and maps out how they come together to draw coherent conclusions. The conceptual framework of this study is meant to link the predictors to the outcome of the study. The predictors are the independent variables and the outcome is the dependant variable. This is meant to ensure that the objectives of the study are met regarding the macro- and micro-economic determinants of mining companies' share returns.

Figure 3.1: Conceptual Framework



Source: Author's computation

Figure 3.1 shows the conceptual framework of the study where the macro- and micro-economic variables are outlined together with their effect on the share price or return. This is in line with the objectives of the study which are aimed at examining separately the macro- and micro-economic determinants of stock returns in the mining sector in South Africa. The effect of each variable is described and explained from an empirical literature perspective in the subsequent sections and a distinction is made between macro- and micro-economic determinants.

3.3 Macro-economic Determinants

The macro-economic determinants of the stock returns are outlined in this section and they include interest rate, exchange rate, economic growth which is mainly measured

in gross domestic product (GDP), inflation and oil prices. Each factor shall be described and explained concerning how it affects stock returns.

3.3.1 Inflation

According to Santoso, Sidharta and Wardini (2020), inflation refers to the general continuous rise in prices of commodities, which then results in the reduction of the local currency's buying power. The real value of money deteriorates when exposed to inflation and it leads to a reduction in the asset's expected cash flow except the inflation-indexed financial securities. Changes in inflation expose investors who have some financial assets for payment at the end of the investment period to be dependent on the holding period inflation (Adnan & Isma'eel, 2021). A dollar today is not worth the same dollar next week and could be worse next month because of inflation. This can be overcome if one gets into a derivative market as a loss of value mitigation strategy found in the financial markets (Cakici & Zaremba, 2022).

Inflation negatively affects stock prices (Al-Nasseri, Ali & Tucker, 2021). In addition to full employment, maintaining inflation as low as possible forms one of the core mandates of the economic policy (Shanaev & Ghimire, 2022). Inflation is calculated through the use of the consumer price index (CPI) where the current basket price of the basic consumer products is compared to the one in the same period five years ago. This is done to figure out the rate of increase during a given period for national accounting purposes. Inflation carries two variables, namely, unanticipated and expected inflation (Dumrongwong, 2020).

Various studies were undertaken where an examination between inflation and share returns was established. A study was undertaken through an investigation into the rate of return on ordinary shares and the inflation rate in post-World War ll (Hakim & Kusmanto, 2020). The outcome from the study is contrary to the Fisher hypothesis which posits that the inflation and the ordinary shares' returns move along with the inflation rate. The study postulates that there is a negative relationship that exists between share returns and the inflation rate both anticipated and unexpected. It can, therefore, be noted that the results show that the return on mining companies' shares and inflation have an inverse relationship.

Mahmood, Nazir, and Junid (2021) undertook a study that was aimed at establishing the relationship that exists between inflation and share returns during the period from 2005 to 2010 in the context of Pakistan. The value at risk (VAR) model was applied when estimating the results and a negative relationship was found between the inflation and share returns. However, Barnor (2020) undertook a study that used a time series data analysis to examine the effect of macro-economic variables on share returns in the case of Ghana. The results from the study suggested that inflation has no significant effect on the share returns.

In another study, Naik and Padhi (2020) embarked on a study that was meant to determine the effect of macro-economic variables on stock returns by using the Stockholm Stock Exchange. The monthly data from 1993 to 2012 was employed in the study for observation purposes. The ordinary least squares (OLS) method and the Granger causality tests were used and the results reveal that inflation as part of the macro-economic variables harmed the stock returns. Also, it was noted that there is a directional Granger causality between the share returns and inflation.

Talla (2022) investigated the effect of macro-economic variables on stock returns by using the Johansen co-integration tests as well as the Vector error correlation model with data ranging between 1994 and 2011. The outcome of the study denotes that there is a co-integration among the macro-economic variables which proves a long-run relationship while signalling a negative relationship between inflation and share returns.

The studies that were undertaken in the context of South Africa show evidence of conflicting results. An investigation was undertaken to see the relationship that exists between inflation and stock returns by Alagidede and Panagiotidis (2021) using selected African stock markets. The results from the South African market show that the share price elasticity concerning the consumer price is 2.264 and there is evidence from the results which show that there is a transitory negative response by the share price towards the consumer price within the short run while a positive response exists within the long run. This implies that shares are a hedging tool in the long run against inflation.

Moreover, Junkin (2020) applied the multivariate co-integration approach in a study that was aimed at investigating the macro-economic determinants of South Africa's stock market behaviour. To execute the study, monthly time series data was employed between the periods 1995 to 2010 with the help of a combination of Johansen co-integration, impulse response function (IRF) and variance decomposition (VD) testing methodologies. The outcome of the study denotes that a negative influence exists which is caused by inflation on the Johannesburg Stock Exchange All Share Index (JSE ALSI).

In a different study undertaken by Eita (2020), an examination of the relationship between the share returns and inflation within South Africa was done and VAR methodology was used. The results from the study show that there is a significant and positive relationship between inflation in South Africa and the stock market returns and these results are in contrast with those from the study by Junkin (2020). The results from the study made by Eita (2020) reveal that a positive relationship exists between inflation and stock returns in the South African context and shares are a hedge against inflation.

In another view, Fama and French (2015) allude that a negative correlation exists between the anticipated inflation and the expected real activity within an economy and this also results in a positive relationship with the stock market returns. It means that there should be a negative correlation between the stock market returns and the anticipated inflation which is usually denoted by the short-term interest rate.

A study was also undertaken by Spyrou (2019) in Greece which is an emerging economy to determine the relationship between inflation and stock returns. The results from the study concurred with those of Kaul (2020) which outlined that there is a negative relationship between inflation and the share price. However, this relationship was later found to be insignificant after 2009.

Savilianto and Endri (2019) examined the coal mining sub-sector companies in Indonesia with the help of the panel data regression analysis to see the effect of inflation on the share price. The data used were between 2015 and 2017. The results from the study outline that a negative relationship exists between extreme inflationary

conditions and share prices. It can further be noted that as long as the inflationary levels are kept minimal, it poses no effect on the coal mining companies' share prices.

It can, therefore, be noted that the various studies undertaken regarding the effect of inflation on mining companies' share prices prove that there is indeed a connection between the two variables. The overall studies prove that a negative relationship exists between inflation and mining companies' stock returns and this is mainly because of the negative effect inflation has on the investment climate within an economy.

3.3.2 Interest rate

Interest rate is one of the tools used by the monetary policy authorities to control the supply of money within an economy (Al-Nasseri et al., 2021). The main aim of using such a tool is to preserve the value for money and this is done through ensuring the moderate supply of money. When interest rates are high from an investment perspective, the value of future cash flows decreases and this leads to a reduction in its attractiveness in investment terms (Hakim & Kusmanto, 2020). Against this background, the interest rate can be defined as the cost of capital which is the price paid by the holder for using the monetary resources from the supplier over a given period (Alagidede & Panagiotidis, 2021). The interest rate simply shows the cost of borrowing and a high interest rate discourages investment. The economic theory posits that an increase in interest rates leads to a drop in stock prices (Harahap, 2018).

The two important factors of economic growth in any given economy include the stock exchange and the interest rate (Shanaev & Ghimire, 2022). The effect of the interest rate on the stock exchange poses a huge impact on the national economic activities which include the monetary policy, valuation of financial assets, risk management-related practices, as well as the government policy on the financial markets. Ologunde, Elumilade and Asaolu (2021) buttress that long-term commitment to real capital is necessitated by the presence of a fully functional stock market. As a result, the share market's level of efficiency is an important aspect to a wide range of stakeholders and these include investors and policymakers as part of the major players who are there to enhance long-term real capital within the economy. Economic health at the international level is measured in terms of the level of maturity in the stock market and

the prospects of the nation which instils confidence in both local and global investors (Barnor, 2020).

One of the core macro-economic variables points out interest rate and it is directly linked to economic growth. In essence, the interest rate is the cost of borrowing the monetary resources which is commonly known as the borrowing rate from the borrower's perspective. On the lender's side, the interest rate implies the fee that is charged and enjoyed for lending the money which is also known as the lending rate (Kaul, 2020).

In situations where the rate of interest given by banks to their depositors exceeds the return on investment in stocks, the investors tend to shift their capital investments to the bank (Alagidede & Panagiotidis, 2021). This results in a decrease in the demand for the share thereby reducing the share price because of the market forces where supply exceeds demand. Also, the increase in the depositor's interest paid by the bank poses an effect on the interest rate in that it directly increases the lending rate thereby reducing the real capital investment rate within the economy (Kaul, 2020). This is mainly because of the increase in the cost of borrowing by share capital investors and this situation results in a decline in stock price. In essence, this scenario proves that an indirect relationship exists between the stock price and the interest rate (Shanaev & Ghimire, 2022).

A study was undertaken using the regression analysis by Zhou (2018) in trying to establish the relationship between the interest rate and the share prices. The outcome of the investigation depicts that indeed the interest rate has an impact on the share returns mainly in the long run. However, the same study rejected the hypothesis that the anticipated share returns move directly with the ex-ante interest rates. The study went on to further outline that the visible variation within the price dividend ratios is well explained by the long-term interest rate and this would mean that there is a direct relationship between the volatility within both the stock market and the long-term bond yields, and this can be resolved by altering the forecasts of the discount rates.

Lee (2021) examined the connection between short-term interest rates and the stock market by using a three-year rolling regression. A forecast was established on the

excess returns which is the difference between the short-run interest rate and the share market returns through the use of the standard and poor (S&P) 500 index and the results show an unstable relationship over time. The results also show a gradual change from a significant negative to little or no relationship or an insignificant positive relationship. In a study that was conducted by Kaul (2020), it can be noted that stock markets in countries such as South Africa, Botswana and Zimbabwe have proved that higher interest rates are bound to depress the share prices result because of the substitution effect where shares become less attractive than the interest-bearing securities. This was also found to be caused by an increase in the discount rate which reduces the present value of the future expected returns thereby causing a depressing effect on the real capital investment (Harasty & Roulet, 2019).

An examination was undertaken to find the relationship that exists between the ordinary shares' expected returns and the short-term interest rate (Talla, 2022). A two-factor model was employed which included the AMEX and the NYSE share returns. The results from the study show that there is a systematic relationship between the expected returns on equity and the interest rate. It was further revealed from the study that when the interest rate premium is considered, expected returns tend to be smaller than when it is not considered. In essence, expected returns on the mining sector are affected by the interest rates and a negative relationship, therefore, exists between the two variables.

MacFarlane (2020) undertook a study on JSE intending to find out the extent to which the selected macro-economic variables affect the stock returns with the help of the Johansen co-integration and the vector error correction model (VECM) methodologies on data ranging from 1996 to 2008. Results from the study through VECM stipulate that the stock returns are influenced by both the short- and long-term interest rates. It was also noted that to capture the specific effects on each sector, there is a need to scrutinise each stock market sector separately.

3.3.3 Gross Domestic Product Growth

By using GDP as a measure of economic growth, numerous studies were done and they were aimed at finding the link that exists between aggregate economic output and share returns. In one of the studies, Fama and French (2015) investigated the

relationship between share returns and various factors, which included real economic activity, inflation and money supply. The analysed data was inclusive of monthly, quarterly and annual trends between 1954 and 1980. In doing so, it was noted that there is a positive relationship in existence between real share returns and real economic activity. The results are consistent with the findings from the same study that was undertaken by Chen (2021).

In another study, Shanaev and Ghimire (2022) investigated the impact of macro-economic determinants on Nigerian share prices. Various companies were selected and their quarterly share price time series data was employed. The variables included money supply, inflation, GDP, exchange rate, and oil price between the periods 1985 to 2009. The study reviewed that different variables have a different effect on the share price and the scientific study outlined that GDP has a notable impact on Nigerian share prices (Dumrongwong, 2020).

Malhotra and Tandon (2022) undertook a study that involved three macro-economic variables' impact on the stock returns within NYSE for the sake of measuring the total return variation sources and to judge the rationality around the US stock prices. The investigation was done with the help of the multivariate regression analysis and it is evident from the results that 43% of total variation within the NYSE on annual returns is linked to real activity. In addition, it was also noted that more than 50% of the yearly returns' total variation on NYSE is spearheaded by aggregate economic output.

Another study where the relevance of fundamental and macro-economic information within the French market was undertaken by Martinez (2019) with the help of data between 2007 and 2017. Relationship between the variables was observed on a screen test and the findings state that there is evidence of a strong relationship between the GDP and the stock prices. The results also show that the French stock market returns can be strengthened further by including the GDP component in the explanatory model.

A total of five Asian countries were studied closely by Wongbangpo and Sharma (2020) which include Thailand, Philippines, Malaysia, Indonesia, and Singapore to find out the connection between the stock returns and the major macro-economic

variables. In the long run, it was noted that in all nations under study, the price indices show a positive relationship to growth in GDP. It can also be noted that a linear relationship exists between the stock returns and the GDP.

An examination was also undertaken by Samitas and Kenourgios (2019) to figure out if both the current and future macro-economic variables within both domestic and global spheres can be used to explain the long and short run stock returns. A combination of European and American states was used in the study with the help of the dividend discount model and Johansen co-integration as well as the causality tests. The results outline that the local economic activity and the German factor are responsible for explaining the stock price movements since there is evidence that the European stock markets are imperfectly integrated with the global financial markets.

In analysing a group of emerging markets to establish the relationship between excess returns and macro-economic factors, Apergis (2022) examined the data ranging from 2006 to 2016. The results from the study prove that in explaining the excess returns, GDP plays a pivotal and significant role. Also, the sample from the emerging markets that were used shows that a positive relationship exists between GDP and excess returns. Furthermore, GDP per capita was also used in a study that was carried on by Rafique (2020) where macro-economic variables such as discount rate, gross domestic savings, inflation, and GDP per capita were tested in Pakistan on the Karachi Stock Exchange. This was done with the help of the analysis of variance (ANOVA) method on 20-year data starting from 1996 to 2015. The outcome of the study has shown evidence of the existence of a positive and significant relationship between GDP per capita and Karachi Stock Exchange ALSI and a coefficient of 142.66 was found as proof.

Jefferis and Okeahalam (2019) employed the Johansen co-integration model in Southern African nations which include Zimbabwe, South Africa and Botswana in examining the connection between stock returns and macro-economic variables. In doing so, quarterly time series data was used for the period ranging between 2005 and 2015. The outcome of the study denotes that there is evidence that GDP drove the stock returns.

A Johansen co-integration and Granger causality test were employed by MacFarlane (2020) on JSE to find out if macro-economic variables can explain the future market movement. Data spanning from 1965 to 2010 were used in the study which makes it one of the unique studies by covering the longest-ever covered period in the context of South Africa. The results from the study show that JSE ALSI is influenced significantly by the GDP and this led to the conclusion that GDP must be used as a future instrument to predict the stock market returns in South Africa.

A study that was undertaken by Savilianto and Endri (2019) in the Indonesia Stock Exchange on the factors affecting share returns reviews that there is a significant connection between GDP and share prices. The results from the study outline a positive and strong correlation between stock prices and GDP. It can, therefore, be noted that the studies undertaken prove that there is a significant and positive nexus between mining companies' share prices and GDP. The GDP shows growth or decline in the economy of any given country and it is one of the inputs used by investors when looking for an investment destination.

3.4 Micro-Economic Determinants

Makoni (2020) opines that the capital investors who do so by acquiring company shares within the capital market start by undertaking an analysis of the prospective company's performance for them to decide based on an informed point of view. This is meant to ensure that the investments made can earn the investor a profit which is also known as the return on investment and it comes in different ways which include dividends and share value growth to mention a few (Adnan & Isma'eel, 2021). The main factor which inspires investors to invest in a share of choice is the return on the share and this also denotes the reward of bearing the uncertainty of investing in that particular share (Marozva, 2019). The company's ability to improve its financial performance is crucial since it is a positive sign which shows the extent of the company's prospective growth in the foreseeable future. Mainly, the investors interpret such information as profit to be obtained from the investment-related decisions that the company would have undertaken (Dumrongwong, 2020).

The stock or share price denotes the value that is found as a result of an individual's equity participation within listed companies' on the stock exchange; a platform that

permits the transfer of shares (Endri, 2021). The share price also derives its definition from the interaction that takes place between the main parties, buyers and sellers, for the sake of forming the price where these two parties are motivated by their expectations which are driven by the company's profits (Goninan, 2019). The price that is requested by the seller of the share which can also be seen as the last trading price during that period is known as the closing share price.

A share is an important instrument to the company since it is the one that connects the company with its external environment such as the prospective share investors (Kaul, 2020). This is because it contains very important information about a company which can be used as input to prospective shareholders when making investing decisions into a given listed company. The information contained includes but is not limited to the shareholder's rights and the share ownership special related rights (Prasetiono, 2020). One of the rights includes the right to a known and fixed income despite the risk taken in case the company faces liquidation. Also, some of the rights include the right to control the company based on the number of shares in possession and this is done during shareholders general meeting where one can use the voting rights at hand (Kewal, 2021).

The various micro-economic determinants of stock returns are discussed in this section of the study. The micro-economic variables are those that have a direct impact on the individual companies and they are commonly known as the firms' specific determinants. The micro-economic variables are presented and discussed hereunder:

3.4.1 Debt to equity ratio (DER)

The solvency ratios as part of the liquidity ratios show the ability of the company to honour its obligations as they fall due through the company's assets and these obligations can either be long or short-term liabilities (Endri, 2021). The analysis of the audited financial statements by the investors to determine the level of the company's liquidity has a direct impact on investor expectations and it directly affects the index movement. One form of the solvency ratio is the DER and this measures the possibility of a company being able to honour all the obligations at hand (Kaul, 2020). This means the capital component that can be utilised to cater to the total company's debt. DER is

also used as a guarantee to the debt holders since it is a measure of the capital component that can be used to settle the overall company's debt (Makoni, 2020).

The DER simply shows the funding portion that is in the form of debt from the overall capital outlay (Prasetiono, 2020). The higher the DER the greater the exposure to liquidity risk by the company. Endri (2021) argues that the debt-to-equity ratio is a tool that is used to assess the debt component within the total equity of an organisation. The ratio is important as it shows the total amount of money within the company that is provided by the creditors and these have an upper hand in terms of funds distribution during liquidation. The ratio is a good tool used to see the extent to which the company is funded from external sources (Harahan, 2019).

DER is capable of affecting the stock prices or share returns by either making the share value appreciate or depreciate and this mainly depends on the level of the ratio (Hanafiah et al., 2020). A higher ratio means that a high component of the capital represents debt and a lower ratio implies less capital portion that can be used to cater for all the company's debt. A high debt-to-equity ratio exposes the shareholder to increased risk. When the overall debt-to-capital ratio increases, this leads to a decline in the company's liquidity levels thereby resulting in the reduction of the company's stock value or return (Prasetiono, 2020).

Studies were carried on by Harahan (2019) and Kurniawati and Dewi (2019) on the nexus between DER and the stock returns. The results from both studies show evidence that there is an inverse relationship between DER and stock returns. This means that as the DER increases, the share returns decrease since a large portion will be used to service the debt component and vice versa. Contrary to these results, various studies were undertaken by Afinindy and Budiyanto (2021), Wijaya (2022), and Yarnest (2022), and all these researchers were focused on establishing the connection between the stock returns and DER. Evidence from the studies depicts that there is no connection between the two variables and this implies that DER does not affect stock returns.

The DER shows the level of solvency the company is in case it is faced with liquidation. It is also a leverage ratio that shows the organisation's limits in terms of funds

borrowing (Sharma, 2020). Based on the explanation of DER, it can be noted that the solvency ratio plays a major part in the determination of the stock prices (Wijaya, 2022). The higher the ratio, the lower the stock returns since it will be clear evidence that the majority of the company's funding is externally sourced thereby falling under the debt component.

Another study focused on examining the determinants of the company value and the resultant effect on the share returns of Indonesian mining listed companies between 2017 and 2020 by Salim and Prasetia (2022). The results from the study review that a higher debt value means that the company has a higher obligation in servicing the debt providers through finance charges which reduce the net income available for distribution through dividends. This, therefore, shows that a negative connection exists between DER and mining companies' share prices.

The studies undertaken prove that there is indeed a relationship between DER and mining companies' share returns. This shows that there is a negative connection between DER and mining companies' share prices.

3.4.2 Price to book value (PBV)

Apart from the solvency ratios, there are market ratios that affect the stock returns and these are normally measured using the price book value and the price-earnings ratios (Wijaya, 2022). The price to book value can also be known as the price share book value. The price-to-book value ratio is a performance ratio that is used to make a comparison between the market value of the stock to its book value. Karim (2020) asserts that a higher PBV ratio shows that the company is highly performing and this calls investors to also highly assess the company since it shows signs of a lucrative investment avenue. In a case where there is a rapid increase in the market value of a share, this has a positive and direct effect on the actual return owing to the effect of capital gains (Afinindy & Budiyanto, 2021). This comes as a result of the difference that exists between the current market value of the shares and its previous stock price which simply shows the actual return on the share if the former is higher than the later price.

The studies that were undertaken to find out the effect of the PBV on stock returns is evident that the market value per share has an effective impact on stock returns (Almumani, 2022; Malhotra & Tandon, 2022; Sharma, 2020; Srinivasan, 2021). Contrary to these findings are the conclusions that were reached by Kurniawati et al. (2019) and Yarnest (2022) in a study that aimed at investigating the nexus between the PBV and stock returns. The results stipulate that PBV was found not to have any significant effect on the stock returns.

Afinindy and Budiyanto (2019) investigated the influence of PBV on both stock price and return was found to be one of the core factors considered by investors when embarking on investing decisions. The PBV is regarded as a mechanism that is vital in a company's valuation by the investors. Prasetiono (2020) asserts that the PBV is a financial ratio that strikes a comparison between the stock price per share to its book value and it is an indication of how much the stockholders are paying for the organisation's net assets. The results from a study that was undertaken by Almumani (2022) indicate that the low PBV ratio outcome is used as a vital tool to value the company and such a ratio outcome poses a negative correlation to the stock return.

In a different view, Wijaya (2022) found that by looking at the analysis of the global index of PBV ratio, a low PBV figure can ultimately result in a high stock return and this comes from an analysis by the investors to see whether the stocks are over or under-valued. It can also be noted that the cross-sectional stock returns can be explained best by the two factors which are the firm size and the PBV (Yarnest, 2022). A study by Jensen, Johnson and Mercer (2021) reveals that there is a strong positive correlation between PBV and stock returns. The results went on further to outline that more relevance comes from the book value than the earnings per share in the determination of the stock prices.

Malhotra and Tandon (2022) used a non-linear multiple regression model and the panel data on 95 national stock exchange-listed companies spanning over a period from 2007 to 2012 in the examination of the factors influencing the share prices. The results from the study revealed that 51.6% of the total share price changes are attributed to earnings per share, book value and the price-earnings ratio. It is, therefore, imperative from the findings that the company's manager must have a close

look at these three factors, namely, earnings per share, book value and the price-earnings ratio, to maximise the share prices.

Contrary to the findings from Gatua (2019), Malhotra and Tandon (2022) undertook a study that included various companies from the seven sectors that are listed on the Nairobi Securities Exchange over five years ranging from 2008 to 2012. The panel data was assessed using the regression analysis and the outcome clearly revealed that no model was found to determine the stock prices. The results also stipulate that individually selected variables must not be used to anticipate stock price movements since the variables are independently correlated to the share prices. Another study was undertaken by Almumani (2022) where listed banks on the Amman Stock Exchange were used with data spanning from 2005 to 2011 in examining the share price determinants. The main factors that were discovered in the study to have an effective influence on the share price and they can be used on share price forecasting are book value, price earnings, dividend per share, and the earnings per share.

Antono et al. (2019) examined the factors affecting stock prices in Indonesia's mining sector with the help of 29 listed companies on the Indonesia Stock Exchange between 2010 and 2015. The results from the study reveal that PBV poses a positive effect on Indonesia-listed mining companies' share returns. The results from the various studies consulted show that there is a positive and significant relationship between PBV and mining companies' share returns.

3.4.3 Return on Equity (ROE)

The ROE is used as a measure of the return on shareholders' investment within a given company (Aryanti & Jayanti, 2020). The main aim of shareholders embarking on investment is to improve their wealth through return which comes in the form of rights issues, capital gains and dividend payments to mention a few. The disclosed information on listed companies on the stock exchange shows how well the management makes use of the stockholders' investments (Avdalovic, 2022). There is a direct relationship that exists between the ROE and the stock prices. Observations imply that a bigger ROE results in a higher share market price since it is evidence of effective usage of the shareholders' funds in enhancing their wealth (Al-Qudah, 2020).

It is also proof that the management is working in favour of the shareholders' goals thereby reducing the agency problem conflict.

According to Harahap (2018), a large ROE is a clear indication of an increase in the return to be earned by the investors. As a result, this works as an incentive for more new investors to have an increased appetite in buying the stocks which further leads to an increase in the stock price. This is because of the market forces where the demand exceeds supply thereby leading to a rise in the market value of the stocks in question. A higher ROE lures investors to invest more within that specific class of stocks.

Bobi (2019) alludes that ROE is used as input by both potential investors and existing shareholders as a measuring tool on the likeliness of the company to earn an income that comes either in the form of dividends or the share price increases denoted by capital gains. A high ROE implies that the company is performing well in the management of the capital contributed by shareholders as evidenced by profit which is distributed to investors (Hutami, 2022).

In a study that was undertaken by incorporating the Islamic banks in Jordan, Al-Qudah (2020) notes that there is a statistically noteworthy relationship between the company’s financial-related performance information which is denoted by earnings per share, return on assets, the return on equity, and the share prices. A multiple regression analysis was used by Avdalovic (2022) to establish the relationship between ROE and share price. The results from the study indicate that no significant relationship exists between ROE and stock prices. This means that ROE does not influence the stock prices according to the study.

In another study by Al-Qudah (2020), no evidence of the existence of any significant relationship was found between the manufacturing companies in Jordan between ROE and stock prices. Contrary to the findings by Fitri, Ratih and Meylita (2020), there is enough evidence from various studies undertaken by Hutami (2022) and Aryanti and Jayanti (2020) that there is indeed a significant positive relationship between ROE and stock prices.

Salim and Prasetia (2022) conducted a study of mining sector-listed companies on the Indonesia Stock Exchange to see if ROE influences the mining share price. The results from the study show the existence of a positive and significant impact between ROE and stock prices. In essence, expected returns in the mining sector are affected by ROE and a positive relationship, therefore, exists between the two variables.

3.4.4 Price Earnings Ratio (PER)

Various market valuation ratios were outlined by Ahmadi (2021) and these ratios relate to the company's stock price, its earnings and cash flows, as well as per-share book value. Almumani (2022) alludes that PER is a useful tool to the organisation since it provides insight to the management on what exactly the investors are thinking of by looking at the company's historic performance and its prospects. The outcome from the inferential statistical analysis shows evidence that the PER has a significant and positive impact on stock returns (Dumrongwong, 2020). The PER derives its definition from the comparison it makes between the concerned market price and the earnings per share (EPS) of the same stock. The PER also strikes a comparison with the price per share and this is mainly shown through the earnings per share.

A high PER shows that the price of the stock has received a higher rating value by the investor based on EPS and the higher rating also denotes that the stock is more expensive on EPS (Martinez, 2019). Therefore, companies that have a high PER are characterised by their exposure to high growth rate chances and this makes it possible for investors to acquire the stocks with an anticipation that the stock will increase in the future. Since there are great signs of anticipated stock price increase in the future of companies with high PER, there will be a positive response from the stock prices which then result in capital gain (Shanaev & Ghimire, 2022). The capital gain is part of the stock return which leads to the conclusion that PER has a positive and significant effect on the stock return. These results reinforce the findings reached in the studies undertaken by Avdalovic (2022), Almumani (2022), Malhotra and Tandon (2022), Prasetiono (2020), and Wijaya (2022) on the PER effect on stock return.

No firm conclusions were reached by the researchers over the definite connection between the price to earnings and the stock returns. According to Dumrongwong (2020), the earnings per share is interpreted as the earnings capitalisation rate. The

Gordon valuation method can be used to confirm the interpretation given that the company's net present value to its growth chances is equal to zero. This condition is fulfilled only if the real growth rate is zero and the company is not earning any economic profit (Almumani, 2022).

Adnan and Isma'eel (2021) used the price earnings as a risk measure in interpreting the PER. The explanation of the price to earnings concurs with the Gordon Model and it does not give an assumption that is restrictive to the fact that the company's growth prospects add no value. The price-earnings is also interpreted as the earnings growth rate (Avdalovic, 2022). The interpretation is in line with the Lynch ratio where the PE ratio is matched with the EPS growth rate during analysis and this is used as a tool to assess the investment before recommending one to acquire any shares. In another analysis, Malhotra and Tandon (2022) view the price to earnings as a good indicator for mispricing the stocks.

Moreover, by looking at the interpretations given, one can note that the theoretical connection existing between the PER and the stock returns is quite ambiguous (Shanaev & Ghimire, 2022). This is because of the notion that if the PER is defined in terms of the measure of risk perspective, the conclusion would be an inverse connection between PER and stock returns. In a case where the PER is not elucidated as a risk measure but as an indicator of the mispricing of stocks, the outcome will be an inverse connection between the PER and the stock return (Martinez, 2019). Contrary to this, one should anticipate a positive and direct relationship between PER and stock price if PER is interpreted from an earnings growth rate perspective (Cakici & Zaremba, 2022).

Salim and Prasetia (2022) undertook a study within the Indonesia Stock Exchange on the determinants of the mining companies' value and the effect thereof on the share returns. The results from the study reveal that there is a significant and positive connection between PER and share returns in mining companies. It can, therefore, be noted that mining sector share returns are influenced by PER and a positive relationship exists.

3.4.5 Current ratio (CR)

The current ratio (CR) is a liquidity ratio that is used to measure the ability of a company to settle its debts when they fall owing with specific reference to the short-term obligations that are due within the current financial year (Apergis, 2022). The current ratio is a liquidity measure that is used to make a comparison between liquid assets and non-long-term liabilities. The CR is one of the tools used by investors when looking for an investment avenue within corporates for it shows how well managed the company is concerning the mining sector companies (Ahmadi, 2021).

A higher CR means that the company can cater to its non-long-term liabilities as they fall due while a 1:2 ratio means that there is too much stock held in non-long-term assets. It is recommended to have a 1:1.2 ratio of non-long-term assets to non-long-term liabilities. A high current ratio is not good for investors as they will view the company as highly inefficient in utilising its non-long-term assets or the available short-term financing facilities (Gatua, 2019). However, a too-high CR is a good measure for creditors as they know that they are guaranteed that the company can pay when the debts fall due (Harahan, 2018). Simply put, the CR as a liquidity ratio is there to measure if the mining company has adequate resources to cater to its non-long-term financial obligations.

3.4.6 Return on Assets (ROA)

Return on assets (ROA) is a performance measure ratio that is used to see the extent to which the company is efficiently using the various assets at its disposal to make a profit and ensure company growth (Adnan & Ismaeel, 2021). Each company is exposed to the same resources but the difference lies in which one can put the available assets to good use (Almumani, 2022). This is normally seen by how profitable the company is through converting the assets into revenue. The mining sector is machine-oriented sector that makes use of both human and mechanical resources to produce revenue. Companies with a high ROA attract new investors and the share price goes up because of the lucrative return provided to the shareholders (Al-Qudah, 2020).

Highly profitable mining companies can have more income after tax and interest for distribution to shareholders in the form of dividends (Bobi, 2022). As a result,

shareholders are attracted to companies that pay dividends more frequently than those that do not pay at all. This poses a huge pressure on the demand for shares by potential investors which automatically causes a rise in the share price owing to market factors. In essence, ROA is a tool that is used to measure the mining company's level of efficiency, productivity as well as profitability, and it gives an insight into the mining company's management on the organisation's overall financial performance (Chen, 2021). The mining company's resource usage and the extent of its financial muscles are evaluated using ROA.

3.5 Other Determinants

The other determinants of stock return that do not qualify to fall either under macro- or micro-economic segments are presented in this section and one of them is momentum.

3.5.1 Momentum

The concept of momentum has gained considerable attention in the field of financial economics and literature has been developed as measures to discredit the two commonly known theories, namely, EMH and CAPM. Momentum, according to Marozva (2019), can be seen as the ability to attain excess returns by simultaneously investing in former winners and selling preceding losers while maintaining a holding period ranging from one to 12 months. It was found that momentum does not emanate from the market risk factors, macro-economic factors or the three-factor model by Fama and French is not able to explain the momentum concept. Profit from momentum originates from the cross-sectional variations that are obtained in mean returns as opposed to the probable time series disparities that are found in stock returns (Kaul, 2020). According to Hearn and Piesse (2020), if there are any gains obtained by utilising momentum tactics, these can be a result of the cross-sectional variation found in average returns.

In a study where a cross-section of the US shares was used to figure out the profitability associated with the use of short-term momentum techniques, Harahap (2018) found that for one to achieve a profit of at most one per cent, there should be investment in formerly winning stocks and selling the previously losing stocks. Another study was undertaken in the European markets by Eita (2020) and the results

concurred with the ones by Harahap (2018) concerning the evidence of momentum effect. The momentum techniques were applied within the real estate area by Malhotra and Tandon (2022) and the findings on a short-term basis outline that the former winners outperformed the previous losers. The short to medium-term momentum profits were also evident in a study conducted by Kaul (2020) on commodity prices.

Tursoy (2021) undertook a study where cross-sectional monthly share returns on mining sector JSE listed stocks were tested using various factors which include book-to-market value, dividend yield and the twelve-month momentum. It was found that the cross-sectional differences in the stock returns of the mining companies were determined independently by momentum and value, and they were proxies by the book to market.

Another study was conducted on 40 markets across the world with South Africa included where both earnings momentum and price were considered by Jorion (2021). The outcome from the study showed evidence of the presence of both earnings and momentum within JSE. In addition, evidence of short-term momentum was also found within JSE because of the presence of a weak though persistent time series correlation on previous and future portfolio returns (Marozva, 2019).

3.6 Conclusion

The empirical literature on stock returns was discussed with the help of the analysis of both macro- and micro-economic determinants. The macro-economic determinants of the stock returns are the broader factors that are external to the company's specific stocks and these include but are not limited to inflation, interest rate, exchange rate, and oil prices. The micro-economic determinants are the firm-specific factors and these include liquidity ratios, performance ratios, profitability ratios, and market ratios. The outcome from the studies undertaken denotes that there is co-integration among the macro-economic variables which proves a long-run relationship while signalling a negative relationship between inflation and share returns. The expected returns on the mining sector are affected by interest rates and a negative relationship, therefore, exists. Concerning GDPG, it was noted that there is a positive relationship that exists between real share returns and real economic activity.

The main factors that were discovered to have an effective influence on the share price include current ratio, price earnings and earnings per share. There is also a significant positive relationship between ROE and the stock prices. Dividend payment has a positive relationship with the share returns and it is an effective investment luring tool that a company can use to gain more capital and improve the per share market value. The capital gain is part of the stock return which leads to the conclusion that PER has a positive and significant effect on the stock return. It can be noted that as long as the market risk is controlled, small firms are prone to having higher returns than large ones.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

The previous chapter dealt with the empirical literature concerning the macro- and micro-economic determinants of share returns. As such, each determinant was discussed and explained by considering the views of other scholars on a given variable. The macro-economic variables that were reviewed include inflation, interest rate, exchange rate, oil prices, and the GDP. The results that were obtained from the review of related literature exposit that there is a positive correlation between the exchange rate and GDPG and the share returns. A negative correlation exists between share prices, inflation and interest rates. The various micro-economic variables that were discussed include DER, ROE, PER, CR, and ROA. The results from the review of related literature imply that a negative correlation exists between share returns and DER. It was also found that there is a positive correlation between share prices and PBV, ROE, CR, and PER.

This chapter proceeds by outlining the research methodology of the study which is a pathway followed to address the objectives as outlined in Chapter One. Pandey and Pandey (2021) define methodology as a workable tactic that is derived from the research problem. The chapter starts by outlining and explaining both the research paradigm and approach which are the core pillars of the research design. Population and sample follow thereafter, where an explanation is given as to how the sample was obtained from the population since the study focused on the mining listed companies on JSE. Data and variables will also be explained by recapping the research objectives and outlining the independent and dependent variables. The model will be specified and explained in this chapter before concluding remarks.

4.2 Research Paradigm and Approach

This section gives an outline of the research paradigm and approach, and these two aspects will be discussed separately from each other. The main aim is to display the actual paradigm used in the study as well as the specific research approach followed in the study to address the research objectives.

4.2.1 Research paradigm

Research paradigm, according to Khaldi (2017), refers to a common belief system that is used by scientists upon agreement on how to understand problems at hand and how to address them. Mohajan (2018) views research paradigm as how scientists address epistemology, ontology and methodological questions. Paradigm in the field of research can also be seen as the effect of accepting a given theoretical approach and the influence it has on the way scientists view the world (Creswell, 2021). The various forms of research paradigms include constructivism, interpretivism, pragmatism, ideology, and positivism. A positivist research paradigm was employed in this study.

The study employed the positivist research paradigm because it is objective and quantifiable. The study is quantitatively oriented since a relationship has to be established between stock returns and the various macro- and micro-economic determinants. The aim is to see the distinct determinants that have an influence on stock returns through a scientific inquiry. This results in the derivation of the hypothesis which shows the assumed relationship between the independent and dependent variable. The hypothesis is proved through the empirical study to see if it is true or false. The relationship between mining companies' share returns and the macro- and micro-economic variables is measured through an analysis of the panel data obtained from the JSE-listed mining companies between a period 2013 and 2021 which is in line with the positivism paradigm. Panel data methodologies such as general methods of moments (GMM) are used to prove the nexus between the macro- and micro-economic variables and mining companies' stock returns within the study.

4.2.2 Research approach

According to Kumatongo and Muzata (2021), the research approach is a strategy used by the researcher to generate answers to the identified questions. It can also be seen as a framework that consists of the various plans a researcher employs to address a given problem (Mohajan, 2018). There are three types of research approaches, and these include qualitative, quantitative and mixed approaches.

This study is meant to determine the macro- and micro-economic determinants of the mining companies' share returns and this one proves that the study is meant to deduce a relationship through hypothesis. Therefore, this qualifies the study to follow a quantitative research approach. According to Mohajan (2018), a quantitative approach is centred on theory testing, fact determination, displaying the connection between variables, and outcome prediction. Quantitative research is undertaken objectively by proving knowledge scientifically as opposed to feelings, personal interpretations, values, and opinions. This approach aims to achieve reliability, objectivity and generalisability (Creswell, 2021). The panel data on mining listed companies on JSE is used to test the pre-set hypothesis on the relationship between macro-economic variables and share returns as well as the microeconomic variables and share returns. The relationship is established mathematically and statistically between the variables in this study with the help of GMM. Hence, the quantitative approach was deemed as the best approach for this study with macro- and micro-economic variables as the independent variables while share returns are the dependent variable. More importantly, the quantitative approach helps in proving the connection between the two variables in this study.

4.3 Population and Sample

Population means the total number of elements within a given area, and this might refer to the number of schools that are within a demarcated area, hospitals, clinics, tree type, cars, companies', animals, human beings, or any other form of elements (Bairagi & Munot, 2019). In essence, the population in research does not relate to the number of people, but it is a collective term that is used to describe the number of cases that are subject to the study at hand. Population in research includes objects, organisations, people, or events (Mulisa, 2022). In the case of this study, the population includes all the mining listed companies on JSE that were listed since 2013. The definition of population in this study excludes those mining companies that were listed after 2013 and the ones that were once listed by 2013 and delisted thereafter.

In a population, there might be a certain group of interest that best suits a given study at hand, for example, of all companies, only small and medium businesses, or of all schools, only those in cities. This is called the sampling frame, and that is where the sample is obtained (Saunders et al., 2012). A sample is a representative of the

population that is selected using various methods to ensure that the population is well-represented (Creswell, 2021). Conclusions about the rest of the population are derived from the sample selected within a given study. The sample comes from the sampling frame.

There are various types of sampling strategies and these include stratified, simple random sampling, snowball, convenience, purposive, systematic, and quota sampling (Clark et al., 2021). A purposive sampling technique was employed in this study because it is the most appropriate strategy to meet the needs and requirements of this study. Purposive or judgemental sampling, according to Saunders et al. (2012), allows one to choose cases that allow the researcher to provide answers to the set research questions and the objectives. The study intends to examine both macro- and micro-economic determinants of stock returns in the mining sector in South Africa. As a result, the selection took place by looking at all mining companies listed on the JSE that were in existence from 2013 until 2021. The mining companies were selected based on their ability to provide data such as ROA, CR, DTE, GDPG, ROE, and PE. Most of the mining companies listed on JSE had the data needed for the study and this constituted the micro-economic determinants.

The population in this study consists of all mining companies within South Africa that form the mining sector of the country. The sampling frame under this study relates to all the mining companies that are listed on the JSE and in this case, there are 16 listed companies in the mining sector. The sample for this study comprised of the listed mining companies that were listed on JSE since 2013, and in total, they were ten.

4.4 Data and Variables

The data from a sample of ten mining listed companies on JSE were obtained from IRESS which covers nine years from 2013 to 2021. This data comprised the listed mining companies' share prices over the nine years with the corresponding independent variables to the study which include but are not limited to inflation, interest rate, GDPG, DTE, ROE, ROA, CR, and PE. The quarterly movements of each variable were considered for easy analysis and interpretation's sake. The data used in this study were obtained from IRESS, the World Bank, and the South African Reserve Bank websites.

There are several variables in this study and they are placed in two distinct categories, namely, are independent and dependent variables. The variables are found within the research topic which is why this study is to be conducted quantitatively.

4.4.1 Dependant variable

A dependent variable is a variable that responds directly to the movements of other variables. This means that a dependent variable is affected by the changes in the independent variable. In the case of this study, the dependent variable is the share returns. In addition, other dependent variables are also considered and these include share price and total returns.

4.4.1.1 Share returns

The share returns simply show the return obtained from an investment made within a given period. For example, the mining companies' share returns are those gained by the shareholders by buying shares in a given mining company over a specific period, for example, a year or six months. It is denoted by the difference between the purchase price and the current price. The share return is made up of the capital gains which is the profit earned by a shareholder and is accounted for by finding the difference between the current share price and the share price of the previous period. The actual return is calculated from the traded share price. According to Jordà, Knoll, Kuvshinov, Schularick, and Taylor (2019), the formula for calculating the share returns is given as follows:

$$R_{it} = \left[\frac{P_{it} - P_{it-1}}{P_{it-1}}\right] \qquad 4.1$$

Where:

R_{it} is the return on share *i* at time *t*

P_{it} is the price per share *i* at the time *t*

P_{it-1} is the price per share *i* at time *t-1*

4.4.1.2 Total returns

The total return is made up of two components and these include the capital gain and the yield component which shows the cash flow return on an investment. According to Jordà et al. (2019), the total returns are calculated as follows:

$$R_{it} = \left[\frac{P_{it} - P_{it-1}}{P_{it-1}}\right] + y_{it} \quad 4.2$$

Where:

y_{it} is the yield component of share i at time *t*

The total returns formula is the one adopted in the study, which is a summation of the share returns and the dividend yield on that particular mining company share.

4.4.1.3 Share price

Share price is derived from the interaction between sellers and buyers of shares which shows a financial claim within a company (Husna & Satria, 2019). The share price simplify shows the price of stocks that are found at the JSE in the case of South Africa or any stock exchange across the world for a given listed company at a certain time. Therefore, the share price under this study reflects the price of a mining company listed on JSE at any given time. The share price used in this study was a weekly average which is then expressed in annual terms.

4.4.2 Independent variable

An independent variable is defined as a variable that if it changes, there will be also a change in the dependent variable (Bougie & Sekaran, 2019). The independent variable is also known as a variable the researcher manipulates to discover its effects within an experimental study (Luo, Luo, Li, et al., 2022). The independent variables in this study include both macro- and micro-economic variables.

4.4.2.1 Inflation

According to Santoso et al. (2020), inflation refers to the general continuous rise in prices of commodities, which then results in the reduction of the local currency's buying power. Changes in inflation expose investors who have some financial assets

for payment at the end of the investment period to be dependent on the holding period inflation (Adnan & Isma'eel, 2021). Furthermore, inflation negatively affects stock prices. Inflation is calculated through the consumer price index where the current basket price of the basic consumer products is compared to the one in the same period five years ago. Several studies (Barnor, 2020; Hakim & Kusmanto 2020; Mahmood et al. 2021; Talla 2022) reveal that a negative relationship was found between inflation and share returns. When there is inflation, financial resources are by nature forced to move out of the investment avenue into consumption and this results in an automatic fall in the demand for financial instruments (Naik & Padhi, 2020). In addition, inflation causes the monetary authorities to respond to the inflationary situation through the use of interest rates.

4.4.2.2 Interest rate

The interest rate is the cost of borrowing the monetary resources which is commonly known as the borrowing rate from the borrower's perspective. On the lender's side, the interest rate implies the fee that is charged and enjoyed for lending the money which is also known as the lending rate (Kaul, 2020). When interest rates are high from an investment perspective, the value of future cash flows decreases and this leads to a reduction in the attractiveness of investments (Hakim & Kusmanto, 2020). The economic theory posits that an increase in interest rates leads to a drop in stock prices (Harahap, 2018). The interest rate in this study is measured using the prime lending rate. Studies that were undertaken by Harasty and Roulet, (2019), Lee (2021), and MacFarlane (2020) show that higher interest rates are bound to depress the share prices because of the substitution effect where shares become less attractive than the interest-bearing securities. In essence, expected returns on the mining sector are affected by the interest rates and a negative relationship, therefore, exists between the two variables.

4.4.2.3 GDP growth

GDP is a measure of the economic growth. According to Chen (2021), GDP measures the total aggregate activity within an economy and it is used as a signal towards the macro-economic environment. Some studies prove that there is a positive relationship existing between the real share returns and the real economic activity (Dumrongwong 2020; Malhotra & Tandon, 2022; Martinez, 2019; Shanaev & Ghimire 2022;

Wongbangpo & Sharma, 2020). The results from the study prove that in explaining the excess returns, GDP growth plays a pivotal and significant role. According to MacFarlane (2020), JSE ALSI is influenced significantly by the GDP and this led to the conclusion that GDP growth must be used as a future instrument to predict the stock market returns within the mining sector in South Africa.

4.4.2.4 Debt to Equity (DTE)

One form of the solvency ratio is the DTE and this measures the possibility of a company being able to honour all the obligations at hand (Kaul, 2020). DTE is also used as a guarantee to the debt holders since it is a measure of the capital component that can be used to settle the overall company's debt (Makoni, 2020). A higher ratio means that a high component of the capital represents debt and a lower ratio implies less capital portion that can be used to cater for all the company's debt. Moreover, a high debt-to-equity ratio exposes the shareholder to increased risk. When the overall debt-to-capital ratio increases, this leads to a decline in the company's liquidity levels thereby resulting in the reduction of the company's stock value or the return (Prasetiono, 2020). Harahan (2019) and Kurniawati et al. (2019) conducted studies on the nexus between DTE and stock returns. The results from both studies show evidence of an inverse relationship between DTE and stock returns.

4.4.2.5 Return on Equity (ROE)

ROE is used as a measure of the return on shareholders' investment within a given company (Aryanti & Jayanti, 2020). Observations imply that a bigger ROE results in a higher share market price since it is evidence of effective usage of the shareholders' funds in enhancing their wealth (Al-Qudah, 2020). It is also proof that the management is working in favour of the shareholders' goals thereby reducing the agency problem conflict. According to Harahap (2018), a large ROE is a clear indication of an increase in the return to be earned by the investors. As a result, this works as an incentive for more new investors to have an increased appetite in buying the stocks which further leads to an increase in the stock price. A higher ROE lures investors to invest more within that specific class of stocks. There is enough evidence from various studies undertaken by Ahmadi (2021), Aryanti and Jayanti (2020) and Hutami (2022) that there is indeed a significant positive relationship between ROE and stock prices.

4.4.2.6 Price to Earnings (PE)

The PE derives its definition from the comparison it makes between the concerned market price and the EPS of the same stock (Martinez, 2019). The PE also strikes a comparison with the price per share and this is mainly shown through the earnings per share. Almumani (2022) alludes that PE is a useful tool for the organisation since it provides insight to the management on what exactly the investors are thinking of scrutinising the company's historic performance and its prospects. Companies with a high PE are characterised by their exposure to high growth rate chances and this makes it possible for investors to acquire the stocks with an anticipation that the stock will increase in the future. Also, Cakici and Zaremba (2022) and Malhotra and Tandon (2022) buttress that one should anticipate a positive and direct relationship between PE and stock price if PE is interpreted from an earnings growth rate perspective.

4.4.2.7 Return on Assets (ROA)

ROA is a performance measure ratio that is used to see how efficiently the company is using the various assets at its disposal to make profit and ensure growth (Adnan & Ismaeel, 2021). Each company is exposed to the same assets but the difference lies in which one can put the available assets to good use (Almumani, 2022). This is normally seen by how profitable the company is through converting the assets into revenue. The mining sector is a machine-oriented sector that makes use of both human and mechanical resources to produce revenue. Companies with a high ROA attract new investors and the share price goes up because of the lucrative return provided to the shareholders (Al-Qudah, 2020). Highly profitable mining companies can have more income after tax and interest for distribution to shareholders in the form of dividends (Bobi, 2022). Consequently, shareholders are attracted to companies that pay dividends more frequently than those that do not pay at all. This poses a huge pressure on the demand for shares by potential investors which automatically causes a rise in the share price owing to market factors. In essence, ROA is a tool that is used to measure the mining company's level of efficiency, productivity and profitability, and it gives an insight into the mining company's management on the organisation's overall financial performance (Chen, 2021). The mining company's resource usage and the extent of its financial muscles are evaluated using ROA.

4.4.2.8 Current Ratio (CR)

The current ratio (CR) is a liquidity ratio that is used to measure the ability of a company to settle its debts when they fall due with specific reference to the short-term obligations that are due within the current financial year (Apergis, 2022). The current ratio is a liquidity measure that is used to make a comparison between liquid assets and non-long-term liabilities. The CR is one of the tools used by investors when looking for an investment avenue within corporates for it shows how well managed the company is concerning the mining sector companies (Ahmadi, 2021). A higher CR means that the company can cater to its non-long-term liabilities as they fall due while a 1:2 ratio means that there is too much stock held in non-long-term assets. Therefore, it is recommended to have a 1:1.2 ratio of non-long-term assets to non-long-term liabilities. A high current ratio is not good for investors as they will view the company as highly inefficient in utilising its non-long-term assets or the available short-term financing facilities (Gatua, 2019). However, a too-high CR is a good measure for creditors as they know that they are guaranteed that the company can pay when the debts fall due (Harahan, 2018). Simply put, the CR as a liquidity ratio is there to measure if the mining company has adequate resources to cater to its non-long-term financial obligations.

Table 4.1: Summary of variables

	Variable	Proxy	Former studies	Expected sign	Data sources
Dependant variables	Share price	JSE Price index	Jordà et al. (2019), Husna and Satria (2019)	n/a	IRESS research domain
	Share returns	JSE return index	Marozva (2019), Rjoub (2022)	n/a	IRESS research domain
	Total returns	Price index plus yield	Jordà et al. (2019), Husna and Satria (2019)	n/a	IRESS research domain
Independent variables	Inflation	CPI	Eita (2020), Junkin (2020)	Negative	World Bank
	Interest rate	Prime rate	Talla (2022), MacFarlane (2020)	Negative	Reserve Bank of South Africa
	GDPG	Economic growth	Rafique (2020), Jefferis and Okeahalam (2019)	Positive	World Bank
	ROA	Profitability	Hakim and Kusmanto (2020), Antono et al. (2019)	Positive	IRESS research domain
	CR	Liquidity	Marozva (2019), Sivilianto and Endri (2019)	Positive/ Negative	IRESS research domain
	RM	JSE ALSI	Sivilianto and Endri (2019), Salim and Prasetia (2022)	Positive	IRESS research domain
	DTE	Solvency ratio	Prasetiono (2020), Kewal (2021)	Negative	IRESS research domain
	ROE	Profitability	Al-Qudah (2020), Ahmadi (2021)	Positive	IRESS research domain
	PE	Market ratio	Martinez (2019), Cakici and Zaremba (2022)	Positive	IRESS research domain

Table 4.1 shows a summary of the variables in the study and a distinction was made where dependent variables were displayed separately from the independent variables. The dependent variables include share returns, total returns and the share price. The macro-economic variables presented include interest rate, exchange rate, GDP, and inflation. The micro-economic variables considered include DER, PBV, ROE, PER, dividend policy, and size. All the variables had their proxies and the studies in which they were used before together with the expected effect they posed to the dependent variables.

4.5 Model Specification

A descriptive statistical analysis is undertaken on the total variables outlined in this study as a starting point for the empirical analysis. All the variables have proxies that are presented in Table 4.1. The study was centred on examining the macro- and micro-economic determinants of the mining companies share returns. An empirical assessment was undertaken to see the connection between selected macro- and micro-economic on share returns with the help of the panel data from ten selected mining companies listed on the JSE during the period 2013 to 2021.

The methodology employed in this study is related to the ones that were used by Almumani (2022), Avdalovic (2022), Barnor (2020), Chen (2021), Eita (2020), Endri (2021), and Hakim and Kusmanto (2020). These studies were focused on either specifically outlined macro- or micro-economic variables effect on share returns such as inflation, exchange rate and oil prices, and ROA to mention a few. The data needed from the sample selected in this study were readily available which included JSE listed mining companies. All the mining companies that formed the sample for the study were in South Africa which eliminated the policy difference problem that comes from geographical-related policy differences. A panel data method of analysis was employed while primarily adopting the GMM approach.

4.5.1 Panel Data Analysis

There is a wide range of econometric procedures that were used to model the share price behaviour. In doing so, panel data estimation techniques were used since they have proved to be stronger because of their ability to consider both the cross-sectional

and time series nature of data. As such, this improves the quality of the data to be analysed.

The use of panel data permits heterogeneity in firms under observation and in this case, it calls for all listed firms falling under the mining sector of South Africa owing to its ability to make use of firms' cross-section over a given period (Jorda et al., 2019). In addition, the use of panel data techniques promotes heterogeneity as it incorporates individual-specific variables (Husna & Satria, 2019). As such, the combination created because of the use of panel data techniques results in the provision of less collinearity among variables and results in more degrees of freedom (Avdalovic, 2022). Also, concerning this study, the use of panel data analysis permits the detection of the dynamics of change. Panel data techniques give flexibility when it comes to the choice of variables to control endogeneity. Endri (2021) asserts that the commonly used panel data applications include pooled effects and random, fixed and GMM.

4.5.1.1 Generalised Method of Moments (GMM)

The GMM is a generic method that is used in statistical methods to estimate parameters (Marozva, 2019). The GMM is applicable mainly in semi-parametric models where the area of focus is finite-dimensional and the entire shape in the data distribution function is unknown which makes the application of the maximum likelihood estimation inapplicable. Moreover, the GMM estimation instruments are obtainable from orthogonality conditions existing between the lagged dependent variable and error term and this aspect has made it superior to other estimation techniques (Endri, 2021). The GMM estimation technique results in the production of strong correlations with high significance at all conventional levels. Therefore, the GMM is the main estimation that will be employed in this study. The GMM model is outlined as follows:

$$y_{i,t} = ay_{i,t-1} + \beta x_{i,t} + \mu_i + \varepsilon_{i,t} \quad 4.3$$

Where:

$y_{i,t}$ represent the share returns measure for the listed mining companies' $_i$ at time $_t$;

$x_{i,t}$ represent vector independent variables for the mining companies' share returns which are the share returns micro- and macro-economic determinants;

α is the slope of the lagged share returns variable;

β is the slope of variables;

μ_i is the fixed effects on mining companies' share returns;

$\varepsilon_{i,t}$ shows the error term; and

the subscript i shows the cross section and t shows the time series dimension.

Upon removing the mining companies' share returns specific effects, the result is:

$$\Delta y_{i,t} = (1 - a)\Delta y_{i,t-1} + \beta \Delta x_{i,t} + \Delta \varepsilon_{i,t} \quad 4.4$$

This resultant model is regarded as inefficient since it does not do away with the correlation existing between the lagged variables and the error since $\alpha y_{i,t-1,}$ and $\varepsilon_{i,t}$ remain correlated (Harasty & Roulet, 2019). This study adopted the GMM estimation technique which employs instruments from the lagged values of the regressors. A one-step GMM system estimation approach was used with instruments such as level and lagged values of the identified variables. The use of this model is based on the notion that the current share returns of mining companies depend on the previous share returns. The lagged share price independent variables are ever-existent over time. This is because the share returns are persistent for, they are driven by momentum where the previous share price can have an influence on today's price which automatically makes it dynamic; hence the use of GMM.

The empirical connection among the variables in the study which are mining companies' share returns, share price, total returns, and macro- and micro-economic variables can be mathematically expressed as follows:

$$SP_{it} = \alpha SP_{it-1} + \beta_1 \sum_{j=1}^{n} MACEV_{j,it} + \beta_2 \sum_{j=1}^{n} MICEV_{j,it} + \sum_{n=1}^{i} \beta X_{i\,t} + \mu_i + \varepsilon_{it} \quad 4.5$$

$$SR_{it} = \alpha SR_{it-1} + \beta_1 \sum_{j=1}^{n} MACEV_{j,it} + \beta_2 \sum_{j=1}^{n} MICEV_{j,it} + \sum_{n=1}^{i} \beta X_{i\,t} + \mu_i + \varepsilon_{it} \quad 4.6$$

$$TR_{it} = \alpha TR_{it-1} + \beta_1 \sum_{j=1}^{n} MACEV_{j,it} + \beta_2 \sum_{j=1}^{n} MICEV_{j,it} + \sum_{n=1}^{i} \beta X_{i\,t} + \mu_i + \varepsilon_{it} \quad 4.7$$

Where:

SP_{it} *is the share price of the listed mining companies at time t,*

SR_{it} *is the share returns of the listed mining companies at time t,*

TR_{it} *is the total returns of the listed mining companies at time t,*

SP_{it-1} *is the share price measure for the mining companies in time t-1,*

SR_{it-1} *is the share returns measure for the mining companies in time t-1,*

TR_{it-1} *is the total returns measure for the mining companies in time t-1,*

$MICEV_{it}$ *is the vector of the microeconomic explanatory variable for mining company i in time t,*

$MACEV_{it}$ *is the vector of a macro-economic explanatory variable for mining company i in time t,*

α *is the auto-regression coefficient,*

β *the estimated change in the dependent variable for a unit change in the independent variable,*

$\varepsilon_{i,t}$ *is the error term,*

μ_i *is the dummy which represents the COVID-19 crisis era*

$X_{i\,t}$ *is the vector of control variables*

It can be noted that three distinct equations were derived which made up the GMM and these include the share price, share returns and the total returns.

4.6 Formal Tests of Specification for Panel Data

4.6.1 Multicollinearity

Multicollinearity happens when more than one variable are found to be correlated and this is not only the case where they are correlated with the dependant variable but with each other too (Husna & Satria, 2019). The presence of multicollinearity results in rendering some of the variables insignificant statistically and it poses a risk of distorting the results to the study. Avdalovic (2022) purports that there is a need to detect multicollinearity within any given study and some of the methods used to detect such include correlation coefficients and variance inflation factor (VIF). In case the Pearson

correlation coefficient factor is 0.8, this implies the existence of multicollinearity (Marozva, 2019). The extent to which the variance of estimated regression coefficient is inflated is measured by VIF. A VIF of exactly one shows that the independent variables are uncorrelated while a greater than five result shows that there is a greater correlation (Barnor, 2020).

4.6.2 Heteroscedasticity

According to Mohajan (2018), heteroscedasticity relates to a situation where the data is inconsistent with the statistical assumption. Mulisa (2022) asserts that when there is lack of consistence within the variance of the error term across observations, it shows the presence of heteroscedasticity. A failure to detect heteroscedasticity implies incorrect resolved results of regression. Visual inspection of scatter diagrams as well as Goldfeld Quandt Test are some of the methods that can be used to detect heteroscedasticity (Clark et al., 2021), and in the case of this study, stata was used to test heteroscedasticity.

4.6.3 Autocorrelation

Talla (2022) implies that autocorrelation takes place in a time series provided the significance of the time sequence. A correlation between the error term in time *t* and the error term in the preceding time *t* is established. Autocorrelation plays a vital role in that it poses an impact on the validity of the inferences that are related to the hypothesis testing as well as the confidence intervals (Naik & Padhi, 2020). Autocorrelation is measured through calculating the Log-1 autocorrelation coefficient. The theoretical exposition was applied during data collection, processing and analysis (Mulisa, 2022), and this formed the basis of the practical as well as systemic approach to the study.

4.6.4 Cross sectional dependence

According to Avdalovic (2022), Barnor (2020) and Chen (2021), panel data pose a high probability of showing a significant cross-sectional dependence. The phenomenon takes place out of the existence of common shocks as well as unnoticed elements that end up being part of the error term, and spatial dependence. This can also be caused by an idiosyncratic pair-wise dependence that arises from the disturbances with no pattern of common components.

4.7 Conclusion

This chapter was aimed at identifying and justifying the best research paradigm and the approach that suits the study. The adopted approach and the methodology were extensively explained and justified. The discussion was meant to connect the core aspects which include objectives, questions and hypotheses to the stated models. The set and selected models in this study were the basis of establishing and testing the nexus between specified macro- and micro-economic variables and the regressors through the stated models.

In essence, the selected models were meant to determine the connection between stock returns and the various macro- and micro-economic variables that were selected for this study. The study employed the GMM based on previous share returns' tendency and ability to influence today's share price and, therefore, dynamic. The following chapter presents the data analysis and discussion of results.

CHAPTER FIVE: DATA ANALYSIS AND DISCUSSION OF RESULTS

5.1 Introduction

The previous chapter was centred on research methodology where aspects such as the research paradigm and approach were discussed and explained regarding how they were applied to the study. In addition, the population and the sample were also stated and the strategy that was used to select the ten companies out of the 16 mining listed companies on the JSE. Aspects such as data and the variables in the study were also discussed before specifying the model. The main aim of the chapter was to outline how the relevant data to the study was obtained.

This chapter proceeds by analysing the collected data to derive meaning and discussion of the results thereof. The nine years of data obtained between the period 2013 and 2021 from the ten mining companies that were selected using the purposive sampling technique from the JSE is to be analysed. This is meant to derive meaning from the raw data as a way of addressing the research questions of the study. The descriptive statistics are presented and discussed which is followed by correlational analysis results from the E-Views. The empirical results will also be presented to address the research objectives of the study which are:

- To examine the macro-economic determinants of stock returns in the mining sector in South Africa; and
- To examine the micro-economic determinants of stock returns in the mining sector in South Africa.

This chapter begins by outlining the descriptive statistics and this will be done with the help of the measures of central tendency on both independent and dependent variables. It will be followed by an outline of the correlation analysis between the variables identified in the study. The main aim is to show the magnitude and direction of the relationship on either independent and independent variables or independent and dependent variables. The discussion is important as it enables one to make conclusions from an informed point of view. Empirical results will also be presented and discussed where the results are captured and interpreted, a theory outline which supports the relationship, as well as interpretation in line with the literature consulted.

Empirical results are displayed based on mining companies' two performance measures, namely, ROA and ROE.

5.2 Descriptive Statistics

Secondary data analysis was used in this study ranging between 2013 and 2021 on the ten selected mining companies from the JSE. Descriptive data is important in that it allows one to visualise the raw data and easily develop meaning out of it. A meaningful way of presenting data that permits easy data interpretation is facilitated by descriptive statistics. The latter were undertaken with the help of the measures of central tendency which include mean, median, standard deviation, maximum, and minimum to mention but a few. In total, 90 observations were used in this study. The descriptive statistics are presented in Table 5.1.

Table 5.1: Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std Dev	Skewness	Kurtosis	JB	Obs
SP	8850,767	1561	61514	42	14255,31	1,993149	6,306619	100,5911	90
R	23,63066	1,848371	666,0377	-85,18048	95,48541	4,117743	25,78469	2201,12	90
TR	27,18822	7,57046	669,3077	-85,18048	94,96668	4,157313	26,20676	2278,825	90
CR	2,109889	1,785	5,94	0,94	1,139433	1,475066	4,623109	42,51662	90
DTE	0,921778	0,575	7,4	0,11	1,019903	3,650854	21,38537	1467,512	90
PE	6,296889	8,135	111,73	-70,45	19,11677	0,100184	16,75376	709,5224	90
ROA	8,517444	8,395	72,67	-43,95	18,52986	0,241846	5,589064	26,01453	90
ROE	6,960889	10,5	74,56	-137,33	30,30587	-1,559929	8,850539	164,8587	90
GDPG	1,603803	1,413826	3,168556	0,303453	0,870738	0,319768	2,110606	4,500105	90
INFL	5,28577	5,184247	6,571396	4,120246	0,779182	0,109685	1,802621	5,556902	90
INT	9,194444	9,75	10,5	7	1,252962	-0,745715	2,011016	12,0092	90
RM	53607,97	54108,4	67075,68	41764,92	6403,962	0,307024	3,58718	2,706885	90

Source: Author's computation

The dependent variables in this study are share price (SP), returns (R), and total returns (TR). The SP is the price at which the share was trading at the given time and all figures were compiled on a real-time basis from the JSE. Out of the 90 observations made on the available data which spanned from 2013 to 2021 for the ten selected

companies, the SP mean was 8850.77 with a median value of 1561 and a standard deviation of 14255.31. The higher standard deviation means that the data are more spread out above the mean. The maximum values on SP are 61514 while the minimum recorded value was 42 with a skewness value of 1.99. The skewness value shows that the distribution is highly skewed since it is greater than 1 (Creswell, 2021). The results also show a kurtosis value of 6.31 which signals a leptokurtic distribution since the value is greater than 1 and the value is rendered appropriate as it is within the range -7 and +7 (Husna & Satria, 2019). The values also show that the distribution is more peaked than normal since it is positive. In addition, a JB value of 100.59 was found and this implies that the sample data does not have a normal distribution since it is not close to zero.

The other dependent variable R shows that the average returns in the mining sector companies are 23.63 as shown by the mean in Table 5.1. It goes on to show that the median value is 1.85 with maximum and minimum values of 666.04 and -85.18 respectively. The standard deviation value in this regard was 95.49 which means that the data are more spread out since the value is high. A skewness value of 4.12 was found from the data and this shows that the data distribution is right and highly skewed since the value is positive. However, the values are unacceptable since it is out of the acceptable range which is -2 to +2 (Talla, 2022). A kurtosis value of 25.78 was also found which shows a leptokurtic data distribution and the distribution is more peaked than normal. The kurtosis value is outside of the appropriate range of -7 to +7 (Naik & Padhi, 2020). A JB value of 2201.12 was also found from the data set which means that the sample data do not have a normal distribution since it is not close to zero.

The descriptive statistics show that the mining sector's TR as a dependent variable is 27.19 as outlined by the mean value in Table 5.1. The results also show that the median value was 7.57 with maximum and minimum values of 669.31 and -85.18 respectively. According to Jordà et al. (2019), investors view a total return of at least 10% as being good and the mining sector of South Africa has an average of 27.19, which is highly commendable. A standard deviation value of 94.97 was also found which means that the data are more spread out as shown by the high value. A skewness value of 4.16 shows that the data is outside of the normal range of -2 to +2. The results show that the data are skewed since the value is positive. A kurtosis value

of 26.21 was found which shows that the distribution of data is leptokurtic and it shows that it is out of the appropriate range -7 to +7. The data are more peaked than normal since the value is positive. A JB value of 2278.83 was also found from the 90 observations made and it means that the sample data does not have a normal distribution since it is not close to zero.

The independent variables fall into two categories and these include macro- and micro-economic variables. The micro-economic variables are presented first and this will be followed by the various macro-economic variables. The CR shows the ability of a company to cater to its short-term obligations and this forms one of the liquidity ratios (Aryanti & Jayanti, 2020). A CR of 1 means that the company can cater to its current liabilities with its current assets. The results from the data show that the mining sector has a CR mean of 2.12 and a median of 1.79. This means that generally the mining sector is highly liquid and it is capable to cater for its short-term debts as they fall due. The maximum value was 5.94 while the minimum value was 0.94 and a standard deviation of 1.14. The CR skewness value was 1.48 which falls within the acceptable range of -2 to +2 and it is right skewed. The kurtosis value of 4.62 was also found and this is an acceptable value since it falls within the acceptable range, of -7 and +7. The JB value was also found to be 42.52 which shows that the data do not have a normal distribution.

The DTE ratio shows the relationship between the company's total debt and the total shareholders' equity (Makoni, 2020). The higher the value the more risk the business. The mining sector shows a mean DTE of 0.92 which means that total debt is less than total equity on average. The median value of 0.58 was found while the maximum DTE value was 7.4 and the minimum value was 0.11. The standard deviation was 1.02 which means that the data are clustered around the mean and a skewness value of 3.65. This value is unacceptable since it is beyond the range -2 and +2 though it is right skewed. A kurtosis value of 21.39 was also found, which means that the distribution is leptokurtic and it is more peaked than normal. The distribution is normal since it falls between -7 and +7. A JB value of 1467.51 was also found which shows that the sample data does not have a normal distribution since it is not close to zero.
The PE ratio relates to the relationship between a company's share price to its earnings per share. A good PE must be lower than the average which is 20 to 25%

(Malhotra & Tandon, 2022). The results from the study show that the mining sector has an average PE ratio of 6.30 with a median value of 8.14. This means that the industry average PE ratio is good since it is lower than the 20 to 25% threshold. A maximum value of 111.73 with a minimum of -70.45 and a standard deviation of 19.12 was found from the data. The results show a skewness value of 0.10 thereby showing normal distribution with a kurtosis value of 16.75, which is out of the normal range -7 to +7. A JB value of 709.52 was also found which means that the sample data does not have a normal distribution.

In contrast, ROA shows the ability of a company to make use of its available resources for the sake of making profits. A high ROA shows efficiency and productivity and a 15 to 20% return is considered good (Al-Qudah, 2020). The results from the study show that on average the mining sector has a ROA of 8.52, which is lower than what is deemed good. It means that the sector is not putting its resources to good use though there is potential. The median value of ROA is 8.40 while the standard deviation is 18.53 and maximum and minimum values are 72.67 and -43.95 respectively. The skewness value was 0.24 which shows the normal distribution and a kurtosis value of 5.59 which is leptokurtic and acceptable. The JB value was 26.01 from the 90 observations.

On the contrary, ROE measures the company's profitability and how well it generates profits through the resources at its disposal. It is obtained by comparing the firm's net income to its shareholders' equity. A 15 to 20% ROE is considered good while 5% is considered low (Ahmadi, 2021). The results from the study show that the mining sector has on average a ROE of 6.96 as shown by the mean. This means that the ROE is low and the sector is not putting the shareholders' funds into good use. The median value found is 10.5 with a standard deviation value of 30.31 and maximum and minimum values of 74.56 and -137.33 respectively. Furthermore, a skewness value of -1.56 was found which means that the data distribution is left skewed and is acceptable. The data had a kurtosis value of 8.85 which falls outside of the normal range of -7 to +7. The JB value of 164.86 shows that the sample data did not have a normal distribution.

The results from the macro-economic variables were also noted as opposed to the company-specific determinants. The results from the study show that the goodness fit test as measured by JB had most of the macro-economic variables having sample data that has a normal distribution since the values are close to zero except INT (12.01) which does not have a normal sample data distribution.

The results concerning skewness show that all the macro-economic variables had a normal distribution with appropriate normal. This shows that the data distribution is highly skewed since it is greater than 1. The kurtosis results show that all the macro-economic variables had a leptokurtic distribution since the values are greater than 1 and the distribution is more peaked than normal as all values are positive. Some variables were above +2, thereby depicting that the distribution is too peaked and these include GDPG (2.11) and INT (2.01). However, in terms of kurtosis, all the values are acceptable since they fall within the acceptable range of -7 to +7.

The GDP growth rate (GDPG) accounts for the change in the national GDP concerning the earlier period. According to Martinez (2019), a good GDPG falls within 2.5 to 3.5% and the results from the study outline that the average GDPG in South Africa for the study period was 1.60 with a median value of 1.41. The results show that the country's GDPG was bad since it is below 2.5 to 3.5%. A standard deviation of 0.87 was also found which shows that the data are clustered around the mean.

Inflation (INFL) implies the continuous increase in prices which leads to a decline in purchasing power over time. The ideal inflation rate is 2% and once it exceeds this figure, there is a need for intervention by the monetary committee in international terms (Adnan & Isma'eel, 2021). However, in the case of South Africa, the inflation target is used as a measure of inflation and it is 3 to 6%. Any inflation figure falling within this range is considered normal. The results from the World Bank website over the years 2013 to 2021 imply that the inflation value in South Africa was on average 5.29 as shown by the mean and the median data value was 5.18 with a standard deviation of 0.78. What it means is that generally, the inflation rate lies within the inflation target by the South African Reserve Bank of 3 to 6%. This is done to preserve the buying power of the local currency while promoting investment and borrowing within the economy. A maximum value of 6.57 and a minimum value of 4.12 were observed over the given

period. A stable inflation rate attracts and promotes investment because of its ability to preserve buying power (Naik & Padhi, 2020).

The interest rate (INT) relates to the cost of borrowing financial resources and this is expressed as an annual percentage rate. An interest rate of below 10% is regarded as good since it promotes economic growth (Kaul, 2020). When interest rates are low, it becomes cheap for businesses and consumers to borrow financial resources and repay them. Data collected from the Reserve Bank of South Africa between the period 2013 to 2021 shows that on average INT was 9.19 with a median value of 9.75. These rates are within the range which is regarded as good. The standard deviation value found was 1.25 with maximum and minimum values of 10.5 and 7 respectively. The standard deviation figure shows that the data are clustered around the mean.

Another variable taken into consideration includes the JSE ALSI (RM). The variable shows that it has a normal distribution and the distribution on skewness is approximately symmetric since it is within the range of -0.5 and +0.5. On kurtosis, RM has a value of 3.59 thereby depicting a peaked distribution. The value is acceptable since it is within the acceptable range of -7 and +7. The RM shows an average value of 53607.97 while the median value was 54108.4. The results go on to show that the minimum value is 41764.92 with a maximum value of 67075.68. The standard deviation figure of 7094.3 was also found which shows that the data are widely spread out.

5.3 Correlational Analysis

This section shows the correlation results on the variables identified in the study with SP, R, and TR as the dependent variables. Independent variables fall under macro- and micro-economic variables which are CR, DTE, ROA, ROE, GDPG, PE, INFL, and INT. The other variable includes RM and the correlation results are outlined in Table 5.2.

Table 5.2: Correlation Matrix

PROBABILITY	SP	R	TR	CR	DTE	PE	ROA	ROE	GDPG	INFL	INT	RM
SP	1											
R	-0,1976*	1										
TR	-0,1797*	0,9989***	1									
CR	0,2729**	0,0716	0,0929	1								
DTE	-0,2316**	0,1951*	0,1838*	-0,4754***	1							
PE	0,1016	0,1491	0,1477	-0,2050*	0,0570	1						
ROA	0,5015***	-0,0416	-0,0268	0,2109*	-0,2163**	0,254968**	1					
ROE	0,3936***	-0,1362	-0,1242	0,2220**	-0,5284***	0,2081*	0,8227***	1				
GDPG	0,1856*	-0,0217	-0,0140	0,1348	0,1369	-0,1128	0,1278	0,0797	1			
INFL	-0,0173	0,0039	0,0047	0,0757	0,0504	0,1083	-0,0779	-0,0803	0,1333	1		
INT	-0,1869*	0,0512	0,0494	-0,0447	-0,1227	0,1172	-0,1443	-0,1099	-0,5299***	0,2864**	1	
RM	0,1270	-0,0006	0,0072	0,1643	0,0637	-0,0177	0,2060*	0,1841*	0,8353***	0,3077***	-0,2394**	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ level of significance

Source: Author's computation

The following micro-economic variables have a positive and significant correlation with SP as a dependent variable and these include CR (0.27), ROA (0.50), and ROE (0.39) at a 1% significance level. This means that as the variables increase, the share price also increases and vice versa. The correlation results show that there is a positive and direct relationship between the independent variables and the dependent variable, that is, the share price. Evidence from various studies undertaken by Ahmadi (2021), Aryanti and Jayanti (2020) and Hutami (2022) indicate that there is indeed a significant positive relationship between the following variables which include ROE, ROA, and CR, and the stock prices. Additionally, a negative and significant correlation exists between SP and DTE (-0.23). The results show that DTE as a selected micro-economic variable or company-specific factor has an inverse relationship with the share price. Studies carried on by Harahan (2019) and Kurniawati et al. (2019) on the nexus between micro-economic variables and the stock price show evidence of an inverse relationship between DTE and the stock prices.

Another dependent variable that was considered in this study was return (R) and it was found that there is a positive and significant correlation between R and TR (0.99) at a 1% level of importance. This means that as the total returns increase, the return will also move in the same direction thereby reflecting a direct relationship between the variables (Husna & Satria, 2019). The total returns, according to Wijaya (2022), refers to a measure of the performance of a given investment and this includes the capital gains as well as the other income emanating from the dividends and other interest payments. More importantly, the TR is a useful tool that is used to make comparisons on various investment options and it helps in assessing both the investment profitability and risk (Makoni, 2020). On the other hand, return simply refers to a change in the price of a given asset or an investment over a given time and this is usually shown as a price change or annual percentage change (Kewal, 2021). The two variables, TR and R, are all focused on the profitability of an investment at hand which shows the gain or loss encountered during the period where an investment was held.

The correlation results show that CR has a positive and significant correlation at a 1% level of importance with ROE (0.22). This means that there is a direct relationship between CR and the outlined variable. Inversely, the results show that there is a

negative and significant correlation between CR and DTE (-0.48). This is evidence that an inverse relationship exists between CR and the outlined variable. Despite the existence of an inverse relationship between CR and DTE, both variables have the same effect on the share prices. According to Kaul (2020), the higher the DTE ratio the higher the stock prices, and the same also exists between CR and stock prices. A higher current ratio leads to a higher stock price as a result of the Modigliani and Miller effect of the corporate tax shield. This is because of the interest payment on debt that is used to reduce the taxable income.

At a 1% level of importance, there is a positive and significant correlation between ROA and ROE (0.82). This means that as ROA increases, so does the ROE, and both ratios are measures of the financial performance of any given company. They are important to investors when making assessments on any investment of choice (Marozva, 2019). One would make an informed investment decision based on the two performance ratios, ROE and ROA.

Additionally, a positive and significant correlation exists between GDPG and RM (0.84). The results also outline that there is a negative and significant correlation between GDPG and INT (-0.53). The relationship between GDPG and RM is linear and direct in that as there is a growth in the GDP so does the RM. This means that as the aggregate economic output grows, the return on the market also grows since resources are put in productive ways through corporates and it encourages investment (Dumrongwong, 2020). The inverse relationship that is evident between GDPG and INT is a result of the easiness of accessing the financial resources that are important in enabling production and investment. A high interest rate discourages borrowing and this affects firms and GDPG negatively (Almumani, 2022). A lower interest rate promotes borrowing and effective usage of financial resources into productive means.

The INFL variable shows a positive and significant correlation with INT (0.29) and RM (0.31). The relationship shows that as INFL increases, INT also increases and vice versa. The interest rate is a strategic tool used by the central bank to control inflation as a way of preserving the buying power of the local currency (Ahmadi, 2021). This means that as inflation increases, the interest rate has to increase as well to discourage borrowing and spending and vice versa.

5.4 Empirical Results

The empirical results from the study are captured under this section of the study and this is followed by discussion and interpretation. To begin with, the diagnostic statistics are discussed and this is followed by determining the relationship between company performance using ROE and the three distinct dependant variables, namely, share price, returns and total returns. The other performance measure used in the study is ROA. A summary of the chapter will be presented at the end which is mainly focused on the main findings from the results.

5.4.1 Diagnostic statistics

A general panel data model was employed and this was a cause of concern to test the fixed effects, random effects and pooled OLS for different diagnostic statistics. The tests undertaken include LM testing of random effects, specification test, joint validity test which is focused on cross sectional individual effects, and the heteroscedasticity test. Firstly, a Chow test or F-test was undertaken for the sake of analysing the individual effects and the validity of cross-sectional evaluation. A second check, LM practice, was performed and this was followed by a third test, specification test, to find out if the fixed or random effects model can be used. As a result, the random effects model was selected on null hypothesis while the fixed effects model was the selected theory for the recommended framework. The fourth test undertaken was homoscedasticity test while cross sectional interdependence test was done as the last and fifth test.

The fixed effects (FE) model could have been the best method since a purposive sampling technique was employed, however, that was not the case as GMM was used instead basing on its ability to address aspects pertaining to endogeneity as well as specification errors that are aligned with the dynamic methods. The GMM was developed specifically to address problems associated with endogeneity and specification which are found in regression analysis and these problems cannot be addressed by either OLS or FE techniques. Dynamic panel GMM estimators were employed in this study to consider the endogeneity of the lagged variables which are independent and dependent (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1988). The instruments used in this study were the lagged independent

variables and, in some cases, the dependant variable was lagged double as an instrument to the lagged dependent variable.

Some models have shown evidence of known problems which are heteroscedasticity and cross-sectional interdependence. To address this, the GMM model was used which has the Driscoll and Kraay Standard Errors estimator.

5.4.2 Analysis of the relationship between share returns and company Performance using ROA

The relationship between the company performance using an ROA as a specific performance measure and share returns is presented and analysed in this section of the study.

The conceptual framework is shown under Figure 5.1.

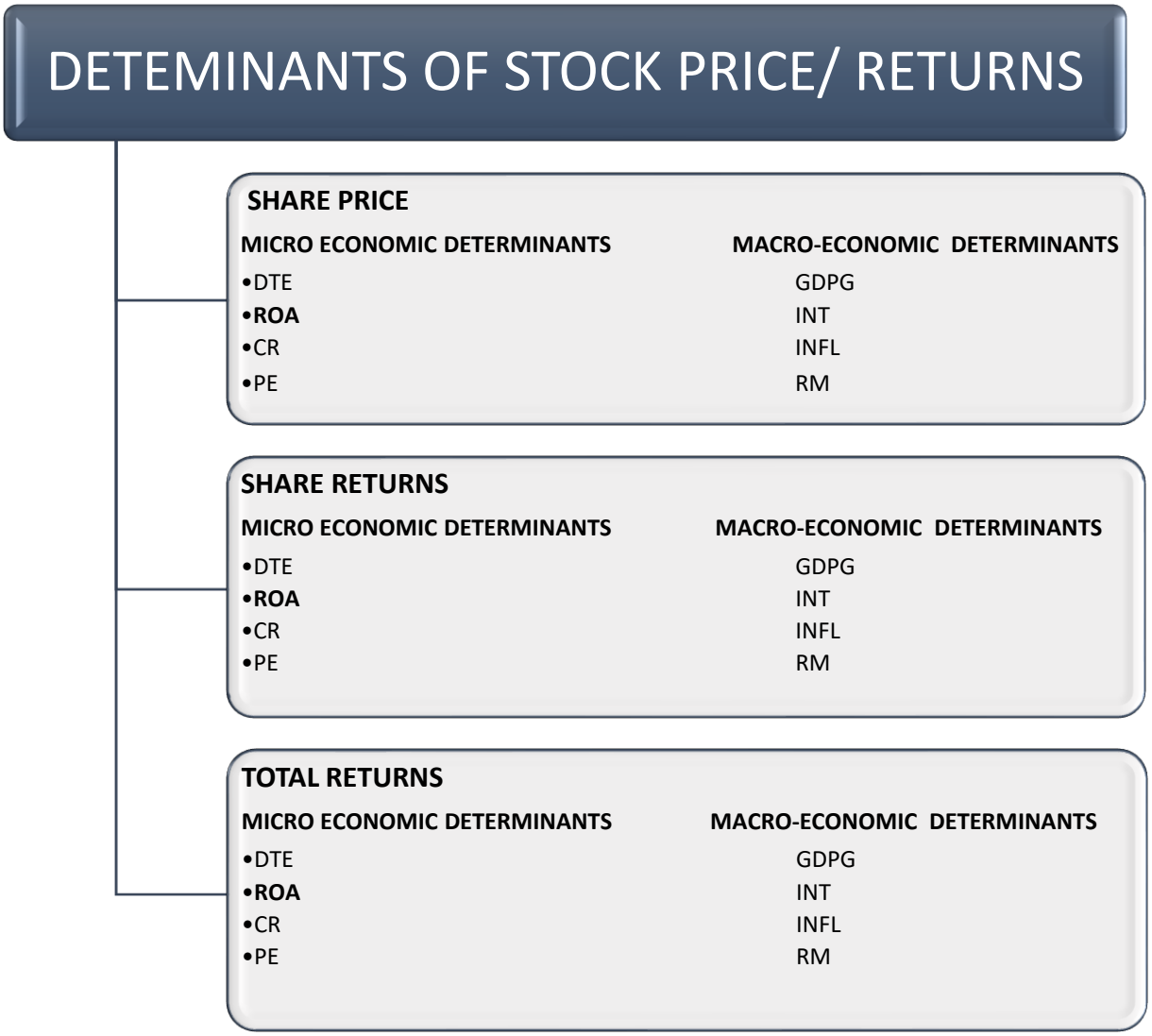


Figure 5.1: Conceptual Framework – Relationship between share returns and company performance using ROA

Source: Own compilation

Table 5.3: Determinants of Share Returns: ROA

	2-Step System GMM	2-Step System GMM	2-Step System GMM
Variable	LSP	R	TR
L.LSP	1.724**		
	(0.657)		
L.R		-0.319	
		(1.079)	
L.TR			-0.278
			(1.079)
RM	-0.0000615*	0.0104*	0.0111*
	(0.0000307)	(0.00455)	(0.00452)
ROA	0.0303*	1.921	1.847
	(0.0126)	(2.015)	(1.993)
CR	-0.942**	7.590	9.375
	(0.366)	(16.72)	(16.35)
DTE	0.141	57.98*	60.19**
	(0.134)	(23.88)	(23.36)
PE	-0.00632	0.639	0.642
	(0.00362)	(0.861)	(0.910)
GDPG	0.509***	-99.10*	-101.3*
	(0.148)	(46.37)	(48.56)
INT	1.149**	-179.2*	-186.6*
	(0.397)	(80.88)	(80.48)
INFL	0.0286	34.41*	35.89*
	(0.0390)	(14.42)	(15.62)
COVID_19	3.132**	-502.2*	-524.7*
	(1.171)	(220.1)	(218.5)
N	90	90	90
Groups	10	10	10
Instruments	8	9	9
AR(1)	-1.17	-0.31	-0.33
AR(2)	-0.42	-0.03	0.02
Sargan Statistic	1.78	3.97	3.93
Hansen Statistic	0.01	0.01	0.01

Standard errors in parentheses

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

Key:

LSP – logged share price

L.LSP – logged share price and then lagged

L.R – lagged stock returns

L.TR – lagged total returns

Table 5.3 shows a summary of the regression analysis that was employed between company performance as measured by ROA and the various independent variables. The aim was to find out the relationship between the selected dependent variables and the independent variables. The relationship examined was between SP, R, TR, and the company performance which is measured using ROA.

The results from Table 5.3 depict the existence of a positive and significant relationship between the LSP and L.LSP. This simply implies that the share prices are persistent and it is proof of the existence of momentum. The results are in line with the study that was undertaken by Al-Nasseri et al. (2021) which concluded that the previous level of share price poses a positive influence on the current level of share price. The current share price depends on the level of the preceding share prices. The results are in line with the momentum theory of stock returns, which implies that stocks that have performed well in the past will continue to do so the future (Hakim & Kusmanto, 2020).

Contrary to this, those stocks that did not perform well in the past will also continue to perform badly in the future. It is one of the strategies that are used by stock investors in that they acquire past winners and dispose of the past losers in stocks (Almumani, 2022). The results from the study can be used as a guideline to stock investors in the mining sector that they must invest in positive-performing mining companies' stocks and sell the ones that are poorly performing for them to be successful in their investment journey. This is mainly a result of the momentum effect which implies that stock prices are persistent. For example, Anglo American PLC's share price kept on rising from the previous year's average which proves the momentum theory.

The results from Table 5.3 show that there is a negative and significant relationship between share price and return on the market. This means that as the return on the market increases, the share prices decrease and vice versa. The results are in line

with the findings from Apergis (2022) who alluded that a rise in the required return will lead to a decline in the stock prices and vice versa with specific reference to the mining sector. For the investors to have the required return, the stock price has to be lower provided that nothing changes. There is indeed an inverse connection between the return on the market and the stock price that is assigned by investors to a given stock (Al-Qudah, 2020). This is contrary to the CAPM theory which implies that the share price is heavily influenced by the return on the market. Based on the CAPM theory, there is a direct relationship between return on market and the share price provided that the risk-free rate and beta remain constant. The results show that the outcome from a mining sector perspective contradicts the CAPM theory. Therefore, these results imply that there is a need for the mining sector's return on the market to be kept as low as possible for the share price to increase, which is a benefit to the investors through capital gains.

Table 5.3 goes on to show that there is a positive and significant relationship between R and RM, and the same relationship is also evident between TR and RM. This implies that as the return on the market increases, so do the share returns, and as the return on the market increases, the total returns also increase. This relationship proves the APT of stock returns. This resonates with the study that was undertaken by Avdalovic (2022) which outlines that as the return on the stock market increases, both total returns and share returns increase as well concerning the mining sector companies. The two variables follow the same direction and this is supported theoretically by the CAPM. What it means is that to increase the share returns and total returns, there is a need to increase the return on the market (Bobi, 2022). This is an investment guiding tool for the mining sector investors in that by looking at the return on the market, they will be able to predict the direction of both the share returns and the total returns. An improvement in the mining sector return on the market is an incentive to invest where funds move from equities into the mining sector stocks because of the linear relationship proven under this study.

The results from the study as outlined in Table 5.3 indicate that there is a positive and significant relationship between ROA and SP. This is in line with the results from the study that conducted by Endri (2021), which reports that the ROA poses a direct and positive impact on the share prices. The relationship between the two variables can

best be described by the APT theory. The results confirm the findings made by Hakim and Kusmanto (2020), which implies that the company's performance is directly related to its share price. What this means is that the management of the mining companies must conceptualise strategies that enhance the company's financial performance to directly influence the share price. This calls for a need to effectively use the mining company's assets as a way of improving the organisation's performance. ROA simply illustrates how well the company is using its total assets to enhance profitability. This calls for a need for the mining sector companies to invest more in heavy machinery used for mining purposes as well as earthmoving equipment, and the machinery must be put to maximum and effective use together with its human resources. Maximum machinery usage implies productivity which in turn affects profitability and share price. However, the results from the study allude that there is a positive but insignificant relationship between RM and the two dependent variables, namely, R and TR.

It can also be noted that there is evidence of the existence of a negative and significant relationship between CR and SP from the study's results as shown in Table 5.3. The current ratio is a liquidity measure within a company and in this case, its effect on the share price was examined. The results from the study are contrary to the findings from Malhotra and Tandon (2022), which implies that there is a positive and significant relationship between a company's liquidity level and its share price regarding the mining sector companies. This means that highly liquid companies are attributed to a higher share price and vice versa. This is best described by the liquidity preference theory of stock returns. It is, therefore, advised that the management of mining sector companies must keep their CR as high as possible to positively influence the company's share returns. This means that there is a need to increase the non-long-term assets while keeping the non-long-term liabilities constant or reduce the non-long-term liabilities while maintaining the non-long-term assets constant (Marozva, 2019). However, the results show that there is a positive but insignificant relationship between CR and the two dependent variables, namely, R and TR.

Table 5.3 shows the findings from the study that there is a positive and significant relationship between DTE and R, and the same relationship also exists with TR. The DTE is a measure of leverage that looks into the ratio between total debt and total

equity. It checks on how the business is funded to see if it is funded more by external funds or by internally generated funds. The results are in line with the findings made by Jawaid and Haq (2020), which implies that as the DTE ratio increases, so do the share return and the total return. The results are in line with the pecking order theory of Myers and Majluf (1984), which implies that financing a firm's operations follows the hierarchical order which starts with cheap internally generated funds followed by expensive external funds. Furthermore, Junkin's (2020) results are in line with the study's results in that the correlation analysis followed resulted in a positive connection between financial leverage and stock returns regarding the mining sector. It is, therefore, advised that the management of the mining companies has to be careful about the amount of debt they take as it may affect the profitability of the organisation which may pose a negative effect on the returns. The mining companies' management must ensure that the DTE ratio is high to influence the share returns and total returns positively. It is a strategy to lure funds from other sectors to the mining sector based on the share return factor. However, the results show that there is a positive and insignificant relationship between DTE and SP.

The results from GDPG and SP reveal that there is a positive and significant relationship between the two variables as outlined in Table 5.3. GDPG is a measure of economic activity and growth, and it has a huge effect on the companies' share prices. It can be used as a measure of economic performance by comparing the productivity of a nation from one year to another. The study by Malhotra and Tandon (2022) concurs with the current results in that as the country's economy grows, so do its local companies' share prices. This is also supported by the APT theory of stock returns. It is, therefore, advisable that there is a need for national policymakers to devise strategies and implement policies that can promote economic growth and local investment for the sake of enhancing the share prices of individual companies, specifically the mining sector.

The results from the study also reveal that there is a negative and significant relationship between GDPG and R, and the same relationship also exists between GDPG and TR. This is contrary to the findings by Naik and Padhi (2020) outlining that there is a positive relationship between growth in GDP and the two independent variables, namely, R and TR. This relationship can be best described and explained

by the APT theory. The results from the study mean that as the growth in GDP takes place, both R and TR decrease and vice versa. Hakim and Kusmanto (2020) assert that the mining sector's returns and total returns are directly influenced by the growth in GDP. The growth in GDP has enabled the mining sector to grow in terms of investment since it instils confidence in investors to invest and get a return because of the normal functionality of the economy. Junkin (2020) alludes that the growth of the economy measured by GDP had caused a rise in the demand for mineral resources by consumers as a way of storing their value in precious minerals such as gold and diamonds. It can be recommended that the national policymakers must come up with policies that promote productivity within a nation as this directly affects the demand for mineral resources, thereby making the mining sector grow. Small and medium enterprises in the mining sector must be promoted by the government through direct funding, tax holidays, subsidies, and offering advisory services for free to promote their growth (Khairi, 2021).

The results as outlined in Table 5.3 show that there is a positive and significant relationship between SP and INT. Interest rate is the cost of borrowing from the borrowers' side while it is the return earned from investment from a lender's point of view (Malhotra & Tandon, 2022). The results of this study are in support of the view of Narayan and Narayan (2021), which implies that as interest rate increases so does the share price concerning the mining sector. However, Rafique (2020) opines that there is an inverse relationship between the two variables mainly from a mining sector perspective. The argument for this point is that if the interest rate is low, investors move funds from interest-bearing securities into stocks which automatically cause an increase in the share price and vice versa. This phenomenon is best described by the liquidity CAPM. In addition, Kewal (2021) avers that once the interest rate falls, interest-bearing investors tend to move their funds into real assets such as precious minerals to preserve their buying power and this leads to an increase in the demand for minerals. Increased demand for mineral resources leads to an increase in the profitability of mining companies thereby making it a viable investment avenue for stockholders (Lee, 2021). To enhance the share prices, the monetary policy board must ensure that the interest rate works in the interest of the shareholders while ensuring that it does not cause deflation or hyperinflation. This must be kept in a position that promotes investment in the mining sector's stocks.

The results from the study also show that there is a negative and significant relationship between R and INT and the same relationship also holds between TR and INT. This implies that as INT increases, the R decreases and vice versa. The same also applies between INT and TR. This is in line with the findings from Samitas and Kenourgios (2019) in that interest rate as a cost of borrowing affects the return negatively, which thereby affects negatively if high on the returns. Low-interest rate promotes borrowing and mining companies will borrow more to enhance their business activities (Srinivasan, 2021). Less will be paid in servicing the loans and this leaves more to distribute to shareholders in the form of dividends. The results are in support of the Gordon Growth Model. It is, therefore, advised that the monetary policy board must keep the interest rate as low as possible to influence borrowing by the mining sector while keeping in mind that the interest rate must also promote economic growth and avoid inflation.

There is also evidence from the findings that there is a positive and significant relationship between R and INFL and the same also applies between TR and INFL. Inflation is a continuous rise in the prices of goods and services, and this is caused by various factors which include but are not limited to increased demand, scarcity and increase in the cost of production (Spyrou, 2019). This means that as INFL increases so do R and TR. The results are in line with the findings by Talla (2022) in that as inflation increases, total returns and returns increase in the mining sector. In inflationary situations, consumers and investors would put their funds in real goods such as minerals to preserve their buying power such as gold and diamonds (Malhotra & Tandon, 2022). This poses an increase in the demand for mineral resources thereby enhancing the mining companies' profits. A profitable mining sector attracts investors which then increases in share price. However, the results are contrary to the findings of Tursoy (2021) which implies that there is an inverse relationship between inflation and total returns and returns. This is in line with the inflation-adjusted APT. The results from the study imply that the monetary policy board must use interest rates to ensure that inflation levels are kept at moderate levels since it directly affects returns and total returns. Highly inflation implies that the mining sector can have more profits than before while using the same resources.

The dummy variable used in the study was COVID-19 and it can be noted in Table 5.3 that there is a positive and significant relationship between COVID-19 and SP. What it means is that COVID-19 poses a positive impact on share prices. The results are in support of the impulse buying theory. These results are in line with the findings of Yarnest (2022), which implies that unforeseen circumstances such as the emergence of the COVID-19 pandemic increase share prices. This is mainly because of panic buying which increased demand for minerals. The scenario made mining companies increase the prices of minerals while increasing production and this resulted in higher profits than the pandemic-free era. As a result of high profits, demand for shares from specific mining companies increased and so did the share price (Salim & Prasetia, 2022). It is advisable that in the case of such instances where a global pandemic emerges, it is an opportunity for investors to buy shares within sectors that are directly affected by the pandemic to benefit from huge capital gains. Moreover, Salim and Prasetia (2022) reveal that the share prices within the mining sector were affected positively by the emergence of COVID-19 because of the movement of funds from equities into the mining sector commodities to preserve the monetary value since there was uncertainty in stock investment. As a result, the increase in demand for mineral products led to high profitability thereby affecting the share prices positively from a mining company performance perspective.

In addition, the results from Table 5.3 also show that there is a negative and significant relationship between COVID-19 and R and the same results also stand between COVID-19 and TR. The results are in line with the views of Talla (2022) in that unforeseen circumstances such as the pandemic pose a negative effect on both returns and total returns in that production is negatively affected owing to government policies such as social distancing and limited number of workers within mining companies' workspace. As a result, profits are affected negatively thereby causing lower returns and total returns than before (Yarnest, 2022). It is, therefore, advised that the policymakers in the government must not put in place strict rules on mining companies for them to keep in line with their production targets. To the mining companies, there is a need to invest more in automation to cater for the emergency government policies.

5.4.3 Analysis of the relationship between share returns and company performance using ROE

Various determinants of share returns are presented and discussed under this section of the study and ROE is used as a specific performance measure on the selected mining companies. The conceptual framework is presented under Figure 5.2.

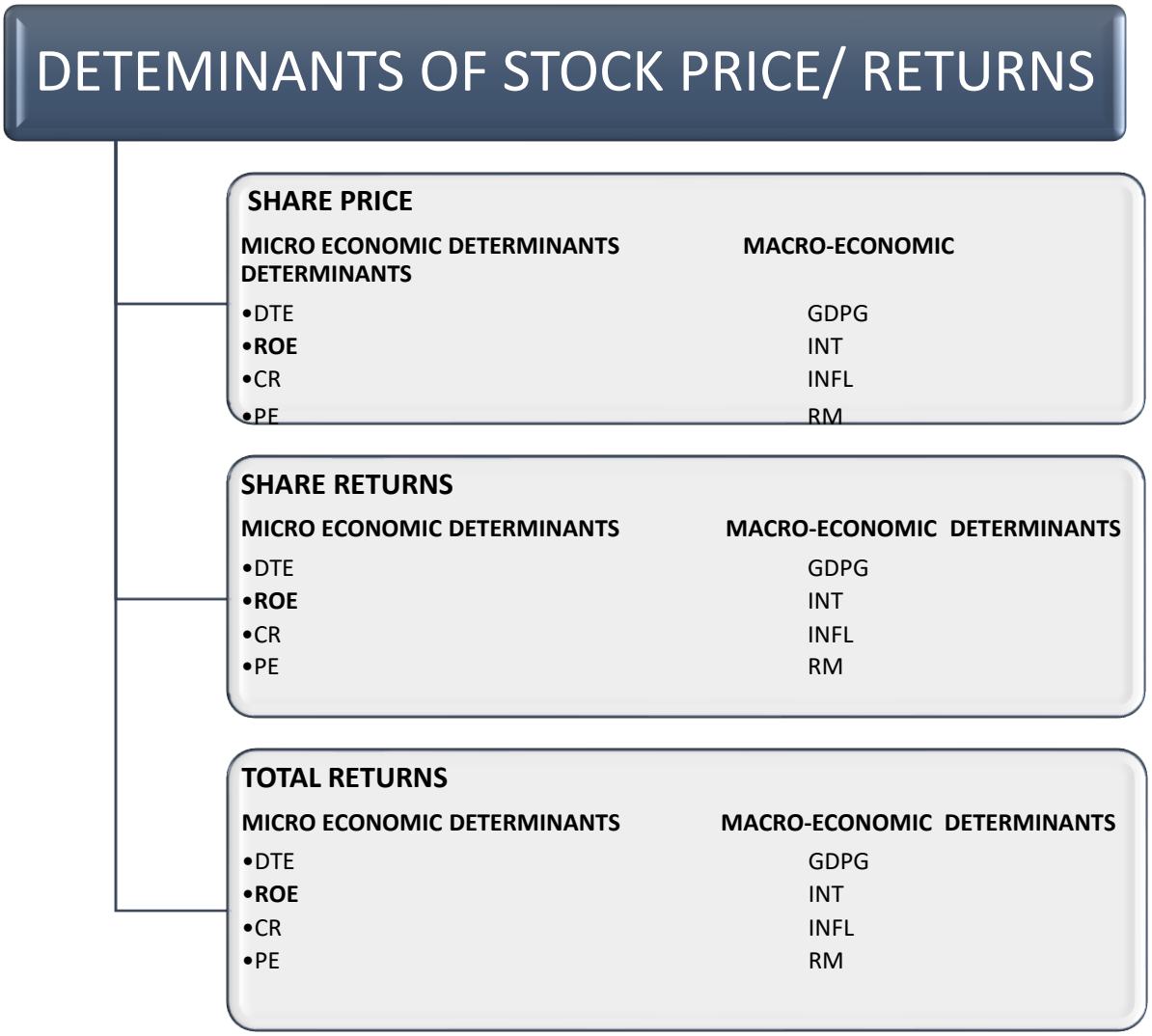


Figure 5.2: Conceptual Framework – Relationship between share returns and company performance using ROE

Source: Own compilation

Table 5.4: Determinants of share returns: ROE

Variables	2-Step System GMM LSP	2-Step System GMM R	2-Step System GMM TR
L.LSP	0.266		
	(0.743)		
L.R		0.0512	
		(0.311)	
L.TR			-2.136*
			(1.079)
RM	-0.0000513**	0.0166*	-0.0186
	(0.0000169)	(0.00679)	(0.0101)
ROE	0.0263**	0.568	-0.750
	(0.00894)	(0.672)	(1.175)
CR	-0.289	-5.379	-86.72**
	(0.270)	(27.58)	(31.26)
DTE	0.914	76.37*	-42.17
	(0.486)	(37.24)	(36.61)
PE	-0.0104*	1.622**	0.106
	(0.00514)	(0.573)	(1.224)
GDPG	0.301***	-113.4	721.8*
	(0.0841)	(73.79)	(324.2)
INT	0.672*	-275.1**	827.2*
	(0.313)	(105.9)	(396.4)
INFL	-0.0320	26.50*	-219.7*
	(0.0386)	(11.92)	(107.9)
COVID_19	1.442	-817.1**	1643.2
	(0.828)	(277.9)	(851.1)
N	90	90	90
Groups	10	10	10
Instruments	9	7	8
AR(1)	-0.09	-1.09	-0.52
AR(2)	-0.02	-0.62	-0.61
Sargan Statistic	6.39	0.57	5.67
Hansen Statistic	0.01	0.02	0.01

Standard errors in parentheses

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

Key:

LSP – logged share price

L.LSP – logged share price and then lagged

L.R – lagged stock returns

L.TR – lagged total returns

Table 5.4 shows the various determinants of the dependent variables which include share price, returns and total returns by using a specific company performance measure, ROE. The various determinants are outlined clearly in Table 5.4 for discussion purposes.

The results in Table 5.4 show that there is a negative and significant relationship between lagged total returns and the total returns. This implies that the previous TR negatively influences the mining sector's current total returns. This also means that the current TR does not follow momentum and therefore, a decision cannot be undertaken based on the historical TR in trying to determine the current and future TR within the mining sector (Sadorsky, 2021). This scenario is in line with the Random Walk Theory of stock returns. The results resonate with those of Shanaev and Ghimire (2022) in that previous total returns do not influence the current total returns and such information cannot be used by investors to predict the future outcome within the mining sector. It is, therefore, advisable that under no circumstances can investors use past information to predict future outcomes (Rjoub, 2022).

It can also be noted that the findings as outlined in Table 5.4 show that there is a negative and significant relationship between RM and SP. This means that as RM increases, SP will decrease and vice versa. This is in line with the CAPM theory of stock returns. The results from Rjoub (2022) concur with the current study's outcome in that there is an inverse relationship between the return on the market and the mining companies' share price. It can be advised that investors must look at the general return on the market first to determine how profitable it is to invest in any of the companies of choice. When the return on the market is high, then the share price of individual mining companies will be low and versa.

The results also reveal that there is a positive and significant relationship between RM and R. This implies that as RM increases then R also increases, and this is in line with the findings by Rafique (2020), which confirms the linear relationship within the mining sector. The CAPM theory supports the outcome. It is advisable to investors that when looking at return on the market as a mining companies' share return determinant, the share return can be predicted, and it is advisable to invest in a market with a high market return. The results from the mining sector concur with the findings from Martinez (2019) in that the return on the mining sector moves in the same direction as the individual mining companies' returns. However, there is a negative and insignificant relationship between RM and TR.

The results from the study as shown in Table 5.4 show that there is a positive and significant relationship between mining sector companies' ROE and SP. This means that as ROE increases, the SP also increases, and this is in line with the findings by Martinez (2019) where the study undertaken was evidence of a linear relationship between the two variables. In addition, the results are in line with the APT theory of stock returns. As the return on equity increases, it gives a positive signal to the potential investors that the mining company is profitable and would result in an increased demand for the company's stocks which therefore leads to a rise in the share price (Marozva, 2019). This is mainly as a result of the market forces. To the investors, it is advisable to use the ROE of a mining company as a tool to influence investment decision-making in any company of choice within the mining sector. The results from the study are in support of the findings by Kling (2019) in that ROE as a performance measure in mining companies poses a direct effect on the mining company's share price. An increase in ROE shows that the specific mining company is performing well financially and this would lure more stock investors thereby pushing the stock price upwards (Bobi, 2022). However, there was evidence of a positive and insignificant relationship between ROE and R while there was a negative and insignificant relationship between ROE and TR.

The results from the study outline that there is a negative and significant relationship between CR and TR. This states that as the current ratio of a mining company increases, the total return decreases and vice versa. The results are supported by those of Lee (2021) who found that there is an inverse relationship between CR and

TR. This is in line with the liquidity preference theory of stock returns. A higher CR means that cash is stuck in liquid stock while a lower ratio means that the mining company is making use of the credit available to fund current business operations (Khairi, 2021). It is, therefore, advisable for investors to check the mining company's CR to determine the future TR. It can also be noted that there is a negative and insignificant relationship between CR and SP, and the same also exists between CR and R.

Table 5.4 also depicts that there is a positive and significant relationship between DTE and R. This means that as DTE increases, R also increases, and this is supported by Kaul (2020) in that as the mining company uses more debt, the return also increases since it is a cheaper way to fund the business operations as opposed to shareholders contributions which attracts dividends. The results are in line with the pecking order theory. Debt financing attracts fixed-interest payments which represent the cost of borrowing (Jawaid & Haq, 2020). So, the decision is left in the hands of the management to profitably make use of the debt for the benefit of the mining company. As the financing costs go down, the profit and return go up. It is, therefore, advisable for the management of the mining company to make use of cheap sources of business finance to improve the company's returns which is a tool used to attract investors (Junkin, 2020). However, it can be noted that there is a positive and insignificant relationship between DTE and SP while a negative and insignificant relationship exists between DTE and TR.

It can also be noted that the results from the study that there is a negative and significant relationship between PE and SP. This implies that as PE increases, SP decreases and vice versa. This is supported by the findings made by Hutami (2022) in that an inverse relationship exists between PE and SP. This is in line with the APT. It is, therefore, advised that investors must check on the PE of the mining company to see if it is profitable to invest in such a company by simply looking at the results from this study.

By looking at the relationship between PE and R, it can be noted that there is a positive and significant relationship between the two variables. This means that as the PE ratio increases, so does R and vice versa. This is in line with the findings by Gatua (2019)

in that as the PE increases, the return also increases since it lures investors to invest in the mining company based on the valuation ratio. This ratio is in line with the APT of stock returns. It is, therefore, advisable for investors to invest in mining companies with a low PE ratio as the stocks might be undervalued while avoiding those with high PE which shows evidence of overvalued shares (Jorion, 2021). However, it can also be noted that there is a positive but insignificant relationship between PE and TR.

The results from the study indicate that there is evidence of a positive and significant relationship between GDPG and SP as shown in Table 5.4. This implies that as GDPG increases, SP also increases and vice versa. This resonates with the findings from Endri's (2021) study that GDP has a direct effect on the mining sector SP since it is a measure of the economic wellness of any given economy. Investors are attracted to well-performing economies and this is shown by the GDP. This is in line with the APT model. According to Marozva (2019), company performance is as good as the performance of the economy. It is, therefore, advisable for the policy makers to devise and implement policies that promote economic growth for the benefit of companies, thereby luring investment.

The results also show that there is a positive and significant relationship between GDPG and TR. This means that when GDPG grows, the mining company's TR also grows and vice versa. This is in line with the findings made by Cakini and Zaremba (2022) in that GDP positively affects the total returns of a company since it shows the level of productivity within a given economy. The results are in support of the APT. Investors must pay attention to the GDPG for them to make effective investment decisions and it is the responsibility of the government to create a conducive environment for the economy to grow. However, the results also show that there is a negative and insignificant relationship between GDPG and R.

The results of the relationship between INT and SP show that there is a positive and significant relationship between the two variables. This implies that when INT increases, SP will also increase and vice versa. This is in line with the findings made by Barnor (2020) in that as the interest rate increases, it means the lenders tend to benefit and promote saving and investment within the nation and this also leads to an increase in the share price. The results are in support of the Gordon Growth Model. It

is, therefore, advised that the Monetary Policy Committee must always ensure that a balance is struck between inflation-curbing and mining sector investment through the use of interest. Hutami (2022avers that as interest rate increases, people tend to hold mineral commodities as opposed to investing in stocks to benefit from the high interest rates which enhances the profitability of the mining sector companies through an increase in mineral commodities demand.

The results also reveal that there is a negative but significant relationship between INT and mining sector R and a positive and significant relationship exists between INT and TR. The former relationship means that as INT increases, R will decrease and vice versa while the latter implies that as INT increases, TR also increases. These results are in line with Apergis (2022) in that interest rate affects differently on both return and total returns. A higher interest rate reduces the return because of its impact on profitability because of increased finance charges if the mining company is heavily indebted while it increases the total return (Almumani, 2022). This is in line with the Gordon Growth Model. It is advisable that mining companies make use of the low interest rates by increasing their debt component relative to equity to enhance the organisation's profitability, and this will automatically affect both returns and total returns.

The results from Table 5.4 show that there is a positive and significant relationship between INFL and mining sector R while a negative and significant relationship exists between INFL and TR. This means that as INFL increases, R will also increase while TR decreases. The results are confirmed by Avdalovic (2022) in that inflation affects the buying power of the local currency which poses a negative effect on mining companies' TR while leading to an increase in R. This is because of the demand-led inflation which is healthy for the organisation since it increases profitability. Also, this is in line with the inflation-adjusted APT. The government through the central bank must keep the inflation rate within optimum levels which allows growth and development while preserving the buying power for investors to invest in the mining sector and increasing the demand for the mineral resources (Goninan, 2019).

The relationship between COVID-19 and R was also examined and the findings allude that there is a negative and significant relationship between the two variables. This

means that as COVID-19 increases, R decreases and vice versa. This is in line with the findings made by Hutami (2022) which indicate that the government regulations placed in by governments as a way to curb the spread of COVID-19 affected the profitability of the mining sector companies in South Africa. The mining companies were forced to operate below capacity because they needed to minimise human contact while at the workplace. As a result, the return also declined when the pandemic was growing (Chen, 2021). The government should not be harsh on the operations of the mining sector in particular during national disasters as a way to promote growth and development (Cakini & Zaremba, 2022). However, the results also show that there is a positive but insignificant relationship between COVID-19 and SP and the same relationship exists with TR.

5.5 Conclusion

This chapter outlined the descriptive statistics and this was done with the help of the measures of central tendency on both independent and dependent variables. It was followed by an outline of the correlation analysis between the variables identified in the study. The main aim was to show the magnitude and direction of the relationship on either independent and independent variables or independent and dependent variables. The discussion was important as it enable one to make conclusions from an informed point of view. Empirical results were also be presented and discussed where the results were captured and interpreted, a theory outline which supports the relationship, as well as interpretation in line with the literature consulted. The next chapter presents summary, conclusions and recommendations.

CHAPTER 6: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the concluding remarks to the study which was based on macro- and micro-economic determinants of the mining companies' share returns. In doing so, a summary of the main objectives of the study will be given followed by a summary of the results obtained from the primary findings. The contributions of the study and the policy implications will also be presented as well as the theoretical, social, and policy implications of the results. A discussion of the limitations of the study and recommendations for further research will also be made.

6.2 Summary of Objectives of the Study

The core aim of the study was to examine the macro- and micro-economic determinants of the mining companies' share returns. In doing so, this led to the examination of the macro- and micro-economic determinants of the mining companies' share returns. The macro-economic variables considered include GDPG, INFL, INT, and COVID-19. The various micro-economic variables considered include RM, ROA, CR, DTE, PE, and ROE. The aim was to see the effect of both categories of variables on share returns, share price and total returns as dependent variables. The examination was undertaken based on the company performance measures which are ROA and ROE, and this was done to test the robustness of the GMM model used in the study.

6.3 Summary of Results

The role played by the mining sector within the economy cannot be underestimated because of the immense contribution it makes towards GDP, employment, equality, and poverty reduction. Survival and growth of the mining sector in any given economy must be a priority because of the impact it has on the wellness of an economy. This has been the main cause for concern for this study to examine the various variables that determine the mining companies' share returns concerning macro- and micro-economic factors. In the 2022 fiscal year, the mining sector had a 7.5% contribution towards GDP in South Africa while it employed half a million people (World Bank, 2023). A need to examine the various variables determining miming companies' share returns was found necessary so that investors, sector managers, policymakers, and

all stakeholders relevant can incorporate the factors towards enhancing the share returns as an incentive to luring investment within the mining sector.

It is imperative to know that the market regulators are always trying to improve the JSE condition through the imposition of various operating platform rules and regulations (Dahel & Laabas, 2019). This exercise is implemented mainly because price trends are the main factor that lures investors and companies when making decisions on how they can spread their investment funds as well as the risk. In addition, stock prices provide a benchmark for evaluating the profits of the investment projects at hand (Fama, 2015). A market where both capital resources and the embedded risks are well priced in the absence of any distortions thereof is regarded as an informational efficient market (Hamman et al., 2015).

The GMM was used to address the hypothesis on the interrelationships between the independent and dependent variables within the study. The independent variables included the selected macro- and micro-economic variables while the dependent variables included SP, R, and TR. The discussion was made based on two company measures, namely, ROE and ROA, to measure the robustness of the employed model. The panel data was used for the time series data with 90 observations in the extraction of the year-to-year data. The secondary data was obtained from various sources which include the selected mining companies' financial statements, World Bank, and the South African Reserve Bank statistics. A total of ten listed mining companies on JSE were selected using a purposive sampling technique for nine years spanning from 2013 to 2021. It can be noted that both the independent and dependent variables were associated with the research goal.

The results from the study prove that based on the specific company performance measure ROA, the previous SP positively and significantly influences the subsequent SP which shows that share prices are persistent. Contrary to this, those stocks that did not perform well in the past will also continue to perform badly in future. The results resonate with the study by Al-Nasseri et al. (2021), which concluded that the previous level of share price poses a positive influence on the current level of share price. It was also found that there is a negative and significant relationship between share price and return on the market. The results show that the outcome from a mining sector

perspective contradicts the CAPM theory. The results corroborate those of Apergis (2022) who alluded that a rise in the required return will lead to a decline in the stock prices and vice versa with specific reference to the mining sector.

There is a positive and significant relationship between R and RM and the same relationship is also evident between TR and RM. This corroborates the study by Avdalovic (2022) which outlines that as the return on the stock market increases, both total returns and share returns increase as well concerning the mining sector companies. The results also show that there is a positive and significant relationship between ROA and SP. This is in line with the results from the study that conducted by Endri (2021) which implies that the return on assets poses a direct and positive impact on the share prices.

It can also be noted that there is evidence of the existence of a negative and significant relationship between CR and SP from the study's results. The results from the study are contrary to the findings from Malhotra and Tandon (2022), which implies that there is a positive and significant relationship between a company's liquidity level and its share price regarding the mining sector companies'. The results from the study indicate that there is a positive and significant relationship between DTE and R and the same relationship also exists with TR. The results corroborate those by Jawaid and Haq (2020), which implies that as the DTE ratio increases, so do both the share return and the total return.

The results from GDPG and SP reveal that there is a positive and significant relationship between the two variables. The study by Malhotra and Tandon (2022) concurs with the current results in that as the country's economy grows, so do its local companies' share prices. Also, it was found that there is a negative and significant relationship between GDPG and R and the same relationship also exists between GDPG and TR. This is contrary to the findings by Naik and Padhi (2020) outlining that there is a positive relationship between growth in GDP and the two independent variables, namely, R and TR.

The results also reveal that there is a positive and significant relationship between SP and INT. The results are in support of the view of Narayan and Narayan (2021) which

implies that as interest rate increases so does the share price regarding the mining sector. Also, there is a negative and significant relationship between R and INT, and the same relationship also holds between TR and INT. This is in line with the findings from Samitas and Kenourgios (2019) in that interest rate as a cost of borrowing affects the return negatively which thereby affects it negatively if high on the returns.

There is also evidence from the findings that there is a positive and significant relationship between R and INFL and the same also applies between TR and INFL. The results are contrary to the findings of Tursoy (2021) which implies that there is an inverse relationship between inflation and total returns and returns. There is a positive and significant relationship between COVID-19 and SP. These results resonate with those of Yarnest (2022), which implies that unforeseen circumstances such as the emergence of the COVID-19 pandemic increase share prices. In addition, the results show that there is a negative and significant relationship between COVID-19 and R and the same results also stand between COVID-19 and TR.

The other company performance measure used was ROE in the study to see its effect on the share price. The results show that there is a negative and significant relationship between lagged total returns and the total returns. The results are in line with the view of Shanaev and Ghimire (2022) in that previous total returns do not influence the current total returns and such information cannot be used by investors to predict the future outcome within the mining sector. It can also be noted that there is a negative and significant relationship between RM and SP. The results from Rjoub (2022) concur with the current study's outcome in that there is an inverse relationship between the return on the market and the mining companies' share price.

The results also reveal that there is a positive and significant relationship between RM and R. This is in line with the findings by Rafique (2020) which confirm the linear relationship within the mining sector. There is a positive and significant relationship between mining sector companies' ROE and SP. The results from the study are in support of the findings by Kling (2019) in that ROE as a performance measure in mining companies poses a direct effect on the mining company's share price. Furthermore, the findings from the study outline that there is a negative and significant relationship between CR and TR. The results are supported by the view of Lee (2021)

which outlines that there is an inverse relationship between CR and TR. There is a positive and significant relationship between DTE and R. This is supported by Kaul (2020) in that as the mining company uses more debt, the return also increases since it is a cheaper way to fund the business operations as opposed to shareholders' contributions which attract dividends.

It can also be noted that the results from the study that there is a negative and significant relationship between PE and SP. It can be noted that there is a positive and significant relationship between PE and R. This is in line with the findings made by Gatua (2019) in that as the PE increases, the return also increases since it lures investors to invest in the mining company based on the valuation ratio. The results from the study indicate that there is evidence of a positive and significant relationship between GDPG and SP. In addition, the results also show that there is a positive and significant relationship between GDPG and TR. This is in line with the findings made by Cakini and Zaremba (2022) in that the GDP positively affects the total returns of a company since it shows the level of productivity within a given economy.

The results of the relationship between INT and SP show that there is a positive and significant relationship between the two variables. The results also reveal that there is a negative but significant relationship between INT and mining sector R and a positive and significant relationship exists between INT and TR. These findings are in line with Apergis (2022) in that interest rate affects both return and total returns differently.

The results show that there is a positive and significant relationship between INFL and mining sector R while a negative and significant relationship exists between INFL and TR. The relationship between COVID-19 and R was also examined and the findings allude that there is a negative and significant relationship between the variables. This is in line with the findings made by Hutami (2022) which indicates that the government regulations placed in by governments as a way to curb the spread of COVID-19 affected the profitability of the mining sector companies in South Africa.

6.4 Contributions of the Study and Policy Implications

The studies that were undertaken concerning the determinants of share returns were not conducted based on performance measure dimension and this study managed to

look into ROE and ROA. The main aim was to check the robustness of the model employed in the study to see if performance has an impact on the share returns. As a result, this study is highly important in that the body of knowledge will benefit immensely through an extension of the already existing knowledge for future reference sake by other researchers. Moreover, the results from the study are capable of being used within developing economies as a way of growing investment within the mining sector since all the determinants necessary for consideration by investors are examined within the study. In addition, there has been continuous development in data that is available and relevant for determining the mining companies' share returns. This study uses new and latest data as well as the latest econometric procedures such as panel data that was rarely used in preceding studies undertaken on the various determinants of mining companies' share returns.

The role of the mining sector within global economies and in individual economies cannot be ignored because of the impact the sector poses on the wellness of any given country. So, its underperformance resulted directly in the suffering of the overall economy such that there will be an increased unemployment rate because, in South Africa, only over half a million employees are within the mining sector while its GDP contribution in 2022 was 7.5% (World Bank, 2023). This means that such GDP growth which is driven by employment promotes equality in all areas and this is in support of the South African government's core national mandate. The study is meant to ensure that the mining sector grows by equipping potential investors on what to look for when looking for a profitable investment avenue. The study outlines the various factors to look at which are in the form of variables that are necessary to focus on when making an investment assessment.

Also, the study tackled both macro- and micro-economic determinants of mining companies' share returns from an emerging market point of view. To the best of my knowledge, this is the first study to be conducted with both categories of independent variables on share returns. The previous studies would either look at the micro-economic determinants of mining companies' share returns or macro-economic determinants in separate studies as opposed to combining the two. This study went on to combine the two to determine the exact determinants that affect mining companies' share returns. The impact of this study is that it helps managers of mining

companies as well as policymakers at a national level to be conversant in the various aspects that are pertinent to the determination of the mining companies' share returns.

By examining the role played by the mining sector towards the economy of South Africa and the rest of the world, it is worthwhile to ensure that the sector attracts investment to the maximum level. This can only be done when there is a rise in the share returns since shareholders' main goal in investing in shares is to maximise their wealth (Cakini & Zaremba, 2022). In doing so, the study helped by identifying the various macro- and micro-economic determinants of the mining companies' share returns. This is done to help the management to know where to put their main focus to enhance the share price of their mining companies.

To my knowledge, the majority of the studies undertaken before this study focused on the entire stocks listed on the stock exchange in determining either the micro- or macro-economic determinants of share returns and this includes the study on the Indonesia Stock Exchange conducted by Degiannakis et al. (2018), Hakim and Kusmanto (2020), and Shanaev and Ghimire (2019). This would mean that the study would focus on the overall economy and the factors would be assumed to apply to all companies within various sectors within a given economy. However, this study would make a difference in that it examined both macro- and micro-economic determinants concerning the mining sector as opposed to focusing on all sectors. Some of the factors that affect share returns are sector-specific and they might pose the same effect on another sector. This study helps in that the outcome can be applied to any mining company since the focus is on the mining sector and any suggestions can be applied to the mining sector at large.

The results from the study indicate that there is a positive and significant relationship between INT and SP. This implies that it is the responsibility of the Central Bank Governor together with the Monetary Policy Committee to ensure that the interest rate used promotes the growth of the mining sector investment through share price. The Monetary Policy Committee must adjust the interest rate while keeping in mind that it also curbs inflation.

The study also reveals that the previous share returns influence the subsequent share returns, which means that the share returns follow momentum and they are persistent. This is an incentive to investors in that they can only follow stocks that have a history of performing well at the expense of the ones that performed badly in the previous fiscal year. This will help investors to invest in worthwhile stocks within the mining sector as outlined by the results of the study. To the management of the mining companies, the results help by ensuring that they work towards elevating their mining companies' share returns for the sake of attracting new investments and increasing the demand for the shares.

6.5 Limitations of the Study and Recommendations for Further Research

The study was only limited to the mining sector companies listed on the JSE over a period from 2013 to 2021. These companies are only limited to the ones that were continuously in existence during the period within the study while those that were delisted or listed after 2013 were excluded. Out of the 16 listed mining companies on the JSE, only ten were considered for they managed to meet the inclusion criteria. The excluded companies could not meet the criteria because of missing data, listed after 2013 or listed before 2013 but delisted before 2021. To overcome this limitation, only companies with complete data relevant to the study were considered to enhance the completeness of the study. If all listed companies were to be included in this study, the results would have been compromised because of the missing data in some of the companies.

Also, the study's period of analysis included years when there was a global pandemic, COVID-19 and this was controlled through a dummy variable. It is, therefore, recommended that the period must be split into periods which are before and during the pandemic era. Understanding the behaviour of both macro- and micro-economic determinants of mining companies' share returns would help the management of mining companies to know the exact determinants in each period while considering the effect of the performance measures, namely, ROA and ROE.

Also, only listed mining companies were used in the study while neglecting the ones in the small to medium enterprises. This means that only big companies were considered in the study because of the availability of data necessary to fulfil the

objectives of the study. Most of the small mining companies do not keep their financial details up-to-date because of poor accounting practices which then limits them from being included in formal studies. Also, issues relating to compliance and lack of adequate resources for small businesses limit them from having adequate and up-to-date data.

It is, therefore, recommended to have another study on the macro- and micro-economic determinants of the mining companies' share returns while using other macro- and micro-economic determinants that were not used in this study such as CF, DTA, DY, TAT, UNEM, EXCH, OIL, and RGDP. The data to be used should be on the post-pandemic crisis since the COVID-19 pandemic brought in several changes in the manner business is done and this includes working from home, automation, introduction of artificial intelligence at workplaces, and changes in working and trading policies. It is also recommended to undertake a further study on a global scale by examining the role of the global economic developments on the domestic mining sector performance.

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APPENDICES

Appendix A: Ethical Clearance Certificate

UNISA university of south africa

College of Economic and Management Sciences_ERC Finance, Risk Management & Banking

Ref #: 1735
Name: Mr Simbarashe Moyana
Student #: 62400835

Date: 16/10/2023

Dear: Mr Simbarashe Moyana

Decision: Ethics Approval from 16/10/2023 to 15/10/2026 (specify the time period relevant to the approval)

Researcher: Mr Simbarashe Moyana

47 1st Avenue

Johannesburg

62400835@mylife.unisa.ac.za 0618100590

Supervisor: Professor Godfrey Marozva marozg@unisa.ac.za

Macro and micro-economic determinants of the mining companies share returns

Qualification: MPhil Financial Management

Thank you for the application for research ethics clearance by the College of Economic and Management Sciences_ERC Finance, Risk Management & Banking for the above-mentioned research study Ethics approval is granted for three years.

The **negligible risk application** was **reviewed** by the College of Economic and Management Sciences_ERC Finance, Risk Management & Banking on 16/10/2023 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College of Economic and Management Sciences_ERC Finance, Risk Management & Banking.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.

6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.

7. No field work activities may continue after the expiry date 17/10/2026. Submission of a completed research ethics progress report will constitute an application for renewal, for Ethics Research Committee approval.

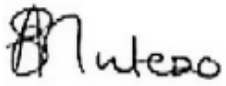
Additional Conditions

1. Disclosure of data to third parties is prohibited without explicit consent from Unisa.
2. De-identified data must be safely stored on password protected PCs.
3. Care should be taken by the researcher when publishing the results to protect the confidentiality and privacy of the university.
4. Adherence to the National Statement on Ethical Research and Publication practices, principle 7 referring to Social awareness, must be ensured: "Researchers and institutions must be sensitive to the potential impact of their research on society, marginal groups or individuals, and must consider these when weighing the benefits of the research against any harmful effects, with a view to minimising or avoiding the latter where possible." Unisa will not be liable for any failure to comply with this principle.

Note

The reference number 1735 should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,



Prof A Mutezo
Chair of College of Economic and Management Sciences_ERC Finance, Risk Management & Banking
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Prof MT Mogale
Executive Dean / By delegation from the Executive Dean of College of Economic and Management Sciences_ERC Finance, Risk Management & Banking
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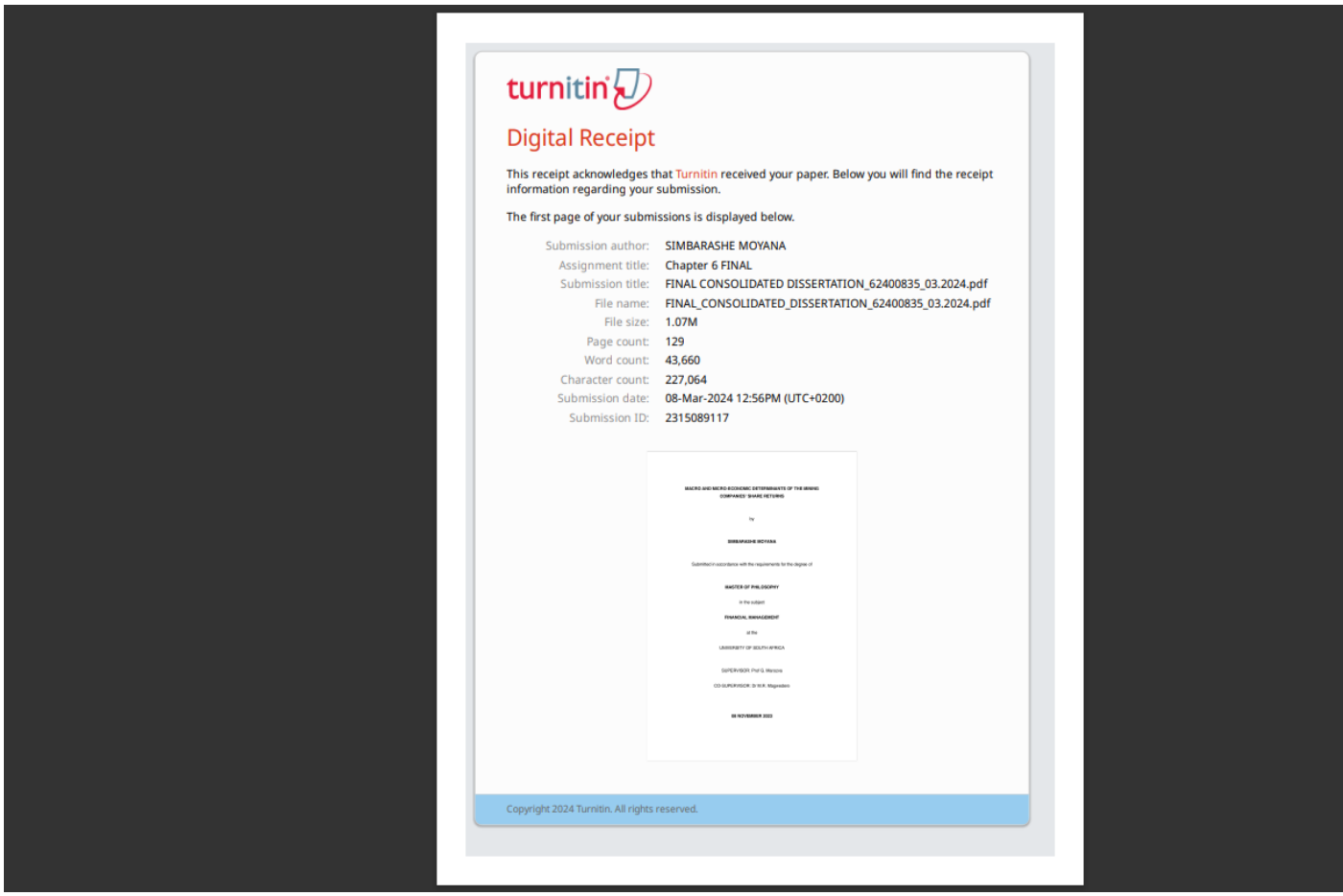
Appendix B: Turnitin Report



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Appendix C: Language Editing Certificate

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08 November 2023

TO WHOM IT MAY CONCERN

This certificate serves to confirm that I have edited S Moyana's dissertation entitled, **MACRO AND MICRO-ECONOMIC DETERMINANTS OF THE MINING COMPANIES' SHARE RETURNS.**

I found the work easy and intriguing to read. Much of my editing basically dealt with obstructionist technical aspects of language, which could have otherwise compromised smooth reading as well as the sense of the information being conveyed. I hope that the work will be found to be of an acceptable standard. I am a member of Professional Editors' Guild.

Hereunder are my contact details:

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