THE RELATIONSHIP BETWEEN CASH FLOW AND SHARE PRICES OF GENERAL MINING FIRMS LISTED ON THE JOHANNESBURG STOCK EXCHANGE

by

NEVER CHIMUCHITI

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SUPERVISOR: PROFESSOR D. MAKINA

CO – SUPERVISOR: DR. J. KASOZI

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DECLARATION

Name: NEVER CHIMUCHITI

Student number: 46058117

Degree: MASTER OF COMMERCE in BUSINESS MANAGEMENT

The relationship between cashflows and share prices of general mining firms listed on the Johannesburg Stock Exchange

I declare that the 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.

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

MR. N. CHIMUCHITI **NOVEMBER 2022**

SIGNATURE DATE

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May this study be an inspiration to everyone out there who believes in the beauty of their dreams.

ABSTRACT

The purpose of this research was to investigate the relationship between cashflows and the share prices of the 12 general mining firms listed on the Johannesburg Stock Exchange (JSE) from 2015 to 2020. Empirical data were collected from the Iress (SA) database and the Statistical Package for Social Sciences (SPSS) version 25 was used to analyse the cashflows and share prices of the mining firms. The study applied an in-depth regression analysis using the pooled OLS model, fixed and random effects models, and the FGLS model and found only the latter model to fit the data favourably. The Agency Theory, the Free Cash Flow (FCF) Hypothesis, and the Financial Leverage Theory provided a basis for the study's theoretical framework.

Based on the study findings, the nature of the relationship between cashflows and share prices is dependent on the cashflow type. The study highlighted that cashflows from investment and financing activities had a statistically significant relationship with the share prices at a 1% significance level. However, the study findings showed a statistically insignificant association between cashflows from operating activities and the share price of the 12 general mining companies listed on the JSE between 2015 and 2020.

Based on the study findings, one of the major recommendations is that general mining firms should prioritise cashflows from investing and financing activities since these types of cashflows have a significant impact on their share prices.

Keywords

Cashflow, Agency Theory, Free Cash Flow Hypothesis, Financial Leverage, Dividend Policy, Efficient Market Hypothesis

ABSTRACT/OPSOMMING: AFRIKAANS

Die doel van hierdie navorsing was om die verhouding tussen die kontantvloei en die aandeelpryse van die 12 algemene mynboumaatskappye wat van 2015 tot 2020 op die Johannesburgse Effektebeurs (JSE) genoteer was, te ondersoek. Empiriese data is ingesamel van die Iress-databasis (SA), en die Statistiese Pakket vir die Sosiale Wetenskappe (SPSS) se weergawe 25 is gebruik om die kontantvloei en aandeelpryse van die mynboumaatskappye te ontleed. Die studie het ’n omvattende regressie-ontleding gedoen, asook die gepoelde OLS-model, vaste en ewekansige effektemodelle, en die FGLS-model gebruik, en het bevind dat slegs die laasgenoemde model goed by die data pas. Die agentskapteorie, die Vrye Kontantvloeihipotese (FCF-hipotese) en die Finansiële Hefboomwerkingsteorie het as grondslag vir die studie se teoretiese raamwerk gedien.

Aldus die studie se bevindings is die aard van die verhouding tussen die kontantvloei en die aandeelpryse afhanklik van die tipe kontantvloei. Die studie het daarop gewys dat die kontantvloei van beleggings- en finansieringsaktiwiteite ’n statisties-beduidenheidsverhouding met die aandeelpryse teen ’n 1% beduidendheidsvlak het. Die bevindings van die studie het egter ook ’n statisties beduidende verbintenis tussen die kontantvloei van bedryfsaktiwiteite en die aandeelpryse van 12 algemene mynboumaatskappye wat tussen 2015 en 2020 op die JSE genoteer was, aangetoon.

Een van die belangrikste aanbevelings, gebaseer op die studie se bevindings, is dat algemene mynboumaatskappye kontantvloei van beleggings- en finansieringsaktiwiteite moet prioritiseer omdat hierdie tipe kontantvloei ’n betekenisvolle invloed op hulle aandeelpryse het.

Sleutelwoorde

Kontantvloei, Agentskapteorie, Vrye kontantvloeihipotese, Finansiële Hefboomwerking, Dividendbeleid, Doeltreffende markhipotese

ABSTRACT/ OKUCASHUNIWE: ISIZULU

Inhloso yalolu cwaningo bekuwukuphenya ubudlelwano phakathi kokugeleza kwemali kanye namanani ezabelo ezinkampani ezijwayelekile zezimayini eziyi-12 ezisohlwini lwe*Johannesburg Stock Exchange* (JSE) kusukela ngo-2015 kuya -2020. Imininingwane ethenjelwe kokuhlangenwe nakho yaqoqwa oqoqweni oluhleliwe olugcinwe ohlelweni lwekhompyutha lwe-*Iress* kanye nenguqulo 25 yokuqoqiwe kwesofthiwe okutshenziselwa ukuhlaziya imininingwane yezibalo (SPSS) yasetshenziswa ukuze kuhlaziywe ukugeleza kwemali kanye namanani ezabelo zezinkampani ezimayini. Ucwaningo lusebenzise ukuhlaziya okujulile kokuhlehla kusetshenziswa isifanekiso esihlanganisiwe se-OLS, izifanekiso zemiphumela engaguquki nengahleliwe, kanye nesifanekiso se-FGLS futhi lwathola isifanekiso sakamuva kuphela ukuze silingane imininingwane ngokufanele. Isimiso sokuxazulula izinkinga ebudlelwaneni phakathi kwabaphathi bebhizinisi namanxusa abo, uMbono weNkomba yaMandla eZimali enkampani, kanye noMbono woMzamo waMasu wokuBoleka Imali ukuze utshale ezimpahleni kunikeze isisekelo sohlaka lombono wocwaningo.

Ngokusekelwe emiphumeleni yocwaningo, imvelo yobudlelwano phakathi kokugeleza kwemali nezintengo zezabelo incike ohlotsheni lokugeleza kwemali. Ucwaningo lwagqamisa ukuthi ukugeleza kwemali okuvela emisebenzini yokutshalwa kwezimali neyokuxhasa ngezimali kunobudlelwano obubalulekile ngokwezibalo namanani ezabelo ezingeni lokubaluleka elingu-1%. Nokho, okutholwe ocwaningweni kubonise ukuhlobana okungabalulekile ngokwezibalo phakathi kokugeleza kwemali okuvela emisebenzini yokusebenza kanye nenani lezabelo lezinkampani ezijwayelekile zezimayini eziyi-12 ezisohlwini lwe-JSE phakathi kuka-2015 no-2020.

Ngokusekelwe kulokho okutholwe ocwaningweni, esinye seziphakamiso eziyinhloko ukuthi izinkampani zezimayini jikelele kufanele zibeke phambili ukugeleza kwemali okuvela emisebenzini yokutshala izimali kanye neyokuxhasa ngezimali njengoba lezi zinhlobo zokugeleza kwemali zinomthelela omkhulu emananini azo ezabelo.

Amagama asemqoka

Cashflow - Ukugeleza kwemali

Agency Theory - Isimiso sokuxazulula izinkinga ebudlelwaneni phakathi kwabaphathi bebhizinisi namanxusa abo

Free Cash Flow Hypothesis - uMbono weNkomba yaMandla eZimali

Financial Leverage - uMzamo waMasu wokuBoleka Imali

Dividend Policy - iqoqo lezinkombandlela elandelwa yinkampani lapho inquma ukuthi yimalini inzuzo yayo

Efficient Market Hypothesis - Umbono wezintengo zempahla ezibonisa lonke ulwazi olutholakalayo

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LIST OF ACRONYMS

ADF	Augmented Dickey-Fuller
ARM	African Rainbow Minerals
ASE	Amman Stock Exchange
BHP	Broken Hill Proprietary
EAT	Earnings after tax
EBIT	Earnings before interest and tax
EMH	Efficient Market Hypothesis
EPS	Earnings per Share
FASB	Financial Accounting Services Board
FCF	Free Cash Flow
FEM	Fixed Effect Model
FGLS	Feasible Generalised Least Squares
FTSE	Financial Times Stock Exchange
GDP	Gross Domestic Product
GMM	Generalised Methods of Moments
GSE	Ghana Stock Exchange
JSE	Johannesburg Stock Exchange
KSE	Karachi Stock Exchange
MEDR	Middle East Diamond Resources
MFM	Merafe Ferrochrome and Mining
NPV	Net Present Value
NSE	National Stock Exchange
NSE	Nairobi Stock Exchange
OLS	Ordinary Least Squares
IMF	International Monetary Fund
REM	Random Effect Model

ROA	Return on Assets
ROCE	Return on Capital Employed
ROE	Return on Equity
SA	South Africa
SPSS	Statistical Package for Social Sciences
UNISA	University of South Africa
US	United States
USA	United States of America

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

The relationship between cashflows and the share price has received considerable attention since the idea of measuring the performance of firms using cashflow was initially introduced in the seminal work by Jensen (1986). Several studies have been done internationally to investigate this association and the results have been inconclusive. Based on the cashflows and share price data of the twelve general mining companies registered on the JSE, this study aimed at investigating this association from the South African context. Moreover, Jensen and Meckling (1976:3 08) came up with agency theory, which serves as the cornerstone for the free cashflow theory. The agency theory is a theoretical framework that explains the relationship between two parties: the principal and the agent. The principal is the owner of a company, while the agent is the individual or group that acts on behalf of the principal (Jensen & Meckling, 1976). The agency theory asserts that there is a natural conflict of interest between these two parties because the agent may prioritize their own interests over those of the principal. The theory suggests that the principal must create appropriate incentives to align the interests of the agent with their own goals. This may include compensation packages, monitoring mechanisms, and other forms of accountability to ensure that the agent acts in the best interest of the principal.

Free Cash Flow (FCF) refers to the cashflows that is generated by a company's operations that is available for discretionary use after accounting for capital expenditures (Damodaran, 2011). Agency costs, on the other hand, are costs that arise from conflicts of interest between shareholders and managers, where managers may pursue their own self-interest at the expense of shareholder value (Jensen & Meckling, 1976). This is supported by Zhang, Cao, Dickinson and Kutan (2016:116) who state that under the FCF theory, organisations with free cashflow have a higher risk of agency costs owing to a conflict of interest between shareholders and management. The concept of FCF is relevant to the issue of agency costs because FCF provides managers with a source of discretionary funds that they can use to

pursue their own interests at the expense of shareholders. This entails that firm executive are incentivised to use FCFs to finance rather than dispense the FCF as payments, notwithstanding lowly investment prospects characterised by adverse NPVs (Yeo, 2018:114). Likewise, Hastuti, Arfani and Diantimala (2018:1135) support this view by arguing that free cashflow frequently causes conflict between shareholders and executives, with executives preferring to plough back the free cashflow of revenue-generating ventures, since it will boost the executives' incentives. For example, managers may use FCF to invest in projects that benefit themselves, such as expanding the size of the company or increasing their own compensation, rather than investing in projects that maximize shareholder value (Jensen, 1986). One way to mitigate agency costs related to FCF is to use the funds to pay dividends or repurchase shares, which can increase shareholder value and reduce the amount of cash available for managers to use for their own purposes (Jensen, 1986). In contrast, shareholders expect to receive a portion of the cashflows as dividends. In addition, monitoring mechanisms such as independent boards of directors or external auditors can help to reduce agency costs by ensuring that managers act in the best interests of shareholders. Overall, the concept of FCF is relevant to the issue of agency costs because it provides managers with discretionary funds that they can use to pursue their own interests at the expense of shareholder value. By understanding the relationship between FCF and agency costs, investors and analysts can evaluate a company's management practices and governance structures to determine the potential for agency costs to impact shareholder value.

The market value of a share, according to the Financial Accounting Standards Board (FASB), is the price at which a share or stock trades on the stock exchange. The FASB defines market value as "the price at which a security is traded on a public market," and it represents the asset's current demand and supply (FASB, 2011). For investors, market value is an important indicator since it may be used to calculate the fair value of a company's shares. Similarly, Brigham and Ehrhardt (2011:278) explain that share prices depend on all future payments, not just the following year's dividends, unless the shareholders assume the payment upsurge to be maintainable. The money that is present for dissemination is subject to viability, funding in operating capital and the level of liability. Investment in shares is risky, and investors will invest if they get more information regarding the fundamental factors influencing the share prices (Nisa & Nishat, 2011:276). However, Lehavy and Sloan (2008:328) argue that investment fundamentals such as earnings and cashflows can only

account for a small percentage of the variation in share returns, and that investor recognition can be utilized to explain fluctuations in share returns (Lehavy & Sloan, 2008:328).

Excessive cashflows can lead to increased agency costs since hoarding free cash flows can limit the ability of financial markets to monitor managers thereby motivating executives to misuse free cash flow on value-reducing investments (Lin & Lin, 2018:2724). This is in line with Lachheb and Slim (2017:7) who postulate that the manager will at some uncertain future time participate in non - lucrative ventures that have a significant influence on the value of the firm. This can lead to a decrease in the prices of shares driving managers to control earnings as a way of concealing their poor decision making. This gives rise to the importance of the Agency Theory and the Free Cash Flow hypotheses, in understanding the interdependence between cashflows and share prices of general mining firms registered on the JSE from 2015 to 2020.

Chapter One provides the study's introduction and background. The subsequent sections provide further discussions on related concepts and elements of the study. After this initial introduction, section 1.2 provides the study's background, which discusses the pivotal role played by the mining industry in the South African economy. The discussion is illustrated with figures which show critical historical data showing the mining industry's contribution to the South African economy's Gross Domestic Product (GDP) between 2003 and 2019. In addition, the background will provide an analysis of how the firms listed at the JSE are grouped into sectors. Finally, a list of the twelve general mining firms involved in this study and an overview of the JSE is also discussed in this study's background.

1.2 BACKGROUND

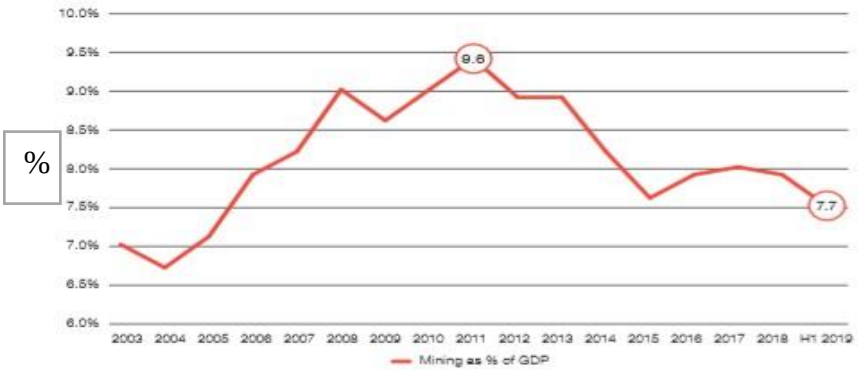
This section initially provides an overview of the South African mining industry, highlighting the industry's contribution to the South African economy. The second part of the section focusses on the FTSE/JSE All Share Index and explains how the JSE classifies the firms into categories. The final part of the sections offers a background of each of the twelve firms involved in this study.

1.2.1 The mining industry in South Africa

The mining industry plays a pivotal part in the economy of South Africa (Twala, 2012:61; Mutemeri & Petersen, 2002:286). The South African mining industry employs 500 000

people directly and another 800 000 indirectly and accounts for about 16% of the country's GDP (Mkhize, 2017:67). In 2018, the industry employed 453 543 people, contributed R22 billion in taxes and contributed R127 billion in employee earnings (Minerals Council of South Africa, 2019:1). The mining sector in South Africa provided 7.3% (R356 billion) of the nation's GDP in 2018 (Minerals Council of South Africa, 2019:8). According to PricewaterhouseCoopers (2019:3), the South African mining industry's revenue went up by R46 billion (11%) in 2019 and the dividends paid to shareholders increased by R11 billion (69%). Figure 1.1 below shows the contribution of the mining industry to the GDP of the country from the year 2003 to the year 2019:

Figure 1.1: % of the mining industry's GDP to the total GDP of South Africa's economy



Source: Pricewaterhouse Coopers, (2019:4).

Figure 1.1 above shows that the mining industry's GDP contribution rose gradually from 2004, and the upward trend was briefly interrupted around 2008 but rose to a maximum of 9.6% in 2011. However, the trend indicates the GDP contribution of the mining industry fell to a maximum of 7.7% in 2019. H1 on the figure refers to the first half of the year 2019. In the past, the mining industry has made a sizable contribution to South Africa's Gross Domestic Product (GDP), which in 2018 accounted for almost 8% of the nation's GDP (Trading Economics, 2021). The recent years have seen a decline in this contribution. Many causes, such as a drop in commodity prices, labour disputes, and regulatory uncertainty, can be blamed for the decline in the mining sector's contribution to GDP. The sector has also had difficulties because of safety and environmental issues, which has raised regulatory monitoring and compliance expenses. Notwithstanding these difficulties, the mining industry

continues to play a significant role in South Africa's economy by creating jobs and bringing in money for the government in the form of taxes and royalties.

The following section will discuss the FTSE/JSE All Share Index and how the firms listed on the JSE fare classified. The section will also provide background information of each of the twelve general mining firms involved in this study.

1.2.2 FTSE/JSE All Share Index

The FTSE/ JSE All Share Index is designed to represent the performance of South African companies and it offers investors a wide-ranging and balancing set of indexes (JSE, 2017). FTSE/JSE Top Index represents the 40 largest firms in terms of full market capitalisation in the FTSE/JSE All Share Index (Pholohane, Ajuwon and Wesson, 2020:60). FTSE/JSE provides investors with comprehensive and complementary data which measures the performance of the main capital and industry segments of the South African market. In terms of coverage, 99% of the full market capital is represented by the FTSE/JSE. The aim of the index is for use in the creation of index tracking funds, derivatives, and as a performance benchmark.

The JSE uses the Industry Classification Benchmark (ICB) cataloguing to categorise all registered firms on the JSE by industry, super sector, sector, and sub-sector, which is the final level. The Financial Times Stock Exchange (FTSE), a British financial institution, specialises in offering indexes for the financial markets is a joint venture between the JSE and the FTSE Group.

FTSE/JSE All Share Index (J203) is currently split into ten ICB industry indices (one for each industry) and 40 sector indices (based on the ICB organisation) (JSE, 2018:1). The five sub-sectors that make up the mining industry were determined from the cataloguing of the All-Share Index (J203) at the sub-sector level. The index code for General Mining is J154, while the ICB sub-sector code is 1775 (JSE, 2012). The following section will provide an overview of the twelve general mining firms that were listed under the J154 category at the JSE from 2015 to 2021.

1.2.3 FTSE/JSE General Mining Index (J154)

The twelve general mining firms sampled for this study are classified under the J154 (General Mining Index) at the JSE. The table below lists the firms that belonged to that category between 2015 and 2020.

Table 1.1: General mining firms listed on the JSE (2015-2020)

African Rainbow Minerals Ltd
Anglo American plc
Bauba Resources Ltd
BHP Group Plc
Glencore Plc
Kore Potash
Master Drilling Group Ltd
Merafe Resources
Middle East Diamond Resources Ltd
South 32 Ltd
Tharisa Plc
Union Atlantic Minerals Ltd

Source: JSE, 2022.

The discussion below provides an overview of the general mining firms listed on the JSE between 2015 and 2020.

- *African Rainbow Minerals (ARM) LTD*

African Rainbow Minerals (ARM) is a prominent, diversified mining and minerals firm based in South Africa. The firm is involved in the mining of various minerals such as iron ore, chrome ore and manganese. In addition, through its ownership of Harmony, the company also has a gold investment. As an integral component of long-term value development, ARM is dedicated to practising ethical and environmental stewardship (Ryan, 2011).

- *Anglo American plc*

Anglo American plc is a world leader in the mining and natural resources industries, along with its affiliates, joint ventures, and subsidiaries. It possesses strong financial and technological capabilities and considerable and concentrated interests in industrial minerals, timber, coal, base and ferrous metals, gold, platinum, diamonds, and platinum. The Group has operations and projects across Africa, Europe, South and North America and Australia, making it a geographically varied organisation. As a result, Anglo American symbolises a vast universe of resources (Marais, 2010).

- *Bauba Resources Ltd*

Bauba Resources Ltd. is engaged in mineral resource exploration, assessment, and development. Chrome Project, Platinum Exploration and Corporate are its three operating divisions. The chrome ore mining on the farm, Moeijelijk, is part of the Chrome Project segment. The activities related to exploring platinum are handled by the Platinum Exploration section. Finally, the corporate section includes the administration, regulatory and corporate expenses incurred. The company's headquarters are in Johannesburg, South Africa (Vermeulen, 2014).

- *BHP Group*

Besides being one of the world’s largest mining firms and the second largest company on the London Stock Exchange, BHP is also the largest firm on the Australian Exchange (Cohen, 2021). In addition to having significant interests in oil and gas, BHP Group plc ranks among the world's leading producers of essential commodities like uranium, aluminium, coal, copper, iron ore, manganese, nickel, silver, and metallurgical coal. BHP has assets which are wholly owned by the company and some which are owned as joint venture between BHP and other partners but operated by BHP (BHP, 2022). Australia's Melbourne is home to the corporate headquarters of the corporation. BHP operations in Australia are based in Western Australia, South Australia, Queensland, and New South Wales. In the Americas, BHP operates mines in Canada, Chile, Peru, USA, and Brazil.

- *Kore Potash*

Kore Potash is trying to put several potash resources that are significant worldwide into production through the development of the Sintoukola potash basin in the Republic of Congo. The two top-notch projects, Kola and DX, are the focus. The DX project, which has a low capital cost and a targeted production of 400,000 tonnes of muriate of potash annually, and its nearby potash projects that offer the possibility for a long-term potash production district from the area, is where the company hopes to generate revenue soon. Regarding the Company's development strategy, Kola is slated to come after DX and is expected to produce 2.2 million tonnes of muriate of potash annually during a 33-year lifespan. Due to their advantageous location, size, extremely high grade and shallow depth of the deposits, Kore's projects seek to be among the lowest-cost producers of potash in the world. Oman Investment Authority (OIA) and Chile's Sociedad Qumica Minera de Chile are two of the company's biggest owners (SQM). In addition, the projects have strong backing from the Republic of Congo government, with whom Kore enjoys a good working relationship (Washbourne, 2017).

- *Glencore plc*

Natural resources corporation, Glencore, is diverse. It engages in the manufacturing and commercialisation of a range of mineral products. The business's activities include refining, processing, storing and transporting metals and minerals and producing energy and agricultural goods. Glencore manufactures and sells ferroalloys, cobalt, zinc, lead, copper, aluminium, nickel, oil products, coal and iron ore. In Australia, Colombia and South Africa, Glencore owns and runs coal mines. Equatorial Guinea, Cameroon and Chad are also home to the company's oil and gas-producing facilities. Its main clients are the automobile, steel, oil, power generating and food processing industries. The business operates throughout the Americas, Europe, Africa, Asia and Oceania. Glencore's headquarters are in Baar, Zug, Switzerland (White, 2020).

- *Master Drilling Group Ltd*

One of the world's giant rock boring and drilling service providers, Master Drilling is headquartered in South Africa. The Group has operations throughout the African continent as in the Democratic Republic of the Congo, Zambia, Mali, Ghana, and Sierra Leone and in Latin America in Brazil, Chile, Colombia, Mexico, and Peru. The US, Canada, Australia, India, Turkey, China, Russia, and France are other countries where they operate. By offering a full range of specialised, adaptable, and integrated services, from rock boring and exploration drilling to support and training, Master Drilling disrupts the status quo. The company strongly emphasises creative and customised solutions supported by strict adherence to international health and safety standards (McKay, 2021).

- *Merafe Resources*

To pursue interests in the ferrochrome and chrome industries, Merafe was incorporated in South Africa. The group's activities are carried out through the company, its principal subsidiaries, and joint ventures. In South Africa, the group is active. Merafe Ferrochrome and Mining (MFM) (Pty) Ltd. MFM invests in chrome mining and the processing of chrome ore into ferrochrome through a pooling and sharing venture with Glencore Operations South Africa (Pty) Ltd (Pinto, 2020).

- *Middle East Diamond Resources Limited (MEDR)*

Middle East Diamond Resources Limited (MEDR) activities include mineral project acquisition, development, and exploration. In addition, it engages in mineral exploration and assessment. Iron ore, rutile, platinum, and vanadium are among the company's products. MEDR is granted prospecting rights for platinum group metals in Gauteng, the Northwest and other South African provinces. The corporation primarily operates in South Africa's Gauteng, Northwest, and Limpopo provinces and on the western limb of the Bushveld Complex. In Sandton, South Africa, in Chislehurston, MEDR has its headquarters (Pinto, 2020).

- *South 32 Ltd*

South32 is a multinational mining and metals corporation. The company's mission is to improve people's lives now and for future generations by harnessing natural resources. Owners and partners of South32 have confidence in the company's full utilization of its resources. Bauxite, alumina, aluminium, metallurgical coal, nickel, silver, lead, and zinc are among the materials that South32 manufactures at its facilities in Australia, Southern Africa, and South America. Also, South32 has two development options in North America and multiple collaborations with junior explorers worldwide, emphasising increasing the company's exposure to base metals (Bamford, 2019).

- *Tharisa plc*

The Tharisa mine in South Africa produces platinum group metals and chrome concentrates for the integrated resource group, Tharisa Plc, which is dual listed in London and Johannesburg. Tharisa, a low-cost producer with a vertical structure that combines processing, beneficiation, marketing, sales, and logistics, is uniquely positioned to maximise stakeholder returns through the responsible exploitation of mineral resources (Vermeulen, 2014).

- *Union Atlantic Minerals Ltd*

Union Atlantic Minerals Limited is a mineral exploration, mining development and investment holding company with its headquarters in South Africa. The company's main areas of interest include mine development, ore mining and the manufacturing of polymetallic concentrates. It also focuses on brownfield exploration for base and technology metals. Lead, silver, zinc and copper deposits are the project's primary target in the South African province of the Northern Cape. The project is on the farm, Rozynenbosch 104, in the Kenhardt district, 78 kilometres southwest of Upington and 38 km southeast of Kakamas. Miranda Minerals (Pty) Limited, Naledi Mining Solutions (Pty) Limited and Molebogeng Mining Investment Holdings (Pty) Limited are a few of the company's subsidiaries (Aitken, 2014).

1.2.4 Overview of the JSE

The JSE provides the financial market information to investors in addition to post-trade and expertise services (Oseifuah, 2017:9). Founded in 1887, the JSE is currently ranked number 19 in the world based on market capitalisation (US $1.36 trillion at the end of 2022) and is reported to be Africa's largest stock exchange (JSE, 2019). It traces its origins to the Witwatersrand's first gold rush around 1800 to raise funds for the fledgling mining industry (Smith, Jefferis & Ryoo, 2002:478; Mkhize & Msweli – Mbanga, 2006:80; van de Linde, 2017: 16). The JSE has benefitted from a substantial amount of foreign capital inflows since 1994 (Smith et al., 2002:478). The Financial Markets Act of 2012, the JSE rules and the Financial Intelligence Centre Act of 2001 make up the governance structure that governs the JSE's position as a market controller and the conformance requirements of approved JSE participants (JSE, 2019).

The JSE is an authorised bourse for equities and a trading floor for financial securities and agricultural commodity derivatives. Pretorius, Delport, Havenga and Vermaas (2008) explain that only shares and derivative instruments in respect of shares are traded on the JSE, and debt securities are traded on the Bond Exchange. Futures and options are traded on the South African Futures Exchange (Pretorius et al., 2008: 43).

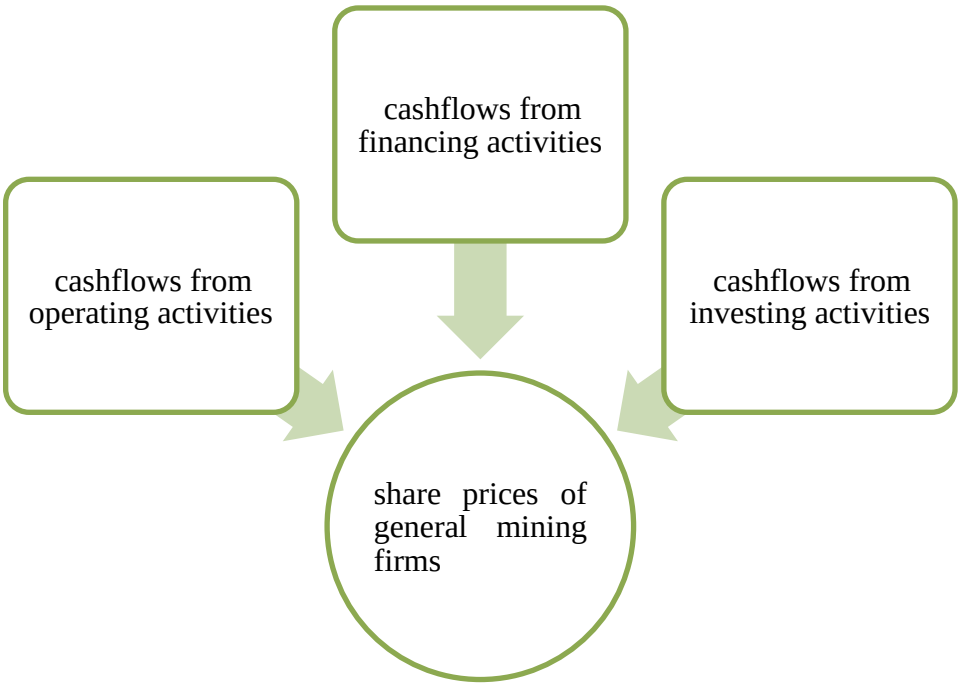
Although the JSE is dominated by big corporates such as BAT, Anglo and BHP Billiton, it caters to various industries and has about 400 firms registered on it (JSE, 2019). The JSE Limited (JSE) and the FTSE Group (FTSE), a global leader in the production and management of indices, collaborated to create the FTSE/JSE Africa Index Series. It consists of two landmark indices, the FTSE/JSE All Share Index and the FTSE/JSE Top 40 Index. In 2009, there were 419 firms and 54 equity member firms listed on the JSE, and the average number of equity trades was over 83 000 (International Monetary Fund, 2010).

Half of the world's twenty largest mining firms have an operational presence in South Africa, and over 40 mining firms are registered on the JSE (Oxford Business Group, 2014). According to Doni, Gasperini and Pavone (2016:191), the mining industry represented the largest capitalisation on the JSE. The following section will discuss the conceptual framework of the study.

1.3 STUDY CONCEPTUAL FRAMEWORK

As illustrated in Fig 1.3 below, this study's conceptual framework was designed to explain the relationship between cashflows and share prices of general mining firms registered on the JSE. The purpose of this study was to examine into the relationship between share prices of general mining firms listed on the JSE from 2015 to 2020 and cashflows produced by operating, investing, and financing activities. The study's findings were based mostly on empirical data and financial theories. This is motivated by the study by Sabri, Sweis, Ayyash, Qalalwi, and Abdullah (2020) that researched the connection between cashflows from operating, investing, and financial activities, share returns, and the amount of assets for companies listed on the Palestine Stock Exchange.

Figure 1.2: Conceptual framework of the study



Source: Researcher's own compilation, 2022.

The next section will explain the research problem.

1.4 RESEARCH PROBLEM

Financial literature has extensively investigated and established the link between cashflows and share values. According to empirical studies, businesses with positive cashflows often have higher stock prices than those with negative cashflows (Chan & Lakonishok, 1995). Sufficient cashflows are typically regarded as a sign of a company's financial strength and stability, demonstrating that it is generating enough revenue to cover its costs and make investments in potential future growth prospects. As a result, share prices may rise as investor confidence rises and there is a greater demand for the company's shares.

Negative cashflows, on the other hand, are sometimes viewed as a warning sign by investors as they may indicate that a business is having trouble generating enough income to support its operations or make investments in future growth. Because of this, there may be less investor confidence and less interest in the company's shares, which will result in falling share prices. The importance of cashflows as a value driver for share prices in comparison to other elements like dividends or profitability is up for debate among financial professionals. Compared to other factors, several research have indicated that cashflows have a relatively weak link with share prices. For instance, a study by Fama and French (2001) indicated that book-to-market ratio, size, and market beta all have greater explanatory power for stock returns than does cashflows.

Other research, however, has revealed that, depending on the situation, cashflows can have a significant role in determining share values. For instance, a study by Brav, Jiang, Partnoy and Thomas (2008) discovered that businesses tend to perform better over the long run when their cashflows are high compared to their market valuations. Nevertheless, while there is considerable debate among experts regarding the importance of cashflows as a value driver for share prices, it is generally accepted that investors should take cashflows into account when assessing a company's financial health and prospects.

With a sizable number of mining companies listed on its platform, the JSE is one of the biggest stock exchanges in Africa. Despite the mining industry's significance to the South African economy, little is known about the correlation between cashflows and share prices of general mining corporations listed on the JSE. This knowledge gap prevents investors, decision-makers, and mining companies from making wise choices regarding investment opportunities and corporate plans. To provide empirical support for the value of cashflows

as a determinant of share prices in the mining industry, this research aims to investigate the link between cashflows and share prices of general mining corporations listed on the JSE.

The research problem of this study emanates from, firstly, the non-availability of similar studies performed in the South African (SA) context and secondly, the inconclusiveness regarding previous studies done in other countries. This study sought to determine if there is a relationship between cashflows and share price in general mining firms listed on the JSE between 2015 and 2020.

The following section will discuss the primary and secondary objectives of the study.

1.5 OBJECTIVES OF RESEARCH

The specific aims a researcher seeks to accomplish with their investigation are known as research objectives. These goals aid in giving the research process focus and guarantee that the investigation is concentrated on addressing the research issues. This is backed up by Sekaran and Bougie (2016), who claim that to make sure the study is feasible and yields insightful data, research objectives should be precise, measurable, and explicit. They consist of investigation, explication, description, correlation, assessment, intervention, and action research. Investigation is the process of analysing a certain topic or issue to better comprehend it or to respond to a research inquiry. Explication is the process of elaborating on and analysing a specific idea or phenomenon to provide the reader a more thorough grasp of it. Description refers to the practice of presenting a detailed account of a certain object, event, or phenomena to gain insight into its qualities or attributes. The term "correlation" refers to the connection between two or more variables, which is frequently investigated to ascertain whether they are connected or whether one variable has an impact on the others. Assessment is the process of determining if a given program, intervention, or system is effective or of high quality. The term "intervention" describes a conscious effort to alter or enhance a certain circumstance or condition, frequently by putting out a particular plan of action. Action research is a term used to describe a sort of research that entails cooperation between academics and industry professionals to address current issues and produce workable answers.

Sections 1.5.1 and 1.5.2 will discuss the study's primary and secondary objectives.

1.5.1 Primary objective

The primary goal of this study was to investigate the relationship between cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020.

1.5.2 Secondary objectives

The following secondary empirical objectives were formulated.

- To investigate the relationship between cashflows from operational activities and share prices of general mining firms listed on the JSE between 2015 and 2020.
- To investigate the relationship between cashflows from financing activities and share prices of general mining firms listed on the JSE between 2015 and 2020.
- To investigate the relationship between cashflows from investment activities and share prices of general mining firms listed on the JSE between 2015 and 2020.

Findings from the investigations will be used to make conclusions regarding the association between the cashflows and share prices of the general mining firms listed on the JSE between 2015 and 2020.

In the subsequent section, an explanation will be provided regarding the formulation of the hypotheses framed to assist in investigating the relationship between cashflows and share prices of the twelve general mining firms.

1.6 HYPOTHESES OF THE RESEARCH

According to Creswell (2009:132), quantitative hypotheses refer to the investigator's expectations regarding the anticipated results of connections between variables. It refers to a deductible premise regarding the association among two or additional variables, notions, or occasions (Abdulai & Owusu-Ansah, 2014:6).

The following statistical hypotheses, founded on the research's hypothetical outline and earlier studies, were formulated, and tested.

Hypothesis 1

(H_{01}): There is no relationship between cashflows from operating activities and share prices of general mining firms registered on the JSE between 2015 and 2020.

(H_a): There is a significant relationship between cashflows from operating activities and share prices of general mining registered on the JSE between 2015 and 2020.

Hypothesis 2

(H_{02}): There is no relationship between cashflows from investment activities and share prices of general mining firms registered on the JSE between 2015 and 2020.

(H_b): There is a significant relationship between cashflows from investment activities and share prices of general mining firms registered on the JSE between 2015 and 2020.

Hypothesis 3

(H_{03}): There is no relationship between cashflows from financing activities and prices of shares of general mining firms registered on the JSE between 2015 and 2020.

(H_c): There is a significant relationship between cashflows from financing activities and share prices of general mining firms registered on the JSE between 2015 and 2020.

The following section gives a brief overview of the research methodology.

1.7 RESEARCH METHODOLOGY

Research methodology is a rigorous and logical approach to a study that describes how a researcher intends to carry out the investigation. It also describes how a researcher will carry out the investigation to provide reliable information that satisfies the investigation's aims and objectives (Leedy & Ormrond, 2015: 26). For this study, a quantitative research strategy that was centred on the objectives, questions, hypotheses, and review of the relevant literature was found to be appropriate. In a quantitative study, associations between variables are investigated and quantified using different statistical methods (Saunders, Lewis &Thornhill,

2012:162). As a result, a quantitative approach was decided to be appropriate for this study, given that the goal was to investigate the relationship between cashflows and prices of shares of general mining firms registered on the JSE from 2015 to 2020.

1.7.1 Research design

A quantitative approach was undertaken for this study and the correlational technique was used. Quantitative research is a strategy for researching independent concepts by looking at the relationship between variables (Cresswell, 2014:31). The primary goal of a correlational study is to identify or demonstrate if there is a relationship between two or more aspects of a situation (Kumar, 2011). The primary descriptive method is correlational research, which analyses the relationship between variables. This method is specific whether the variables are related in any way (Salkind, 2012:12).

This study analysed the previous international studies regarding the relationship between cashflows and share prices and the theoretical framework argued by Jensen and Meckling (1976). The hypotheses and the research questions were tested.

1.7.2 Population and sampling

Salkind (2012:95) defines population as a collection of possible members from which the researcher wishes to extrapolate the research. It refers to the complete frame of observations (Singh, 2006:82). This study focused on the general mining firms registered on the JSE between 2015 and 2020 (a period of 6 years).

The following criteria were applied to choose the final sample of the general mining firms registered on the JSE:

- The company must have been operating during the entire period (2015 – 2020).
- The company must have remained registered on the JSE during the period (2015 – 2020).
- The company must have published its annual financial results during this period (2015 – 2020).

1.7.3 Data analysis and hypothesis testing

The study used panel data comprising of time series and cross sections, a combination which has the advantage of improving both the quality and quantity of data, according to Mwangi, Makau and Kosimbei (2014:195). Data collected from the Iress (SA) database and was arranged in the Microsoft Excel software based on the following categories for each year from 2015 to 2020:

- Name of firm
- Year
- Cashflows from operating activities
- Cashflows from financing activities
- Cashflows from investing activities
- Share price

The above data was then entered into the SPSS software to investigate the hypothetical relationship between cashflows and share prices of the general mining firms and to get robust results, this study utilised panel data regression techniques. The study applied an in-depth regression analysis using the pooled OLS model, fixed and random effects models and the FGLS model and found only the later model to fit the data favourably Results obtained from the analysis include, descriptive statistics, correlation analysis and panel regression tests results. The interpretation of the results was guided by the test statistics, degrees of freedom, and p-values.

The following section will analyse the validity and reliability issues surrounding the study and techniques applied in mitigation.

1.8 VALIDITY AND RELIABILITY

Salkind (2012:397) defines reliability as consistency in prediction or performance. Reliability transpires while a test measures the same thing repeatedly and provides the same

results. According to Cresswell (2014:201), reliability implies that grades or items on a tool are internally consistent or if the item responses are conceptually coherent.

Although reliability is a pivotal element of the quality of a research project, it is inadequate to ensure by itself good quality research hence the need to consider validity (Saunders et al., 2012). The degree to which a test genuinely reflects what it purports to assess is called test validity. In addition, the appropriateness and significance of inferences, conclusions and decisions drawn from test results is another measure of test validity (Saunders et al., 2012).

In this study, it was noted that statistical conclusion validity could be threatened by low statistical power, violating assumptions in the statistics used. It was also presumed that the outcomes obtained from this study could have been more problematic to generalize the results to firms operating in a different type of industry. To counter these threats, the researcher:

- Used an appropriate sample.
- Used suitable statistical methods for the examination of acquired data.
- Acknowledged specious connections and superfluous influences which may be influencing the data.
- Steered clear of creating insinuations and sweeping statements outside the ability of the data to reinforce such declarations.
- Avoided inaccurate or wrong reporting of data.

1.9 ETHICAL CONSIDERATIONS

The extensive use of the code of ethics, which consists of a list of ideals outlining the essence of ethics, is a response to the difficulties in controlling ethical complexities resulting from varied standards and conflicting rational approaches (Saunders et al., 2012:228). Principled research entails what researchers must and must not do in their research and research conduct (Cohen *et al.,* 2018:111). Cresswell (2014:92) asserts that during the study process, consciousness should be directed toward ethical issues.

This study involved collecting secondary data from financial data publications such as the annual report of the JSE and the financial statements published by the concerned firms.

Therefore, the researcher avoided collecting harmful information. However, the researcher was aware that he could be required to discuss the motivation of the research and in what manner the custodians of these databases utilised the information.

Before beginning the data collection procedure, the researcher sought the University of South Africa's (UNISA) approval for ethical clearance to conduct the research. During the whole research process, the researcher was guided by the UNISA's ethical code, policies, and regulations regarding research ethics.

The researcher avoided falsifying authorship, evidence, information, outcomes, and deductions by reporting honestly and correctly referencing. Besides acknowledging all sources of the gathered information, the researcher also acknowledged all the organisations and individuals who contributed materially to the study.

To conclude this chapter, the following section will provide an overview of the rest of the study thesis.

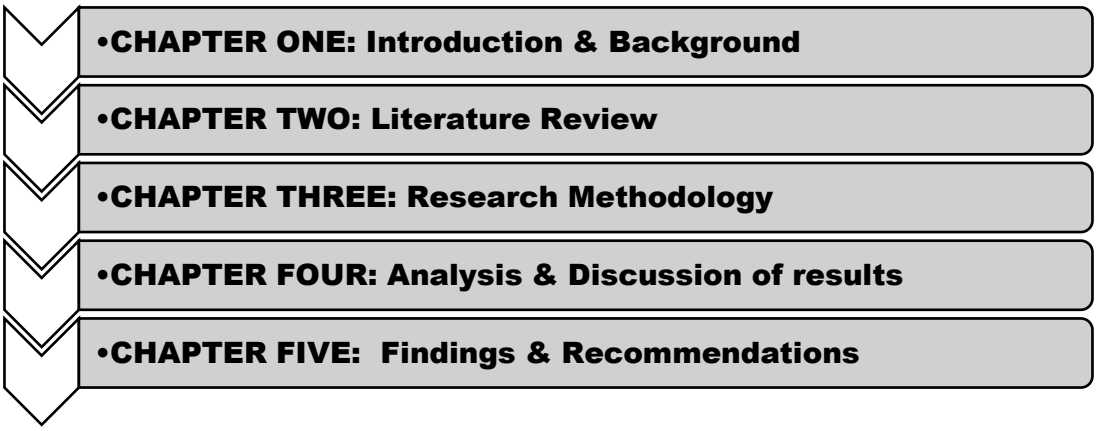
1.10 CHAPTER OUTLINE

The thesis of this study consists of the following chapters as illustrated in Figure 1.3.

Chapter Two: Literature review

Following Chapter One, Literature Review was the topic for the second chapter of the thesis. In this second chapter, the researcher expounds and acutely examines the empirical conclusions of previous researchers who have attempted to explain the connection between cashflows and share prices. Sections under this topic include defining key concepts, theoretical frameworks, and empirical studies.

Figure 1.3: Thesis structure



Source: Researcher's own compilation, 2022**.**

Chapter Three: Research Methodology

Research Methodology was the title of Chapter Three, and sections within it cover the following topics: research design, research philosophy and approach, study population and the study's sampling, sampling procedure, information collection and an explanation regarding the analysis of the data, reliability and validity and ethical consideration.

Chapter Four: Results and discussions

Chapter Four consists of the following sections: objectives of the study, descriptive statistics, correlation coefficient analysis, panel unit root test results, regression analysis, the Feasible Generalised Least Squares (FGLS) model and a summary of findings.

Chapter Five: Findings and discussions

Chapter Five explains in detail the study's findings. Before examining the conclusion of each research hypothesis, Chapter Five presents a synopsis of the preceding chapters. In this chapter, the conclusions of each of the study's objective is discussed. Other sections of the chapter include policy recommendations, study constraints, validity and reliability of the study findings, contribution to the body of knowledge and suggestions for future research.

1.11 CONCLUSION

Based on the general mining firms registered on the JSE, this study sought to find the relationship between cashflows and share prices. Because the study's population is small, the sample is made up of all the general mining firms that fit the requirements. Secondary data were collected from the Iress (SA) database and analysed using the SPSS statistical software tools.

The findings of this study have a dual relevance because it is debatably the first to look into the relationship between cashflows and share prices among general mining firms in South Africa. Throughout this investigation, it was anticipated that the lack for earlier research in the South African context regarding the relationship between cashflows and share prices would be a constraint. Most of the literature examined during this study focused on research conducted in countries such as Turkey, Iraq, Sudan, and Jordan.

The following chapter, Chapter 2, discusses in detail the literature associated with this study's objectives. The chapter's discussions include a definition of key terms, theoretical framework of the study, and empirical studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter one initially introduced the study's background and then proceeded to lay the groundwork for the study by discussing the contextualisation of the relationship between cashflows and share prices, as well as the accompanying ideas and foundational works. Issues concerning the validity and reliability of the study and the measures taken to mitigate against them, as well as ethics-based aspects and the proposed chapter layout of the study thesis, were discussed.

The literature review chapter is the second chapter of the study. According to Sekaran and Bougie (2016:393), a literature review is a progressive process that entails the documentation of existing and unpublished research from secondary sources of information regarding the subject under investigation and the assessment of this work in connection to the matter. This is supported by Xiao and Watson (2019:108) who state that literature reviews lay the groundwork for academic research.

The key reason for doing a literature review is to discover pertinent information that might augment the study (du Plooy – Cilliers, Davis & Bezuidenhout, 2019: 101). Bryman, Bell, Hirschsohn, Dos Santos, Du Toit, Masenge, Van Aardt and Wagner (2014:93) further point out that during the literature review process, the following aspects should be identified: information regarding what has already been discovered regarding the topic, concepts and theories associated with the topic, strategies and research methods that were used by the previous researchers, inconsistencies and controversies connected to the topic and the unanswered research questions regarding the topic.

Section 2.2 of this chapter provides definitions of the key concepts associated with this study. Fisch and Block (2018:204) suggest that a literature review must contain the meaning of the search terms and important words used to find the literature. Next, theoretical frameworks, including sub theories associated with this study are discussed in section 2.3. Finally, section 2.5 analyses related studies previously performed in South Africa and other countries.

2.2 KEY CONCEPTS

The main terms that were used in this study are discussed hereunder.

2.2.1 Cashflows

Cashflow is a measure of how much money a company generates or spends on its operations, investments, and financing (Kimmel, Weygandt & Kieso, 2020). This is in line with Soboleva, Matveev, Ilminskaya, Efimenko, Rezvyakova and Mazur (2018:2035) who define cashflows as the quantity of money that a company possesses, which guarantees its effectiveness, monetary solidity, liquidity, creditworthiness, and overall image. Cashflows, the essence of the business, is the main component in every financial evaluation model and is central to the company assessment procedure (Gitman & Zutter, 2012:123). Alexandroi (2019:6) explains that cashflows statistics are chiefly applied to assess creditworthiness, liquidity, and value investment prospects but these figures do not endeavour to forecast the future values of the shares issued by a business. According to Bala (2017:4), cashflows analysis is crucial for investment decisions.

According to previous research, there is an affirmative relationship between cashflows and investment, and executives of firms with surplus cashflows are more likely to have the opportunity to overinvest and are presumably more likely to do so than executives of firms with less cashflows (Kim et al.., 2012:380). In contrast, if investors are aware of the inconsistencies regarding cashflows, the price of the company's share is likely to be independent of both the management's projection and the inaccuracy in that projection, and therefore only the management's earnings report would impact the company's share price (Beyer, 2009:1732).

2.2.2 Cashflow Statement

According to Mackenzie, Coetsee, Njikizana, Chamboko, Colyvas, Hanekom and Selbst (2012), the cash flow statement offers data regarding the company's inflows and outflows over a specific time during which the financial statements are announced and classified into three groupings: operating, investing, and financing activities. Cashflow statements furnish

facts regarding a company's cash disbursements and receipts, which determine the financial strength of a business in achieving its financial objectives (Omag, 2016:116). According to Paramasivan and Subramanian (2009:19), a cash flow statement is a declaration that indicates the origins of a company's cash inflow and applications of cash outflow over time. Talebnia, Abadi and Baghiyan (2017:70) clarify that a financial statement provides all activities and financial-related events for a business over a period, usually a year.

Brigham and Ehrhardt (2008:93) assert that the cash flow statement is a pronouncement that summarises shifts in a business's situation in terms of cash and separates the activities into three separate activities, namely, operating, investing and financing activities. Gulin and Hladika (2017) further elaborate that the purpose of a cash flow statement is decision-making by management. Furthermore, Nguyen and Nguyen (2020:86) posit that the company's lenders are also interested in the information provided by the company's cash flow statement. Finally, Van Horne and Wachowicz Jr (2008:176) reiterate that the cash flow statement may be presented either using the 'direct method', which is endorsed by the Financial Accounting Standards Board (FASB) in the USA, or the 'indirect method', which is followed by many firms because it is easy to prepare.

Brigham and Ehrhardt (2008:93) distinguish cashflows activities into three main classifications: operating, investing, and financing. Operational activities generate revenue for the company, and investment activities refer to activities concerned with acquiring assets and other investments. In contrast, financing activities refer to the ventures that conclude in variations in capital make-up (Rizal & Idris, 2017: 75). Figure 2.1 on the next page illustrates a summary of cashflow activities.

Figure 2.1: Summary of cashflow activities

Operating activities	**Investing activities**	**Financing activities**
• sales of goods and services • depreciation • dividends received • dividends paid • payments for the purchase of inputs • interest paid • interest received	• acquisition of fixed assets •short term financial investments such as savings accounts or time deposits •selling of non-physical resources •purchases of securities and bonds	•issuing of short- & long-term debts •cash used to buy back shares •loans from financial institutions •cash received from mortgages or bonds •payments made in form of dividends and repaid loans • short term debts

Source: (Marx, de Swart, Pretorius & Rosslyn – Smith, 2017:53)

2.2.3 Cashflows from operating activities

Cashflows generated from operating ventures refers to cash that is made from the daily operations of a company (Liman & Mohammed, 2018:2). Osagie (2016:95) argues that the cashflows from operations indicates a company's liquidity and is a good appraisal of the business's capability to meet its interim commitments. This is reinforced by Huiling, Fengchao, Hua, and Ziwen (2019: 327), who elaborate on the idea that a company is more stable the more cash it receives. Sources of cash inflows include decreases in assets, increases in liabilities, and net profits after taxes. Conversely, sources of cash outflows for a company consist of increases in assets, liabilities, net loss, and paid dividends (Gitman, 2009:110).

2.2.4 Cashflows from investment activities

Gitman (2009: 110) explains that investment cashflows refer to the cashflows from buying and selling fixed assets and equity investments in other firms, whereby sales deals bring inflows and purchase transactions result in cash outflows. Cashflows from the investment

are cashflows that are credited to non-current assets of a company, and it consists of both inflows and outflows of cash from activities from the selling and acquiring fixed assets like plant equipment and buildings (Gathu, 2018:5).

2.2.5 Cashflows from financing activities

Cashflows resulting from financing debt and equity enterprises are known as financing cashflows (Gitman, 2009:110). A firm's financing activities include activities such as cash generated from the selling of shares and cash paid for the redemption of shares. Debentures and payments towards loans result in changes in a company's share structure (Nangih, Ofor & Onuorah, 2020:4). Under financing activities, the sale of shares results in cash inflows. On the other hand, the company incurs cash outflows by repurchasing shares or paying cash dividends. Omag (2016:116) contends that financing activities may produce either cash inflows or outflows depending on a company's strategy. For instance, during the growth phase, a company may require cash inflows to supplement the inadequate cashflows from operating activities.

2.2.6 Share evaluation models

Mundia (2016:1) defines share prices as the cost of purchasing shares or shares on a security exchange, and the price of a share can be used to portray the strength of the business's financial stability. According to Campbell, Polk and Vuolteenaho (2010), if the prices of shares are determined by discounting their cashflows at a constant rate, the changes in share prices are therefore influenced by information regarding cashflows. Therefore, a shared change in the share prices should be traceable to a shared change in cashflows.

Similarly, to the value of a bond, the price of a share is the current price of all potential cashflows (dividends) that are predicted to supply for an indefinite period (Gitman, 2009:345).

This association is illustrated by the following equation on the next page:

$$P_o = \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots \frac{D_\infty}{(1+r_s)^\infty} \quad (1)$$

Where, P_o = price today of ordinary share,

D_1 = per share dividend expected at the end of year

r_s = required return on common share

The "1" in the dividend valuation method is a crucial element that enables us to calculate the present value of future dividend payments and calculate the intrinsic value of a stock. Notwithstanding the fact that there are numerous approaches to share valuation, Brigham and Ehrhardt (2011:287288) assert that there is a widespread perception that a company's cashflows and share price are related. This concept is based on the fundamental share evaluation equation, which states that the price of a common share equals the value of all anticipated future cashflows (dividends). While a shareholder can make money by selling a share for more than the buyer paid, the buyer is merely forking out the exact amount for the share's future dividends. As a result, shares that do not pay dividends now have a value that may be traced back to a future dividend stream or earnings from the sale of the company. Similarly, Damodaran (2006) claims that the price of a share is the discounted present value of future free cash flow to equity, discounted at the price of equity. Ma, Pace and Stryker (2015:332) argue that although earnings generally determine share prices, shares are sometimes priced based on cashflows. Furthermore, Fabbozzi, Chen, Ma and West (2015:511) clarify that there are divergent views regarding the comparative significance of cashflows against profits in the valuing of shares and that cashflows pricing of shares that they termed as "negative shares", shares which they said are regarded as not liquid, inappropriately priced or having a brief transaction record or poor market performance.

According to Whitely (2004:153), this technique of appraising shares is grounded on the projected dividends, which are supposed to be collected from the shares as mentioned earlier, and the price of the shares must not only imitate the subsequent dividend but the complete flow of dividends. Whitely (2004:155) further argues that this way of share pricing has a weakness regarding the upcoming dividends that can be estimated for a practically unlimited period. The longer the projected period, the lesser the effect they have on the eventual outcome, and the forecast of the future dividends presumes a continual rate. However, in certainty, dividends have a habit of fluctuating.

2.2.6.1 Zero growth model

This model postulates a perpetual, stagnant dividend flow and the following equation illustrates it:

$$P_o = D_1 \, X \, \sum_{t=1}^{\infty} \frac{1}{(1+r_s)^t} \quad (2)$$

where, P_0 = price today of common share

D_1 = per share dividend expected at the end of year t

r_s = required rate of return on common share

In financial modelling, the zero-growth model is a concept used to predict the future value of an asset or business. It is predicated on the idea that the business or security won't develop at all during the investment's lifetime. The present price of the security or business, the anticipated rate of return, and the discount rate are the major factors employed in a zero-growth model.

2.2.6.2 Constant growth model

This model hypothesises that dividends will develop at a continuous rate, but at a rate below the required profit and is illustrated by the following equation:

$$P_o = \frac{D_0 \, X \, (1+g)^1}{(1+ r_s)^1} + \frac{D_0 \, X \, (1+g)^2}{(1+ r_s)^2} + \cdots \frac{D_0 \, X \, (1+g)^{\infty}}{(1+ r_s)^{\infty}} \quad (3)$$

2.2.6.3 Variable growth model

Due to changing expectations, future growth rates might change up or down, hence the need to take into account a variable growth model that accommodates for a variation in the dividend growth rate illustrated by the following equation:

$$P_o = \sum_{t=1}^{N} \frac{D_0 \times (1+ g_{1)})^t}{(1+ r_s)^t} + \left[\frac{1}{(1+ r_s)^N} \times \frac{D_N+1}{r_s - r_g}\right] \quad (4)$$

2.2.6.4 Free cash flow evaluation model

It is a model that determines the value of a company as the current value of its expected free cash flow discounted at the company's weighted average cost of capital, which is its estimated average future cost of financing over the long term, as shown by the equation below:

$$V_c = \frac{FCF_1}{(1+ r_a)^1} + \frac{FCF_2}{(1+ r_a)^2} + \ \dots \ \frac{FCF_\infty}{(1+ r_a)^\infty} \qquad (5)$$

Where:

V_c = value of the entire company

FCF_t = the cashflows expected at the end of year *t*

r_s = the company's weighted average cost of capital

2.2.7 Uses of cashflows

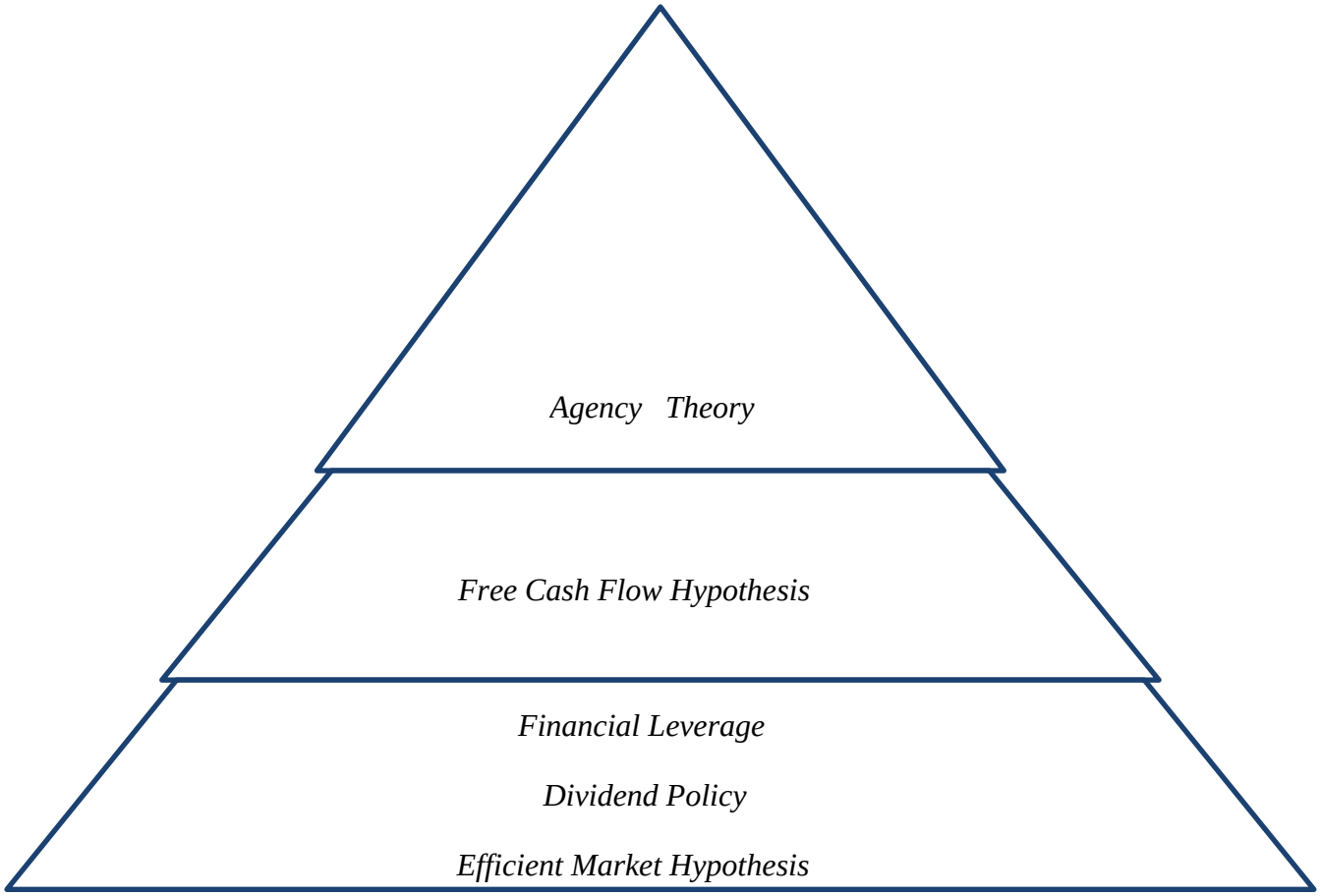
According to Gitman (2009:11), a company's cashflows must be sufficient to pay its obligations. The five potential uses of free cash flow include paying cash dividends, buying back shares, reducing debt, and investing it again in the company's capital projects (Priest & McClelland, 2007:20). Free cash flow enables a company to look for opportunities that may increase shareholder value through activities such as the development of new products and acquiring new firms (Salehi et al., 2017:92). Shadmehri, Khansalar, Giannopoulos and Dasht-Bayaz (2017:21) contend that free cash flow enables the business to invest in other opportunities and consequently upsurge the value of the business on behalf of shareholders through activities such as the introduction of new products and reducing debt.

The following section discusses the theoretical framework of the study.

2.3 THEORETICAL FRAMEWORK OF THE STUDY

Turner, Balmer and Coverdale (2013:305) explain that theoretical frameworks provide the context for steering research and construing findings. To develop the theoretical framework and explain the relationship between cashflows and share prices of general mining firms registered on the JSE during the period from 2015 to 2020, this study focussed on the Agency Theory (Jensen & Meckling, 1976) and the Free Cashflow Hypothesis by Jensen (1986), as well as additional related sub-theories.

Figure 2.2: Structure of the theoretical framework



Source: Researcher's own compilation, 2022

2.3.1 The Agency Theory (Jensen and Meckling, 1976)

In economics, the Agency Theory describes the connection between the principal and the agent in a commercial organization. Owners or shareholders are considered the principal, while the person or group of people hired to represent the principal in legal proceedings is considered the agent. Due to the principle-agent connection, there is a chance that the agent's interests and aims won't coincide with those of the main (Eisenhardt, 1989).

While the principle's responsibility is to supply the required resources and oversee the agent's actions to ensure that they are in line with the principal's objectives, the agent's duty is to manage the company's resources and operations in the best interest of the principal (Jensen & Meckling, 1976). The principle gives the agent the power to make decisions, but this delegation of power may cause a conflict of interest between the two parties. Moyer, McGuigan, Rao, and Kretlow (2008:8) explain that these problems arise due to divergent objectives between business owners and managers as each party in the transaction is assumed to act in a way consistent with maximising his or her interests.

When an agent's objectives deviate from the principal's, such as when the agent prioritise their own self-interest over maximizing the return on the principal's investment, a conflict results (Jensen & Meckling, 1976). Agency costs, or the expenses incurred by the principal to supervise the agent's activities and minimize any potential conflicts of interest, may result from the principal not having enough information about or control over the agent's decisions (Eisenhardt, 1989). Challenges associated with agency ensue when there is a segregation of ownership and authority. Because of this imperfect relationship, managers might need to perform their duties better on behalf of the investors (Jensen & Meckling, 1976). According to Correia, Flynn, Uliana, Wormald and Dillon (2015:23), in an agency relationship, although managers act as agents, they may put their interests ahead of the shareholders, and such decisions may be disadvantageous to the interest of shareholders.

Brush, Bromiley and Hendrickx (2000: 457) explain that the agency theory is based on three grounds, namely, the need for managers to be motivated to follow their concerns, the

availability of excess free cash, and the absence of governance control measures to monitor and control the managers' behaviours.

The managers are accountable for fulfilling specific responsibilities for the shareholders, including the maximisation of wealth for the investors. Nevertheless, according to Jensen and Meckling (1976), these managers sometimes splurge to exploit investors' wealth. As Jensen and Meckling (1976) claimed, the agency dilemma contributes to the agency expenses, which refers to the entirety of the cost of surveillance, bonding and surplus cost (Siddiqui, Razzak, Malik & Gul, 2013:103).

In financial management, two of the most agency relationships are between owners and creditors and between owners and shareholders (Moyer et al., 2008:8) because returns paid to creditors are fixed. In contrast, the returns to the owners rely on the company's profitability. Owners may scale up the riskiness of the business's investments to receive greater returns. In such a scenario, the shareholder's creditors suffer because they do not get to enjoy the profits. A natural principal-agent conflict arises because managers who are hired in the owners' best interests cannot always maximise their wages without reducing the wealth of the owners (Brooks, 2016:42).

Earlier seminal work by Jensen and Meckling (1976) confirms that as business executives' possession of a vested interest in a business decrease, it is in a managers' opportunism to carry out expenditures to furnish themselves with rewards at the expense of investors and the agency costs are straightforwardly relative to the size of the business (Kim, Pilotte & Yang, 2012:380). Jensen (1986), in his seminal contribution, believes managers use the excess internally generated cashflows when their objectives differ from the shareholders. Brigham and Ehrhardt (2011:1087) define agency costs or problems as direct or indirect expenses suffered by a principal because of having entrusted power to a representative. This view is shared by Correia et al. (2015:23) by explaining that agency problems arise when owners of firms suffer financial penalties because managers acting in their interests may take detrimental actions.

According to Gitman and Zutter (2012:21), the Agency Theory assumes that this situation occurs and depicts the business process as a collection of agreements, one of which is a principal-agent interaction, in which the principals are the investors while the agents are the executives. In the non-existence of agency dilemmas, managers behave in investors'

interests, picking projects that are either profitable or at their worst, value-neutral (Kim et al., 2012:376). To minimise agency problems resulting from improper use of free cash flow by managers, governance measures such as institutional ownership and board independence need to be implemented to monitor the managers' behaviours (Salehi, Mohammadi & Afshari, 2017:92).

2.3.2 The Free Cashflow (FCF) Hypothesis

According to Jensen (1986), free cashflow is the money left over subsequently a company has paid for all its current projects with a positive NPV. This view is shared by Habib (2008:101), who explains that the amount of cash available to be made available to each shareholder once the company has covered all its obligations, including investing, is referred to as free cash flow. However, Wang (2010:409) argues that free cash flow refers to financial resources available for use using their discretion; it can also be regarded as 'idle cashflows'. Bhandari and Adams (2017:12) support this view and further elaborate that besides free cash flow being funded, which is available for distribution, free cash flow also includes funds that are available for spending by managers. Maksy (2013) expounds that unlike in finance, in accounting, the concept of free cash flow (FCF) varies considerably, according to definitions differing across academic papers and articles, textbooks and firms. Nevertheless, definitions of cashflows in financial literature are based on the Jensen (1986) Free Cash Flow Hypothesis. Maksy (2019:11) explains that Jensen (1986) hypothesises that the availability of Cashflows results in agency costs since the managers spend it on projects with negative NPVs and increasing their salaries.

There is no generally accepted definition of free cash flow (Christy, 2009:29). This dispute, according to Christy (2009:29), stems from the fact that certain investors, in the definition, do not include variances in Working Capital. Some analysts consider maintenance capital expenditure when estimating free cash flow and omit new capital expenditure. Following Christy (2009), most corporations need to disclose the exact breakdown of capital expenditures into the maintenance of current assets and acquisition of new assets, which is improper.

The significance of free cash flow stems from the fact that it allows managers to explore opportunities that might result in a rise in shareholder value (Mundia, 2016:16). However,

Lin and Lin (2018:2724) contend that because the availability of free cash flow makes it difficult to supervise managers, extreme free cash flow may result in agency problems. In addition, due to the lack of profitable investment options, agency expenses occur because of the misappropriation of available free cash flow (Wang, 2010:409). Susanto Pradipta and Djashan (2017:284) agree that if managers do not utilise the available free cash flow to boost the owners' revenue, the company will not develop.

However, according to Gitman and Zutter (2012:124), free cash flow refers to the entire cashflows available to shareholders, subsequently to the company meeting its fundamental operational requirements and funded for its net investments in fixed assets and net current assets, as shown by the following equation:

$$free\ cash\ flow = operating\ cash\ flow - net\ fixed\ asset\ investment - net\ current\ asset\ investment \quad (6)$$

Free cash flow is defined by Brigham and Ehrhardt (2011:285) as the cashflows available for distribution to all the shareholders of a company. A company's funding prospects, including its ability to turn those prospects into certainties, determine the source of free cash flow. According to Mundia (2016), the availability of free cashflow indicates the ability of a company to pay dividends, service debt and sell and repurchase shares. Free cashflow is a specialised notion that helps a corporation to figure out how much cash it has available for immediate, discretionary, and strategic usage (Priest & McClelland, 2007). Besides, Christy (2009:2) explains that free cashflow refers to the money left over after a company pays its operating costs like electricity bills and purchases equipment and computers using cash.

High cashflows allow managers to make additional investments for the business so that it can enhance production, which consequently increases both the shareholder value and the value of the business (Oktaryani & Mannan, 2018:4). When managers have enough funds to finance all attractive initiatives, as maintained by the Free Cash Flow Hypothesis (Jensen, 1986), they are anticipated to finance endeavours that are unfavourable to investors. Therefore, as maintained by the Free Cash Flow Hypothesis, high cashflows are likely to result in management disposition and agency issues (Lin & Lin, 2016:145).

Lang, Stulz, and Walking (1991:317) explain that the Free Cash Flow Hypothesis predicts that more significant cashflows worsens agency difficulties in organisations with limited investment prospects and that managers value operations investments more than financial

assets. Cardoso, Martinez and Teixeira (2014:85) highlight that, on the authority of Jensen (1986), the company executive's authority is diminished through the payment of dividends since it minimises the amount of cash accessible to executives.

A favourable Free cash flow situation might also lead to the company buying back its shares and taking on the business of linked parties (Nekhili & Cherif, 2011). That kind of behaviour might negatively affect the company's financial standing, result in lower share values, and probably change management (Opler, Pinkowitz, Stulz & Williamson, 1999; Richardson, 2006). In addition, management may temper the business's revenue to cover up for their misuse of free cash flow and enable the extraction of their enjoyment of control.

The following section discusses sub-theories that support the main theories discussed above.

Sub Theories

2.3.3 Financial Leverage

Financial leverage refers to the utilisation of debt in a company's capital structure as financial leverage and is determined as the difference between Earnings After Tax (EAT) and Earnings Before Interest and Tax (EBIT). It is seen as a financial tool that may be employed to increase the rate of return and value of a company (Adenugba, Ige & Kesinro, 2016:14). According to Jensen (1986) the use of debt of free cash flow reduces management's control this is supported by Mostaghimi, Ramezanpour and Nozari (2014:2) who state that it diminishes free cash flow accessible for investment as a disbursement to investors as dividends.

Based on Jensen and Meckling (1976), leverage is essential in decreasing agency costs. Past studies regarding the association between debt and agency cost propose that highly leveraged firms are scrutinised by investors, which inhibits management from engaging in nonprofitable investments, which leads to decreasing agency costs because when firms pay interest, a lesser amount of revenue is retained inside the company. Therefore, management cannot utilise the cash for their benefit based on the Free Cash Flow Hypothesis (Siddiqui et al., 2013:105).

The next section will examine dividend policy.

2.3.4 Dividend Policy

A dividend is a reward to the shareholders for their risk-bearing investment; therefore, it is important to the shareholders (Nga, Tin & Phe, 2020:48). The purpose of issuing dividends to shareholders is to reduce free cash flow, which may result in managers engaging in activities that may not be in favour of investors (Jensen, 1986). Following Rostamlu, Pirayesh and Hasani (2016:132) because dividends indicate the cash outflows done by a business, dividend policy is regarded as part of the utmost critical concerns in financial management and one of the most significant decisions faced by management.

Rozeff (1982) was one of the pioneers to suggest how dividends can be used in lessening agency costs by replacing the costs for other bonding and auditing expenses experienced by the business. The study by Rozeff (1982) concludes that ownership concentration is adversely correlated to remuneration, which is in line with the reasoning that superior insider concentration culminates in improved surveillance, hence the necessity to remunerate investors.

Thus far, the dividend policy irrelevance theory by Miller and Modigliani (1961) is resolutely linked with the Dividend Policy. Paramasivan and Subramanian (2009:101) explain that in the opinion of Modigliani and Miller (1961), in a free enterprise setting, the dividend policy of the business is inapplicable and has no influence on the financial standing of the business. Modigliani and Miller (1961) established that based on certain presumptions as well as rational investors and a perfect capital market, a company's market value might be separated from its dividend policy, a view buttressed by Black and Scholes (1974) and Jose and Stevens (1989). A company's dividend policy has a significant impact on its cashflows, which in turn influences its share price. The amount of earnings that are paid out as dividends to shareholders as opposed to being reinvested determines a company's dividend policy. An ideal dividend policy can reassure investors about the stability of the economy and the prospects for the future, which may boost stock values. A bad dividend policy, on the other hand, can cause share prices to fall. As a result, assessing a company's total financial success requires examining the relationship between cashflows, dividend policy, and share prices.

2.3.5 Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH) contends that financial markets are effective and that current security prices accurately reflect all available information. The foundation of the EMH is the assumption that since investors compete with one another, new knowledge should be accurately and quickly reflected in pricing, making it impossible for any one person or entity to continually beat the market. Fama (1970) was an early proponent of the EMH, arguing that securities markets are efficient because investors compete to exploit any potential profit opportunities, resulting in prices reflecting all available information. This is supported by Rossi (2018:183) who elaborates that according to the EMH theory, the price of the shares allotted by the business indicates the company's value and that shares always trade at a fair price. Based on Fama et al. (1969), microenvironment parameters determine share prices (Kalama, 2009:1).

The Efficient Market Hypothesis theory dictates that whenever new information is made available to new users, their assumptions are updated immediately, and they react immediately (Fama et al.,1969). According to Du (2008:6), the Efficient Market Hypothesis posits that the share's value at time *t* fully reflects all the available information at time *t -1*. Gitman (2009:344) summarises the Efficient Market Hypothesis as a basic model defining the behaviour of a perfect market whereby:

- Market prices are stable.
- The prices in the market are an indication of all the information available to the public, and the market prices can behave fast in response to changes in the information.
- Since the price of shares in the market is fair and complete, potential investors do not waste time searching for shares that are not priced correctly.

Fakhry (2016: 431) explains that the Efficient Market Hypothesis is grounded on the premise that the share market operates in perfect competition, where the participants are sensible, reluctant to take a risk and interested in maximising income. However, Lekovic (2018: 369) explains that based on financial-related literature, there is no concurrence concerning the validity of the Efficient Market Hypothesis. Rahman, Simon, and Hossain (2016:355)

support this view, further elaborating those results from global studies regarding the Efficient Market Hypothesis are debatable.

There are three variations of the EMH: weak, semi-strong, and strong. The semi-strong form contends that all publicly available information is already reflected in market prices, whereas the weak form contends that previous prices and returns cannot be utilized to forecast future prices or returns. Finally, the strong form implies that market prices already reflect all information, including insider information. The correlation between stock prices and value-creating factors like cashflows at a mining company is influenced by the market's efficiency. Investors find it challenging to discover undervalued or overvalued stocks in an efficient market since stock prices respond fast to fresh information. As a result, it is possible for stock prices to nearly immediately reflect a mining company's cashflow and intrinsic value, so lowering the risk of mispricing and excessive gains. Cashflow and other value drivers, however, might not be priced effectively in an inefficient market, where prices do not fully reflect all available information, creating the possibility for mispricing and excessive returns.

In summary, market efficiency is influenced by the sorts of information included into market pricing, which affects the relationship between a mining firm's stock prices, cashflows, and value drivers. The likelihood of mispricing and excessive profits is diminished in an efficient market since cashflows, and intrinsic value are promptly reflected into stock prices. As a result, understanding the level of market efficiency is crucial when making investment decisions in the JSE mining sector.

2.4 EMPIRICAL STUDIES

The relationship between share prices and cashflows has been the subject of numerous studies, although the results have been conflicting. A study by Liu and Yu (2018) on publicly traded Chinese companies, however, showed no evidence of a correlation between cashflows and share prices. In a similar fashion, Kim, and Lee's (2019) research on Korean listed companies revealed that while cashflows did influence share prices positively, it did so in a less significant way than other value drivers like earnings or dividends. However, a study by Muzammil, Saeed, and Hussain (2018) on listed companies in Pakistan revealed that cashflows was the most crucial factor. These contradictory results imply that the relationship between share prices and cashflows may change based on the setting and traits of the

companies under study. To fully comprehend this link and the ramifications it has for investors and businesses more research is required in South Africa. The section below identifies some of the few local studies on cashflows and share prices.

2.4.1 Local studies

To investigate factors that influence share prices, Enow and Brijlal (2016) sampled 14 firms registered on the JSE from 2009 to 2013, and for this study, the Multiple Regression technique was applied to analyse the data. Dividend per share, earnings per share, and price-earnings ratio were the study's independent variables, while share prices were assumed to represent the dependent variable. According to the study's findings, all three variables were responsible for 57.8% of the changes in share prices, and there was a positive relationship between earnings per share, price-to-earnings ratio and share price. Nonetheless, the study findings revealed no correlation between the dividend per share and the share price.

Another study titled 'Cashflow as a Predictor of Share Returns: Evidence from the Johannesburg Stock Exchange was done locally by Alexandroi (2019). The study used cash and accounting variables. fixed effects panel regression models were applied to a dataset of 85 shares listed on the Johannesburg Stock Exchange from 2008 to 2018 to examine their capacity to forecast six-month forward, total share returns. The findings show that accrual-based metrics have greater explanatory power for share return volatility than cashflows measures, thus in contrast to the findings by Foerster, Tsagarelis and Wang (2017). However, further research is necessary before employing these variables to generate consistent excess returns. Additionally, the most robust regression model includes cashflows and bottom-line earnings variables, thus indicating that a combination of traditional profitability and cashflows figures has some predictive validity. The importance of utilising this cashflows information in the fundamental investment process has tangible effects on return forecasting, asset pricing and anomalies in the financial markets. The study by Alexandroi (2019) also includes a built-in examination of the JSE's level of market efficiency. The resulting significance levels assist in our understanding of how South African equity markets process and reflect financial data by indicating that past changes in corporate financial information can explain some variance in future returns. Thus, the analysis offers proof against a strong-form level of market efficiency and favours the case for a semi-strong form level on the JSE.

Li, Moutinho, Opong and Pang (2015) conducted a study on cashflow forecasts for South African firms listed on the JSE. They investigated and contrasted each model's out-of-sample performance. In contrast to the reported findings of studies conducted in the United States and Australia, their results demonstrated that several accrual terms, such as depreciation and inventory changes, do not improve cashflows projection for the typical South African corporation. The out-of-sample results showed that adding additional explanatory variables may improve the models. This research suggests applying the moving average model to panel data and the regressive vector model for the multi-period forecasting of cashflows for South African firms.

2.4.2 International studies

Dechow (1994) investigated the circumstances under which accruals could enhance earnings capacity and thereby determine the profitability of a business as reflected in share earnings. The study sample consisted of firms listed on the New York Stock Exchange (NYSE), analysed quarterly, annually, and over four-year periods. The findings of Dechow (1994) indicate that earnings are more strongly associated with share profits over shorter measurement periods than with realized cashflows. Furthermore, in firms that have substantial fluctuations in their working capital requirements, investment and financing activities, earnings are more closely related to share returns than realized cashflows.

In a study conducted in New Zealand, Laswad and Baskerville (2005) sampled 161 enterprises in terms of their realised and unrealised earnings and cashflows using the Spearman Rank Correlations approach. The results showed that realised earnings had a negative association with unrealised earnings, but a positive relationship with Cashflows from operations for a single year (1998).

Finally, Habib (2008) used regression models for data analysis in a study done in New Zealand to explore the role of accruals and cashflows in calculating share returns in New Zealand. Although the variance is not statistically significant, Habib (2008) found that wages had greater explanatory power than cashflows. Furthermore, the study's findings demonstrated that earnings and cashflows provide additional information for share returns.

According to Du (2008), in a similar study done in the USA using the multiple valuation techniques, it concluded that operating cashflows performed better than earnings and

dividends in the multiple valuation checks, which contradicts the findings from previous studies, which showed that earnings had the most substantial explanatory power in the variance of the share price.

Chen and Fraser's (2010) study found that neither cashflows nor earnings could explain share price changes in the Hong Kong and Singaporean markets. The authors concluded that these unresolved price deviations may be attributable to prolonged deviations from intrinsic value resulting from irrational momentum-based investor behaviour. Campbell et al. (2010) propose that if discount rates change gradually, categories of shares may move in unison due to common shocks to discount rates, rather than underlying fundamentals.

In a separate study by Wang (2010) which focused on Taiwanese firms, the impact of free cash flow on agency costs was investigated, and the results indicate that free cash flow significantly contribute to agency costs, which adversely affect company performance. This finding is consistent with Jensen's (1986) Free Cash Flow Hypothesis, which posits that excess cashflows tend to be squandered by firms.

Nisa and Nishat (2011) used the Generalized Method of Moments (GMM) technique to investigate factors affecting share prices in 221 Pakistani enterprises. The investigation covered the years 1995 through 2006. However, the study findings demonstrated a favourable association between share prices and the previous year's earnings per share and firm size. In addition, the share price was also influenced by macroeconomic factors such as the GDP and the interest rate.

Srinivasan's (2012) study on the determinants of share prices in the Indian economy investigated data spanning six major sectors over the period of 2006 to 2011, using panel data techniques for analysis. The findings of the study indicate that factors influencing share prices vary across industrial sectors. Specifically, the share prices of the manufacturing, pharmaceutical, and energy sectors exhibited a negative and substantial association with the dividend per share ratio. Moreover, the company's size was significantly related to share prices in all sectors, except for the manufacturing sector.

Malhotra and Tandon (2013) sampled 95 firms registered on the National Stock Exchange (NSE) in the United States of America (USA) from 2007 to 2012 to investigate factors that

affect share prices. The study found a positive relationship between the company's share price and book value, earnings per share and price-earnings ratio. However, the dividend yield revealed a negative relationship with the company's share price when data were analysed using the linear regression technique.

In Nigeria, Malaolu, Ogbuabor and Orji (2013) explored the factors that affect changes in the share prices of Nigerian firms during the period from 1985 to 2010. The information collected was analysed using the Engle-Granger two-step co-integration model. The study findings showed that of all monetary variables, only the inflation rate significantly impacted the price of shares of Nigerian firms during the period under investigation. The exchange rate, interest rate and money supply were found to have no meaningful association with the prices of shares.

Similarly, in a study done in the Middle East, Al-Saedi (2014) investigated the influence of cashflows on share market value using the Panel Data technique for firms registered on the Iraqi Stock Exchange between 2006 and 2010. In this study, a sample of 63 firms was selected. The study findings demonstrated that the relationship between cashflows and the share market value of firms registered on the Iraq Stock Exchange is insignificant.

Subsequently, Almumani (2014) researched the quantifiable dynamics influencing the share values of banks listed on the Amman Stock Exchange from 2005 to 2011. Both correlational and linear multiple regression techniques were used to analyse the study variables. The research indicated that dividend per share, earnings per share, book value, and price-earnings significantly impact the prices of shares of banks listed on the Amman Stock Exchange.

Bhattarai (2014) used the regression technique for data analysis in another Asian study to look at the factors influencing the share prices of Nepal Stock Exchange-registered commercial banks. Earnings per share, dividend yield and price-earnings ratio were the primary determinants of share prices of commercial banks registered on the Nepal Stock Exchange between 2006 and 2014, according to data taken from the yearly reports of the selected banks.

Based on a sample of 717 firms from the Latin American industrial sector, Vedd and Yassinski (2015) investigated the impact of financial ratios, company size and operating cashflows on the share price. The selected firms were registered on stock exchanges in

countries such as Mexico, Colombia, Brazil and Chile, and the study covered the period from 2004 to 2013(10 years). Data were analysed using the regression technique. As a result, Vedd and Yassinski (2015) determined that the Assets Turnover Ratio company size has a substantial impact on the share prices of Brazilian, Chilean, and Mexican firms. In contrast, the Debt Ratio significantly impacts Colombian firms' share prices based on this analysis.

Khanji and Siam (2015) conducted a study to examine the impact of cashflows on share prices, using the Linear Regression technique via SPSS software to analyse data from Jordanian commercial banks registered on the Amman Stock Exchange. The study's results indicated that there is no statistically significant relationship between cashflows generated from operating, investment, and financing activities and share prices of Jordanian financial institutions registered on the Amman Stock Exchange. Specifically, the authors concluded that Jordanian financial institutions exhibit similar characteristics to firms in other areas of the economy in Jordan with regards to the relationship between cashflows and share prices. Similarly, Ghasemi and Noorifard (2015) conducted a study that investigated the relationship between cashflows and share prices by selecting 130 firms registered on the Tehran Stock Exchange from 2009 to 2013. The authors utilized correlational analysis to analyse the study data, and the results indicated that a relationship exists between a company's free cash flow and the degree of its yearly share profit. The authors found that firms with higher cashflows experienced a higher rate of annual share returns than firms operating within the same industry.

Mundia (2016) used a multiple linear regression model to analyse the relationship between free cash flow and share prices of non-financial firms listed on the Nairobi Stock Exchange (NSE) in Kenya and found that free cash flow had a significant impact on the share price.

Etale and Bingilar (2016) investigated the impact of cashflows on the share price of Nigerian banking institutions. The study employed a sample of ten banks. The independent variables in this study by Etale and Bingilar (2016) were the cashflows per share ratio, cashflows to total assets ratio and dividend to operational cashflows ratio. The cashflows was expected to be represented by the components listed above. The study employed multiple regression techniques to analyse the data. The study looked at whether there was a relationship between cashflows and the share prices of Nigerian financial institutions over nine years. The findings

revealed that cashflows has a beneficial impact on the share prices of Nigerian financial institutions.

Asif, Arif and Akbar (2016) investigated the impact of accounting data on KSE – 30 firms listed on the Pakistan Stock Exchange. The study took place over eight years, from 2006 to 2013. Earnings per share, book value per share, capital utilised per share and net operating cashflows were used as independent variables in the study. The study used the Ordinary Least Squares models for data analysis, and the share price was the dependent variable while accounting for information. The study concluded that the accounting variables directly influence the share price, which is consistent with a previous study (Asif, Arif & Akbar (2016:132).

Hau (2017) conducted a study to examine the relationship between free cash flow and firm performance of 90 non-financial firms listed on the Ho Chi Minh City Stock Exchange in Vietnam. The study included manufacturing, trading, and real estate industries, and the data was sourced from audited financial reports and share price information for the period 2009 to 2015. The data was analysed using panel regression and random effects models. The results indicated that free cash flow had a significant impact on the performance of firms in all three sectors listed on the Ho Chi Minh City Stock Exchange during the period 2009 to 2015.

Girish and Desai (2017) conducted a study in India to investigate the influence of cashflows from operating and financial activities on the share price of firms listed on the Nifty Pharma Index of the Indian National Stock Exchange. The study's sample comprised ten firms, and the data covered the period from 2010 to 2016. The study used the market price per share as the dependent variable and cashflows from operating and financing operations as independent variables. The study's data was analysed using the Fixed Effect Model (FEM) and the Random Effect Model (REM). Based on their findings, Girish and Desai (2017) concluded that only cashflows from operating operations positively and significantly affects the market share price.

Oroud, Islam and Ahmad (2017) studied the impact of cashflows on the share prices of Jordanian firms listed on the Amman Stock Exchange (ASE). Cashflows have a significant impact on share values, according to the findings of the enquiry. Moreover, cashflows from operating activities favoured the prices of Jordanian firms trading on the ASE. In contrast,

according to this study, cashflows from financing activities had a negative effect. Additionally, Bala (2017) conducted a study in Sudan to investigate the relationship between cashflows from operating activities, investment activities, financing activities, and the return of shares of financial institutions registered on the Khartoum Stock Exchange. The study was based on data obtained from relevant financial literature and financial statements and involved a sample of two banks. The analysis of data was conducted using the Spearman coefficient and the SPSS software package. Based on the study's findings, Bala (2017) concluded that no significant evidence was found to support the existence of a relationship between cashflows from operating activities, financing activities, and investment activities with the returns of shares of the financial institutions between 2010 and 2015.

Purswani and Anuradha (2017) investigated the impact of accounting information on the share price of construction firms listed on the Bombay Stock Exchange, including earnings per share, book value per share, dividend per share and cashflows from operational operations. The accounting information was used as the independent variable in the study, while the share price was supposed to be the dependent variable. The study covered 2011 to 2016 and included 15 firms as a sample. Data were analysed using the statistical regression technique. According to the data, only earnings per share and price to book value per share significantly impact the share price.

In a related study, Alnawaiseh, Alomari, Al – Rawashdeh and Alnawaiseh (2017) looked at the impact of free cash flow on financial leverage and dividends in Jordanian enterprises, focusing on 58 firms. Data was analysed using the regression analysis technique. The findings show a considerable link between free cash flow, financial leverage, and dividend pay-outs.

Dissanayake and Biyiri (2017) investigated the impact of earnings per share, dividend per share, and return on equity on the share price of hospitality firms listed on the Colombo Stock Exchange in Sri Lanka. The study sample comprised 20 firms conducted from 2011 to 2015. The study's findings revealed that all three financial parameters, namely earnings per share, dividend per share and return on equity, positively impacted the share price when data were analysed using the regression technique.

Utomo and Pamungkas (2018), using a selection of 204 firms registered on the Indonesian Stock Exchange, investigated the influence of cashflows activities and share returns of manufacturing firms in Indonesia. The period of the study was from 2012 to 2016. The collected data were analysed using the Multiple Regression method. Both operational and financial cashflows had a significant impact on share returns, according to Utomo and Pamungkas (2018), whereas investment cashflows had a lesser impact on share returns.

Sebastian and Sundar (2018) investigated the effect of free cash flow on the profitability of firms listed on India's National Stock Exchange (NSE). The study encompassed the years 2013 to 2018, and the sample size was 50 firms. The Linear Regression technique was used to examine the impact of free cash flow, the independent variable, on profitability, which was the study's dependent variable. The analysis indicated that free cash flow has a minor impact on profitability.

Musah and Kong (2019) investigated the relationship between cashflows and the financial performance of 15 non-financial firms on the Ghana Stock Exchange (GSE). The study's variables were calculated return on assets (ROA), return on equity (ROE) and return on capital employed (ROCE) and the study period was seven years, from 2008 to 2017. Data were analysed using the Pearson Correlation Coefficient statistical technique. The study findings revealed a significant positive relationship between cashflows, and the company's financial performance based on the ROA calculation. However, the relationship between cashflows and the company's financial performance based on the ROE and ROCE was insignificant.

Simu and Pangaribuan (2020) investigated the factors that influenced the share price of 26 firms listed on the LQ45 index in Indonesia from 2016 to 2017. Data was analysed using the Multiple Linear Regression technique, and the findings revealed that while the capital structure and sales growth have no impact on share prices, profitability has a significant impact on the price of the shares of the 26 Indonesian firms listed on the LQ45 Index from 2016 to 2017.

2.5 CONCLUSION

The literature review began with the introduction, which shows how the rest of the chapter is structured. The second part of the literature review discusses the key concepts, where

critical terms of the study are discussed, the theoretical structure initially discussed the brief overview of general mining firms listed on JSE between 2015 and 2020, the Agency Theory, and the Free Cashflow Hypothesis, the two leading theories associated with this study, are also discussed. In addition, financial Leverage, Dividend Policy, and the Efficient Market Hypothesis are explained as sub-theories of the study.

Section 2.4 of the Literature Review looked at previous studies related to the relationship between cashflows and share prices done in South Africa and abroad. Little research has been conducted in South Africa on the relationship between cashflows and share prices, whether among general firms or firms in other sectors of the South African economy. The above literature review explained that the relationship between cashflows and share prices had been extensively researched, especially in Asia and Middle Eastern countries. Although the findings of these studies are helpful, they cannot be applied to Africa in general or South Africa in particular. Additionally, to the best of the researcher's knowledge, there has not been a similar investigation into the connection between cashflows and share prices of mining companies in South Africa listed on the Johannesburg Stock Exchange (JSE), which provides the impetus for undertaking this research. The following chapter, Chapter 3, discusses the study's research methodology.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The previous chapter discussed the study's literature review, which covered the theoretical framework, various financial theories, concepts, and previous local and international studies done to investigate the relationship between cashflows and share prices. Section 3.2 of this chapter focuses on the research design, including the research approach. Under section 3.3, the study's population and sampling are discussed. The data collection method used for gathering the data related to the cashflows and share prices of the general mining firms is discussed in section 3.4. Finally, section 3.5 analyses the data evaluation methods employed in the study, and section 3.6 focuses on the Panel data analytical and diagnostic technique.

3.2 RESEARCH DESIGN

According to Schindler (2019:71), research design refers to the blueprint for achieving research objectives and has the following characteristics:

- It is a sequential and technical strategy for the study's operations.
- It is continuously focused on the question of the research.
- It provides direction in terms of choosing data sources.
- It lays out the background for establishing the relationships among the study's variables.

According to Bryman and Bell (2011:40), the research design is the approach the researcher selects to combine the various elements of the study in a logical and cogent manner, ensuring the researcher solves the research problem successfully. In addition, it serves as the guide for the data gathering, measurement and analysis processes. Cooper and Schindler (2014:125) further elaborate that a research design appertains to a strategy and arrangement of a study to acquire responses to research questions. Derived on the above explanations, the research design for this research was structured to achieve the following:

- Describe how the research problem was set up, including the context, organisation, or disposition of the relationships between cashflows and share prices of general mining firms listed on the JSE between 2015 and 2020 as well as the exploration strategy used to find empirical support for those relationships.
- Serve as a blueprint for gathering and examining information on the cashflows and stock prices of general mining firms listed on the JSE between 2015 and 2020.
- Assist the investigator with allocating study resources by presenting crucial research methodological options.

The chosen research design for this research was of a causal type, a well-structured research strategy used to recognise the interconnection between two or more variables (Bajpai, 2011:35)

3.2.1 Research approach

The study adopted a quantitative research approach and employed the correlational technique. Quantitative research is a methodology used to assess objective concepts by exploring the interrelationships between variables (Creswell, 2014:31). Given that the present study aimed to examine the relationship between cashflows and share values, a quantitative approach was deemed appropriate. In correlational research, the central objective is to establish or demonstrate the existence of a relationship among multiple variables concerning a phenomenon (Kumar, 2011:10). Correlational research design examines the relationship between variables and, being a descriptive approach, it is highly effective in revealing the presence of interrelationships among variables (Salkind, 2012:12). The objective of correlational research, as noted by Du Plooy-Cilliers et al. (2014:76), is to explore the existence of a link or relationship among multiple study variables. The researcher in correlational research is not expected to manipulate the variables but rather to observe them (Bordens & Abbot, 2018:105).

To grasp reality and test hypotheses using empirical data, post-positivism research philosophy promotes the use of impartial and systematic methodologies (Creswell, 2014). A post-positivist viewpoint in this study would entail using an objective and methodical methodology to examine the correlation between cashflow and share price of general mining

corporations listed on the JSE. The post-positivist school of thought contends that reality may be viewed and assessed using methods that are not dependent on human perception (Burrell & Morgan, 1979). As a result, the study would try to gather and analyze data on cashflow and share prices of mining corporations utilizing trustworthy and legitimate data gathering and analysis techniques. To evaluate these hypotheses about the relationship between cashflow and share price, financial documents, stock market data, and statistical analysis are used.

This study intends to investigate the relationship between mining company cashflow and share price from an impartial standpoint, free from any biases or preconceived beliefs. This method aids in delivering a more precise and trustworthy knowledge of the link between these two variables. The post-positivist approach would also permit the use of a variety of data collecting and analysis techniques to offer a more thorough understanding of the connection between cashflow and share price. As a result, the post-positivist research ethic is well adapted to researching the relationship between cashflow and share price of general mining corporations listed on the JSE. It focuses on the use of systematic, objective approaches to comprehend reality and test hypotheses using empirical data, which is crucial for delivering a trustworthy and valid knowledge of the relationship between these two variables.

3.3 RESEARCH POPULATION AND SAMPLING

3.3.1 Study population

Population, according to Salkind (2012:95), is a group of likely participants whose perspectives the study hopes to encompass. Population refers to the complete frame of observations (Singh, 2006:82). Du Plooy – Cilliers et al. (2014:132) distinguishes between the "target population" and the "accessible population" of a study and elucidate that the term "target population" refers to everyone or items that are within the limits of a population, whereas "accessible population" alludes to the section of the population which can be included in the study. For this study, the target population consisted of the entire general mining firms registered on the JSE during the period between 2015 and 2020, while the accessible population was made up of general mining firms registered on the JSE between

2015 and 2020 and whose financial data for that period were available on the Iress (SA) website.

3.3.2 Sampling and sample size

According to Salkind (2012:397), a sample represents a population's subset. Considering the small population for this study (n = 12), the study's sample consisted of all members of the population, that is, all general mining firms registered on the JSE between 2015 and 2020. Singh and Masuku (2014:10) clarify that a whole population must be appraised in limited populations to attain a necessary degree of accuracy, as it eradicates sampling error and affords information for the entire population. Leedy and Ormrod (2021:207) agree that sampling is unnecessary for populations of less than 100 and that the entire population should be surveyed instead. The following criteria were applied to choose the final representatives of the general mining firms registered on the JSE used for this study. The general mining firms that met the criteria below were used as the study's sample.

- The company must have been operating during the entire period (2015 – 2020).
- The company must have remained registered on the JSE during the period (2015 – 2020).
- The company must have published its annual financial results during this period (2015 – 2020).

3.4 DATA COLLECTION

In this investigation, secondary data sources were used. Information that has already been obtained and analysed by another party is referred to as secondary data by Kothari (2004:111). Secondary data is frequently employed in descriptive and explanatory research, according to Saunders et al. (2012:307), and comprises both quantitative and qualitative information. According to Bryman et al. (2014:257), the main advantage of using secondary data is that the information is immediately accessible and that previous scholars do not necessarily gather this information; instead, it may be gathered by a business or another type of organisation for its purposes. Maxfield and Barbie (2015:353) agree that collecting secondary data is less expensive and faster than collecting original data. Cohen et al.

(2018:587) explain that secondary data has the advantage of timelessness and speed for decision-making compared to other types of data that require a longer time to collect.

Bryman et al. (2014:271) summarise the following as the limitations of using secondary data in research:

- Lack of familiarity with data – because others have collected the data, the researcher might need time to familiarise himself with the range of variables and how the data has been organised.
- The complexity of the data – the volume of data might be problematic to manage if it contains large numbers.
- No control over data quality – the researcher must never take for granted, especially when using survey data gathered in-house at the company level.
- Absence of critical variables – there is a possibility that one or more key variables might be missing.

Ghauri *et al.,* (2020:158) also explain several drawbacks of using secondary data in research. According to Ghauri et al. (2020:158), the major disadvantage of secondary data is that since such information was gathered for motives other than the researcher's, the information might portray something different from the theoretical concepts the researcher is interested in. According to Bajpai (2011:127), the accuracy of secondary data is jeopardised because the researcher is unaware of the outline of data collection and has no control over the data collection pattern. However, because secondary data are gathered for different reasons, it is essential to consider whether they are relevant in a particular market research circumstance. Several critical considerations should be considered while evaluating secondary data. Firstly, the information ought to be accurate and free of mistakes. The information must be pertinent to the current state of the research. The level of data aggregation and the units and time intervals in which the data are given all affect relevance. The data should also be provided in an accessible format. Furthermore, secondary data must be current. The format of the data and any limitations on its use should also be considered (Mulhern, 2010).

The principal source of information employed for this study was the Iress (SA), formerly known as the INET BFA website database. Iress (SA) is Africa's leading financial data and analysis tool provider. The study also used data from the JSE's annual publications and

published financial declarations of general mining firms registered on the JSE from 2015 to 2020, in addition to secondary data obtained from the Iress (SA) database.

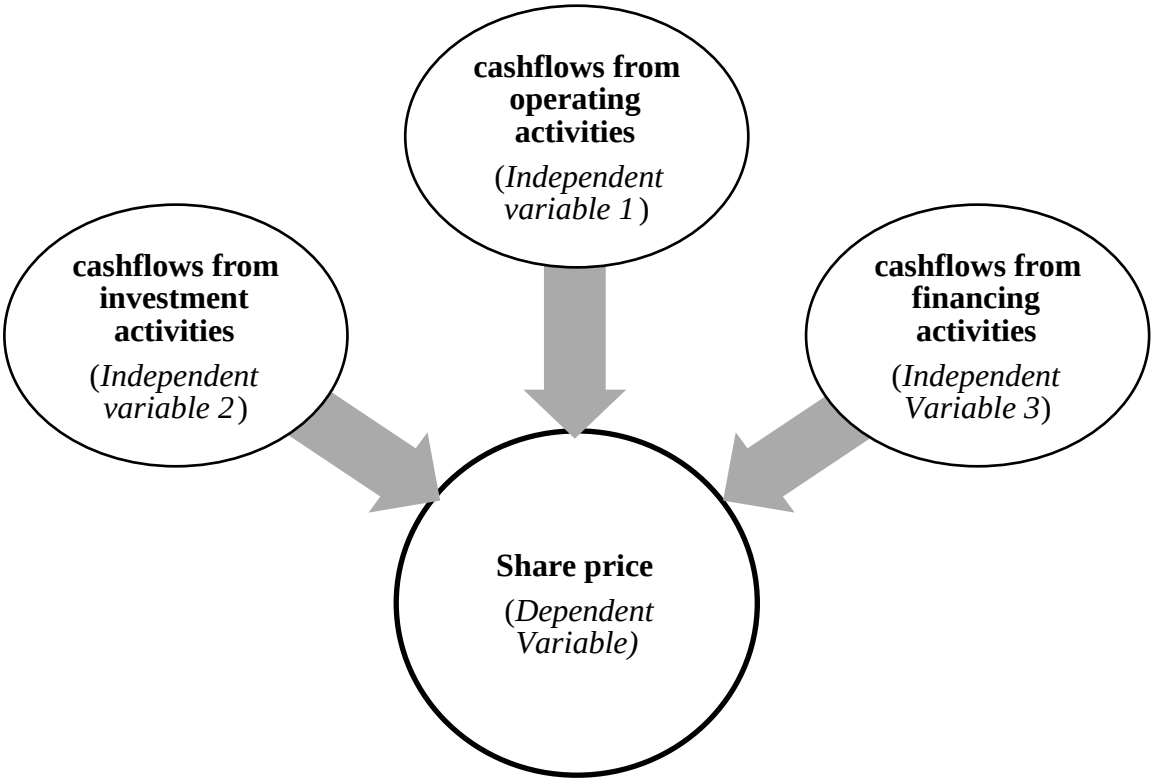
3.5 ANALYSIS OF DATA AND EVALUATION OF HYPOTHESES

3.5.1 Study variables

The variables used in this study as independent variables are cashflows from investment, operating and financing activities, and the dependent variable was the share price.

Saunders et al. (2012:174) describe an independent variable as a controlled or altered variable to assess its effect on a dependent variable. The dependent variable is the variable that may adjust in reaction to shifts in other variables. As shown in Fig 3.1, the dependent variable of this study was the share price of general mining firms registered on the JSE, and the cashflows were the independent variables. It is important to note that there are three cashflows: cashflows generated from operating activities, cashflows generated from investment activities, and cashflows generated from financing activities. The independent variables (cashflows) encompass all three types of cashflows, as illustrated in Fig 3.1 on the following page.

Figure 3.1: Illustration of study variables



Source: Researcher's own compilation, 2022.

3.5.1.1 Cashflows generated by operating activities

Cash from sales is subtracted from cash paid for operational expenses to determine operating cashflows. Operating cashflows is noted on a company's cashflow statement, which is presented both quarterly and annually. Operating cashflows shows if a business can produce enough cashflows to support and grow operations, but it can also show when a business could need outside finance for capital growth.

3.5.1.2 Cashflows generated by investment activities

The term "cashflows from investing" or "investing cashflows" refers to a report that shows how much money was made or spent within a given time on various investment-related activities. Buying speculative assets, investing in securities, or selling securities or assets are all examples of investing activity. Negative cashflows from investment activities is not

always a red flag because it could result from vast sums of money being spent on the long-term viability of the business, including research and development.

3.5.1.3 Cashflows generated by financing activities

"Financing cashflow," also known as "cashflows from financing," refers to the net cashflows utilised to finance a company's capital. Transactions, including issuing debt, equity, and dividend payments, are considered financing operations. Investors can learn about the financial health and management of a company's capital structure from the cashflows from financing activities.

In determining the suitable methodology to use in the study, it was decided to analyse methodologies employed in previous studies regarding the relationship between cashflows and share prices. Table 3.2 below briefly summarises previous studies and the estimation techniques applied.

Table 3.1: Recap of earlier studies and their respective statistical approaches applied in determining associations between variables.

Author(s)	**Estimation Method**
Habib (2008)	Multiple regression
Durgham & Durgham (2010)	Pearson coefficient of correlation
Nisa & Nishat (2011)	Generalised Method of Moments (GMM)
Malhotra & Tandon (2013)	Linear regression
Bhatarai(2014)	Multiple regression
Khanji & Siam (2015)	Linear regression
Ghasemi & Noorifard (2015)	Correlational analysis
Enow & Brijal (2016)	Multiple regression
Etale & Bingilar (2016)	Multiple regression
Asif, Arif & Akbar (2016)	Ordinary Least Squares
Dissanayake & Biyiri (2017)	Multiple regression
Simu & Pangaribuan (2020)	Multiple regression

Source: Researcher's own compilation, 2022.

From Table 3.1, most of the previous studies regarding the relationship between cashflows and share prices utilised multiple regression methods to evaluate the relationship between cashflows and share price. However, Nisa and Nishat (2011), who investigated the determinants of share prices in Pakistan, utilised the GMM technique. Since most of the previous studies had used multiple regression techniques, as indicated in Table 3.2, it was decided to use the multiple regression method using the SPSS software.

3.5.2 Inferential statistics

In descriptive statistics, measurements like mean, median, mode, range, and standard deviation are used to characterize the characteristics of a sample or population. This is helpful in giving a clear grasp of the data being examined, but it excludes drawing any conclusions or making any predictions about the population outside of what is seen in the sample. In contrast, inferential statistics uses data from a sample to draw conclusions or forecasts about the population. This comprises statistical hypothesis testing and estimate and is used to assess whether there is a significant link or difference between variables in the population.

Inferential statistics are employed in this study to analyze the data and evaluate the hypotheses. Regression analysis, for instance, was employed to investigate the connection between cashflows and share prices of the mining companies listed on the Johannesburg stock exchange. Additionally, descriptive statistics were employed to provide an overview of the sample's characteristics and to summarize the results.

Based on the SPSS statistical analysis results, measures of central tendency, dispersion and relative dispersion were done to explain the relationships between the various cashflows and share prices of the general mining firms registered on the Johannesburg Stock Exchange between 2015 and 2020.

3.5.2.1 The correlation of variables (Pearson Correlation of Coefficient)

As Saunders et al. (2012:509) explain, the Pearson Coefficient of Correlation is used to establish the robustness of a correlation between two variables. To evaluate this study's hypotheses, the following test statistic for the Pearson Correlation Coefficient was used:

$$r_{xy} = \frac{n\,X^{n}Y - X^{n}\,Y}{[n\,X_n{}^2 - X_n{}^2][n\,Y^2 - (Y)^2]} \quad (7)$$

Where, r_{xy} = the correlation coefficient between X and Y

X_n= the individual scores on the cashflows X_n

Y = the individual scores on the share price Y

X_nY = the product of each X_n score times its corresponding Y score

$X_n{}^2$ = the individual X_n score squared

Y^2 = the individual Y score squared

Correlation analysis was performed to analyse the acquired data for multicollinearity and find the relationship between cashflows and share prices. A statistical indicator of the strength of the association between the relative movements of two variables is the correlation coefficient. The values are in the -1.0 to 1.0 range. There was a measurement error in the correlation if the estimated value was more prominent than 1.0 or lower than -1.0. A perfect negative correlation is shown by a correlation of -1.0, and a perfect positive correlation is shown by a correlation of 1.0. A correlation of 0.0 indicates no linear relationship between the two variables' movements. The Pearson correlation coefficient is calculated by multiplying the standard deviations of the two variables by the covariance of the two variables (Hair et al., 2019). This coefficient is widely utilized in numerous domains, such as social sciences, finance, and engineering, to explore the relationship between variables, and it is frequently employed in hypothesis testing, regression analysis, and predictive modelling (Field, 2018). It is crucial to remember that the Pearson correlation coefficient only assesses the linear relationship between variables and might not be appropriate for non-linear correlations.

3.5.2.2 Multiple linear regression model

The following multiple linear regression model was used to determine the relationship between the cashflows and share prices of general mining companies.

$$SPRICE_{i,t} = \alpha_{i.t} + b_1 CFO_{i.t} + b_2 CFF_{i.t} + b_3 CFI_{i.t} + u_{i.t} \quad (8)$$

Where, $SPRICE_{i,t} = share\ price$

$\alpha_{i.t} = the\ intercept\ term$

$b_1 CFO_{i.t} = cash\ flow\ from\ operating\ activities$

$b_2 CFF_{i.t} = cash\ flow\ from\ financing\ activities$

$b_3\ CFI_{i.t} = cash\ flow\ from\ investment\ activities$

$u_{i.t} = the\ error\ term$

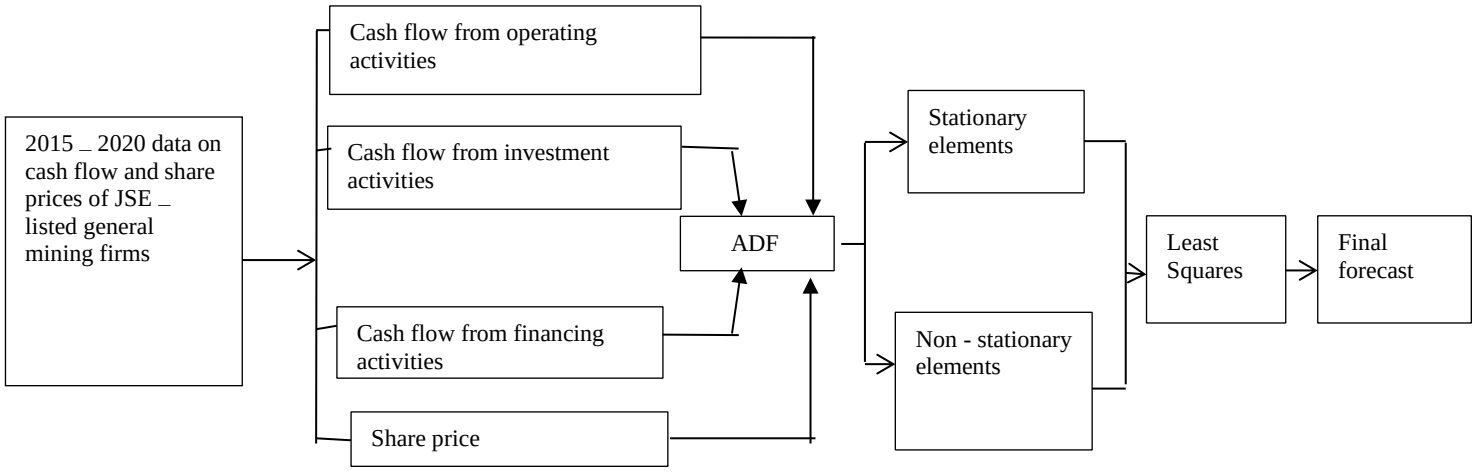
3.5.2.4 Augmented Dickey – Fuller (ADF) test

The ADF unit root test was utilised to examine the stationarity of the variables. Based on Wang, Tianyao and Mengshi (2021:3), the ADF assessment is a commonly used unit root test to determine the stationarity of a time series. The ADF test can establish whether a time series is stationary by computing the t statistics of the variables in a time series model and comparing them to the ADF distribution.

According to Otoo, Sampson, Albert and Apdoei (2020:133), the ADF test is based on the hypothesis that if a time series has a unit root, it will follow a predetermined pattern and thus be difficult to forecast.

Figure 3.2 on the next page illustrates how the ADF was utilised in SPSS for this study.

Figure 3.2: Framework of the ADF test



Source: Researcher's own compilation, 2022.

The null hypotheses presumed that the time series did not have a root and is thus not stationary, whereas the alternative hypotheses claimed that the series was stationary. Therefore, the null hypothesis of the series with a root was rejected based on the test results.

3.5.2.5 Panel data regression

To get robust results and understand the relationship between cashflows and share prices of mining firms, this study utilised panel data information obtained from yearly publications of the twelve general mining firms registered on the JSE, covering between 2015 and 2020, and the information was analysed using panel data regression models. According to Rustam and Putri (2019:32), panel data refers to a set of data in which the performance of objects is studied progressively and consists of cross-sectional and time-series data. Kasozi (2017:339) explains that the panel data approach includes cross-sectional units of observation through various durations and generates extra sturdy estimations than cross-sectional or time series alone. Greene (2018:375) argues that the main benefit of a panel data set is that it enables the person performing the additional research adaptability in developing variations among different objects. Similarly, Purba and Bimantara (2020:151) stated that panel data analysis considers the heterogeneity in the cross-section unit and its ability to evaluate specific discrepancies by allowing different variables. Baltagi (2021:6) explains that panel data allows for the controlling of individual heterogeneity and that time series and cross-sectional

studies not regulating this diversity may be exposed to the risk of bias. Baltagi (2021:7) enlightens that panel data supplies added enlightening information, further flexibility and reduced collinearity among the variables, higher variability, and extra effectiveness.

Stock and Watson (2020:362) distinguish between a balanced and unbalanced panel, where the balanced panel is where all the data are available, and an unbalanced panel refers to a panel where a panel has data for at least one period missing. For example, in this study, one of the observed firms (Kore Potash) had data missing for the 2016 year; therefore, the panel needs to be more balanced.

In this study, the collected information was scrutinised through the SPSS version 25 statistical software. Data were analysed using the following panel data regression models: pooled standard test least squares, fixed effects, and random models to determine the best model for articulating the relationship between the variables. The Fixed Effect Model is more applicable than the random model in cases where the company effects and time effects are unobservable. At the same time, the random effects model is more suitable where the unobserved individual heterogeneity is uncorrelated with the explanatory variable (Songwathana, 2018:1070). To determine if the model matched the fixed effects or random effects regression model, the Hausmann test was utilised. In addition, the Breusch – Pagan Langrage Multiplier test was used to choose between the random Effects Model and the Ordinary Least Squares (OLS) model.

3.6 PANEL DATA ANALYTICAL AND DIAGNOSTIC TECHNIQUES

3.6.1 Panel data analytical models

To analyse the collected data, panel data analytical models, that is the pooled regression, the fixed effects and the random effects models were considered.

3.6.1.1 Pooled regression model

Whether the data are cross-sectional or time series, all observations in a pooled regression model are pooled, and the complete regression is projected. (Nwakuya & Ijomah, 2017:276). Because observations were pooled together for this study, it disguised the discrepancy between the study parameters.

3.6.1.2 Fixed effects model

According to Naylah, Nurfadillah and Cahyaningatri (2021:3), the Fixed Effect model can enlighten dynamisation between individuals (cross) or time series (series).

3.6.1.3 Random effects model

According to Baltagi (2021:171), the random Effects Model presumes the heterogeneity of all the regressors with the random specific consequences, which presumes no link between variables and the individual effects. The reasoning behind the random Effects Model is that the individual-specific outcome or disparity across objects is postulated to be a random variable that is not correlated with the predictor or explanatory variables, and the chief benefit of this method is that it facilitates the inclusion of non-time variant variables, such as sex, dissimilar to the fixed effect model, where the intercept engrosses all the time invariant variables (Nwakuya & Ijomah, 2017:277).

3.6.2 Diagnostic testing techniques

Diagnostic testing entails procedures used to verify the accuracy and dependability of the information gathered. Diagnostic testing methods are used to make sure that the data used in the study is accurate, dependable, and error-free. Furthermore, diagnostic testing approaches like as tests for normality, multicollinearity, and heteroscedasticity are utilized to validate the statistical models used in the study. These tests aid in ensuring the validity and dependability of the study's findings. Diagnostic testing is crucial in assuring the validity and correctness of the data utilized in research studies as well as the suitability of the statistical models employed.

3.6.2.1 Hausman Test

In this study, the Hausman test was used to determine which model between the fixed Effects and random effects models was the most appropriate. The null hypothesis in the Hausman test assumes that a random effect model is appropriate. In contrast, the alternative hypothesis infers that the fixed effects model is appropriate (Riaz & Riaz, 2018:98). The null hypothesis

was going to be accepted. The alternative hypothesis was going to be rejected in this study if the probability (p-value) was significant and vice-versa.

3.6.2.2 Breusch - Pagan Lagrange Multiplier (LM) test

The Breusch – Pagan Lagrange Multiplier (LM) test was used to decide between the random effects model and the OLS. The Breusch – Pagan Lagrange Multiplier test is the most appropriate instrument for measuring heterogeneity (Nwakuya & Ijomah, 2017:278). Purba and Bimantara (2020:153) state that the Lagrange Multiplier test is used to choose the best model between the OLS regression and the random effects model and that it is used only if the results of the fixed and random tests are inconsistent in the Chow or Hausmann tests. The Breusch – Pagan Lagrange Multiplier test was used to examine the following hypothesis:

H_o: the model follows the Ordinary Least Squares Model

H_1: the model follows the Random Effect Model

On the occasion that the Breusch – Pagan probability *p* was less than 0.05, the H_o was going to be rejected, and the H_1 was going to be accepted.

3.7 CONCLUSION

The methodology of the investigation was thoroughly detailed in Chapter Three. The study adopted a quantitative approach and a causal design to determine the relationship between cashflows and share prices of general mining firms registered on the JSE between 2015 and 2020. The research population was deliberated upon and described as consisting of the entire firms registered under the general mining industry on the JSE. Based on the modest number of general firms of general mining firms registered on the JSE during the investigation period, the researcher determined that the sample would include the entire sector of the general mining firms to achieve strong results. The study's data collection process was discussed, and the primary source of the data was revealed to be the Iress (SA) database. The data analysis models were also discussed in detail. In the subsequent chapter, Chapter Four, the study's results are discussed in detail.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

Chapter Four aims to give the findings of the analysis of the relationship between cashflows and share prices of JSE-listed general mining firms from 2015 to 2020. The analysis was carried out through the yearly balanced panel data technique, in which each cross-section and time had its set of variables. This research utilised time series data acquired from yearly publications of the JSE and published financial declarations of the twelve general mining firms registered on the JSE from 2015 to 2020.

The chapter begins with an overview of the study objectives in section 4.2, followed by a discussion of the results of the descriptive statistics performed in section 4.3. Section 4.4 discusses the results of the correlation analysis and section 4.4 explains the results of the Panel unit root test performed on the data. The results of the regression analysis are discussed in section 4.6, which is followed by section 4.7 which discusses the random effects model diagnostic test results. Section 4.8 discusses the results of the panel groupwise heteroscedasticity test results.

Using the SPSS software to analyse the data of the twelve general mining firms, the following procedure was applied. Firstly, the ADF unit root test was applied to check for stationarity of the cashflows and share prices data. Next, the data were fitted into the panel regression models, which included the pooled ordinary least square regression model, fixed effects model and random models to establish which of these panel regression models was the most suitable for describing the relationship between cashflows and share prices of general mining firms. Furthermore, the Hausman test was used to compare the fixed effects and random effects models to see which one was superior, and the findings revealed that the random effects model was the better fit for the data. Later, the Breusch-Pagan Lagrange Multiplier (LM) test was used to choose between a random effects regression and a conventional OLS regression. Again, the findings indicated that the random effect model was more applicable.

The random effects model was then subjected to diagnostic testing. Pesaran's test for cross-sectional independence was performed, and the findings validated the data set's cross-sectional independence. Next, the Wooldridge test used to examine for serial correlation in panel data revealed a first-order serial correlation. Afterwards, the random effect model was evaluated for heteroscedasticity, which revealed panel groupwise heteroscedasticity. The Random Effect model failed all the diagnostic tests, so the data were fitted using the Feasible Generalised Least Squares (FGLS) model, which had no heteroscedasticity or autocorrelation. Finally, the final FGLS model tests were carried out to check for heteroscedasticity and auto-correlation of the data.

4.2 RESEARCH OBJECTIVES

The fundamental purpose of the study was to measure the relationship between cashflows from operating, investment, and financing activities of general mining firms registered on the JSE from 2015 to 2020. The study also contained three sub-objectives that were developed from the main objective in addition to the main objective. The first sub-objective was to investigate the relationship between cashflows from operating activities and share prices of general mining firms listed on the JSE. The study's second sub-objective was to investigate the relationship between cashflows from activities and the share prices of general mining firms registered on the JSE. Finally, the other sub-goal of the study was to investigate the relationship between cashflows from financing activities and the share prices of general mining firms registered on the JSE from 2015 to 2020.

The descriptive statistics of the data are discussed below.

4.3 DESCRIPTIVE STATISTICS

The results of the measures of central tendency, dispersion, and relative dispersion of the independent and dependent variables are displayed in Table 4.2. A sum of 70 observations was utilised in the analysis, since one company (Kore Potash) had missing observations for 2015 and 2016 because it was yet to be registered on the JSE. The descriptive statistics depict the trend and patterns in the data set and are displayed in Table 4.1.

Table 4.1: Results of the descriptive statistics

Summary Statistics	*Operating activities*	*Investment activities*	*Financing activities*	*Operating, investment & Financing activities*	*Share Price Average*
Mean	- 919 245 979.87	-20 290 772.90	- 9 223.37	- 945 840 777.56	65.78
Median	9 223.37	- 9 223.37	- 2 842.15	-7.00	15.46
Maximum	177 049 620.00	40 879 090.00	189 859 680.00	149 741 312. 89	392.91
Minimum	- 633 694 000.00	-191 636 100.00	-126 932 590.00	-66 404 517 635.42	0.00
Standard Dev	7931642 331.46	43 197 048.81	39 094 851.71	793 727 1214.77	102.91
Skewness	-8.19	- 2.15	0.79	- 8.19	1.76
Jarque – Bera	68.01	7.30	12.75	68.01	4.95
Probability	p < 0.001	p < 0.001	p < 0.001	p < 0.001	p< 0.001

Source: Researcher's own compilation, 2022.

Table 4.1 indicates that cashflows from operating activities ranged from – R66 330 694 000 to R177 049 620. The average cashflow from operating activities was – R919 245 979.87, with a standard deviation of R7 931 642 331.46. The median cashflow was R9 223.37, indicating that at most 50% of the data had cashflow from operating activities not more than R9 223.37. Using the empirical rule, about 68.26% of the cashflow from operating activities ranged from –R8 850 888 311 to R 7 012 396 352(± 1 standard deviation from the mean). Results from the Jarque-Bera test gave a p-value below 0.001, which is evidence that the data were not normally distributed.

Cashflows from investment activities had a mean of – R20 292 772.90, with a median of – R9 223.37. Thus, half of the observations had a cashflow from investment activities of – R9 223.37. The mean spread around the mean (standard deviation) was R43 197 048.81, with the lowest value of -R191 636 100.00 and the highest value of R40 879 090.00. About 68:26% of the observations had cashflow from investment activities that ranged from – R63 489 821.71 to R22 904 275.91. The Jarque-Bera test for normality yielded a test statistic of 108.03, with a p-value of less than 0.001. Because the p-value was less than 0.05, the data were not skewed.

The cashflows from financing activities ranged from – R126 932 590.00 to R189 859 680.00. The average cashflow from financing activities was – R9 223.37, with a standard deviation

of R39 094 851.71. Half of the observations had a cashflow from financing activities of not more than - R2 842.15. About 68.26% of the cashflow from financing activities ranged from - R39 104 075.08 to R39085628.34. The Jarque-Bera test for normality revealed a p-value of below 0.001, and since the p-value was below 0.05, the data suggested that it was not normally distributed.

Cashflows from operating, investments, and financing (combined) activities ranged from –R66 404 517 635.42 to R149 741 312.89, with an average and median of –R945 840 777.56 and – R7, respectively. Thus, about half of the observations had cashflow from operating investments and financing activities of – R7. The standard deviation was R7 937 271 214.77. Using the empirical rule, about 68.26% of the cashflows from operating, investments and financing activities varied from –R8 883 111 992 to R6 991 430 437. Results from the Jarque-Bera test for normality resulted in a test statistic of 13 109.24, with a p-value below 0.001, thus showing that the data were not normally distributed.

The mean and median share price was R65.78 and R15.46, respectively. On average, the share price was R65.78, and in half of the observations, the share price was at most R15.46. The lowest share price average was recorded as R0, and the highest was R392.91. The standard deviation, the mean spread around the mean share price, was 102.91, giving a coefficient of variation of 146.45%, thus indicating that there was much variability in share price as supported by it being far away from 0% (no variability). About 68:26% of the share price ranged from –R37.13 to R168.69. The Jarque-Bera test for normality resulted in a test statistic of 47.17, with a p-value below 0.001, thus demonstrating that the data were not normally distributed.

The next analysis done was the correlation test to determine the relationship between the cashflows and the share prices. The results of the correlation analysis are discussed in section 4.4.

4.4 CORRELATION ANALYSIS

The Pearson correlation coefficient was utilised to establish how the share price, the dependent variable, was related to the cashflows. As explained in the study's Research

Methodology in Chapter 3, the guidelines proposed by Salkind (2018:169) were used to interpret the correlation between cashflows and share prices of the 12 general mining firms.

The findings of the cashflows and share prices analysis findings are shown in the following table, Table 4.2.

Table 4.2: Results of the Correlation analysis

	P < 0.01	**P < 0.02**	**P < 0.03**	**P < 0.04**	**P < 0.05**
Variable	-				
1. Share price					
2. Cashflows from operating activities	- 0.088	-			
3. Cashflows from investment activities	- 0.523	- 0.061	-		
4. Cashflows from financing activities	- 0.217	0.207	- 0.217	-	
5. Cashflows from operating, investments, and financing activities	0.092	1.000	- 0.057	0.211	-

Source: Researchers own compilation, 2022.

The correlation analysis results are presented in section 4.3, showing how the share prices were related to cashflows from investment, operating and financing activities. The independent variable, cashflows from investment ventures, was negatively correlated, as illustrated in Table 4.3, with the share price at a 5 % significance level. However, according to Salkind (2018:169), the correlation is moderate. Thus, high values in cashflows from investment activities are related to low values in share price.

All the other variables had weak non-significant correlations with the share price average. However, the variable cashflows from operating activities had a robust correlation with cashflows from operating investments and financing activities, thus indicating multicollinearity. Besides being utilised for establishing the relationship between the share price and the explanatory variables, correlation analysis was applied to determine and check for multicollinearity in the data. Following correlation analysis, panel unit root tests were

performed to check for the stationarity of the data, and the results are discussed in the following section 4.5.

4.5 PANEL UNIT ROOT TEST RESULTS

Panel unit root tests were done using the ADF test to check for stationarity in the data. The models were done using the following three models: no intercept and no trend, intercept only and trend and intercept, with equations shown below.

Equation 1: $\Delta Y_t = Zy_{t-1} + a_i + e_t$ (No trend no intercept)
Equation 2: $\Delta Y_t = b_1 + Zy_{t-1} + a_i + e_t$ (Intercept only)
Equation 3: $\Delta Y_t = b_1 + +b2_t + Zy_{t-1} + a_i + e_t$ (Trend and intercept)

The hypotheses of the ADF unit root test for stationarity were as follows:

H_0: *the series is not stationary*

H_1: *the series is stationary*

Table 4.3 shows the outcomes of the unit root tests from the SPSS software. The null hypothesis that the series had a unit root (was not stationary) was rejected because the entire p-values for all variables were above 0.05 significance level.

Table 4.3: Results of the ADF unit root test

Variable	No Trend	Intercept	Trend and Intercept
Share price average	-0.6425	-5.5747	-9.1867
Cashflow from Operating Activities	-4.40	-5.5886	-7.3487
Cashflow from Investment Activities	-2.6826	-6.3057	-5.1323
Cashflow from Financing Activities	-6.9619	-7.1071	-7.1071

Source: Researcher's own compilation, 2022.

After establishing that the data of the cashflows and share prices were stationary, the next step was to perform a regression analysis. Results of the regression analysis are discussed in section 4.5.

4.6 REGRESSION ANALYSIS RESULTS

The pooled OLS regression, fixed effects model and random effects model were all examined to see which of the three models best described the data. The pooled OLS regression model did not consider the data's cross-section and time series characteristics. The pooling minimised the heterogeneity or uniqueness that might have existed across the general mining firms based on the obtained outcomes. The fixed effect model acknowledged heterogeneity or distinctiveness among the mining firms by permitting each firm to have its unique intercept value. The fixed effect arose from the fact that, while the intercept varied between mining firms, the intercept was unaffected by changes in time. One drawback of the random effect model was that it presumed that the mining firms had a shared mean value for the intercept.

The Hausman test was used to determine if the model was Fixed Effects (FE) or Random Effects (RE) because the data were of a panel nature.

4.6.1 Hausman test

For the Hausman test, the null hypothesis presumed that the ideal model for the data was random effects, whereas the alternative presumed that the ideal model is fixed effects. The Hausman test was used to determine if the characteristic errors were related to the regressors. The results of the Hausman test for the data are presented in Table 4.4 below.

Table 4.4: Results of the Hausman test

H_0 : ε_{it} is not correlated with X_i (Random Effects Model is suitable) H_1: ε_{it} is correlated with X_i (Fixed Effects Model is suitable)	
Test summary	**Model**
Chi-square statistic (χ^2)	3.13
Chi-square degrees of freedom	3
Probability (p-value)	p = 0.372
Decision	Do not reject H_0

Source: Researcher's own compilation, 2022.

The computed chi-square test gave a *p*-value of 0.373, concluding that the random effects model was more suitable for the data. The next step was to select the more suitable model between the random effects and the OLS model and for this, the Breusch and Pagan Lagrange Multiplier test was performed, and the results of the test are discussed in section 4.5.2.

4.6.2 Breusch and Pagan Lagrange multiplier test for random effects

The Breusch and Pagan Lagrange Multiplier test was performed to select between the random effects and the OLS models. The null hypothesis of the Breusch and Pagan Lagrange Multiplier test stated that differences in variables within the general mining firms were zero and that the pooled regression model was appropriate, whereas the alternative hypothesis stated that the random effects model was better suited to characterize the data.

Table 4.5: Results of the Breusch and Pagan Lagrange multiplier test

H_0: Pooled regression model is suitable H_1: Random Effects Model is suitable	
Test summary	**Model**
Chi-square statistic (χ^2)	249.57
Chi-square degrees of freedom	1
Probability (p-value)	$p < 0.001$
Decision	Reject H_0

Source: Researcher's own compilation, 2022

Table 4.5 indicates that the chi-square value of the test was 249.5, with a p-value of less than 0.001. The null hypothesis that the pooled regression model was suitable was rejected since the computed p-value was less than 0.05. The alternative hypothesis that the random effects model was the most fitting model for representing the data was accepted.

Following the determination that the random effects model was the best-suited model for the data, it was decided to perform some diagnostic tests for the model to obtain more robust results regarding the relationship between the cashflows and share prices. Two diagnostic tests, the Pesaran's test for cross–sectional dependence and the Wooldridge test for autocorrelation were done and the results are discussed in section 4.7.

4.7 DIAGNOSTIC TESTS FOR RANDOM EFFECTS MODEL

The initial results showed that the random effects model was suitable for the data and before the interpretation of the model could be made, some diagnostic tests, the Pesaran's test for cross-sectional independence and the Wooldridge test for autocorrelation were done to find out if there was no cross-sectional independence, serial autocorrelation, and heteroscedasticity in the data.

4.7.1 Pesaran's test of cross-sectional independence

To examine if the data residuals were related through the general mining firms, Pesaran's test for cross-sectional dependence was performed. The main disadvantage of cross-sectional dependence is that it can distort test results. The null hypothesis for Pesaran's test stated that the residuals were correlated with the general mining firms. In contrast, the alternative hypothesis stated that the residuals were unrelated across the general mining firms. Table 4.6. presents the results of the Pesaran's test for cross sectional independence.

Table 4.6: Results of the Pesaran's test for cross – sectional independence

H_0: No cross-sectional independence H_1: Cross-sectional independence	
Test summary	**Model**
Statistic	2.913
Probability (p - value)	p = 0.0036
Decision	Reject H_0

Source: Researcher's own compilation, 2022.

Table 4.6 indicates that Pesaran's test of cross-sectional independence resulted in a p-value of 0.0036, indicating that there was cross-sectional independence through the data of the general mining firms.

The next diagnostic test is the Wooldridge test performed to determine autocorrelation in the data. The results of the Wooldridge test are discussed in section 4.6.2 below.

4.7.2 Wooldridge test for autocorrelation in panel data

Data were further tested for serial correlation using the Wooldridge test to determine autocorrelation in the panel data. The null hypothesis of the Wooldridge test assumed no correlation in the data, but the alternative hypothesis suggested that there was autocorrelation. The test statistic used was F test with 1 and 11 degrees of freedom which gave a value of 43.474. The results of the Wooldridge tests are displayed in Table 4.7.

Table 4.7: Results of the Wooldridge test

H_0: No first order autocorrelation H_1: First order autocorrelation	
Test summary	**Model**
Statistic F(1, 11)	43.474
Probability (p-value)	$p < 0.001$
Decision	Reject H_0

Source: Researcher's own compilation, 2022.

Table 4.7 indicates that the null hypothesis was rejected since the p-value of the F test was less than 0.001 implying that the data possessed first-order autocorrelation.

The next step was to test for heteroscedasticity in the data which is an important step in panel data models since cross–sectional units may vary in size. Feng, Li, Tong, and Luo (2020: 91) explain that heteroscedasticity can result in an effective least square estimates and unpredictable covariance matrix estimates, when the error terms in the panel regression model are improperly specified as homoscedasticity. The Wald test for groupwise heteroscedasticity was performed to determine if the data was heteroscedastic and the results are discussed in section 4.8.

4.8 PANEL GROUPWISE HETEROSCEDASTICITY TESTS

4.8.1 Wald Test

Additionally, to get robust results, the Wald tests for panel groupwise heteroscedasticity were done, and the results are displayed in Table 4.8. The null hypothesis was rejected because the computed p-value was less than 0.05. In contrast, the alternative hypothesis was accepted, thus demonstrating the presence of panel group-wise heteroscedasticity in the data.

Table 4.8: Results of the Wald test

H_0: Panel data is of homoscedasticity nature H_1: Panel data is of heteroscedasticity nature	
Test summary	**Model**
Chi-square statistic (χ^2)	12 700 000
Chi-square degrees of freedom	12
Probability (p-value)	$p < 0.001$
Decision	Reject H_0

Coefficients: Feasible Generalised Least Squares	
Panels: Homoscedasticity	
Correlation: no autocorrelation	
Test summary	**Model**
Estimated covariance	1
Estimated autocorrelation	0
Estimated coefficients	4

Source: Researcher's own compilation, 2022.

Since all the diagnostic tests failed, the best solution was to fit the data into a FGLS model. Results of the FGLS model are discussed in section 4.7.2.

4.8.2 FGLS model results

The data was fitted into the cross-sectional time series FGLS regression model and the diagnostic tests showed that the model was homoscedastic and there was no autocorrelation. The outcomes of the test are presented in Table 4.9. The Wald Chi-square value for the model was 455.00, with a p-value of less than 0.001, hence showing that independent factors contributed significantly to the share price. Table 4.9 displays the findings of the FGLS model.

Table 4.9: Results of the FGLS Regression model

Explanatory Variable	**Coefficients**	**Standard Error**	**Z**	**P >|z|**
Cashflows from Operating Activities	$-7.16e-^{10}$	$1.24e^{-09}$	-0.58	0.563
Cashflows from Investment Activities	$-1.43e^{-06}$	$2.28e^{-07}$	-6.28	0.001
Cashflows from Financing Activities	$-8.82e^{-07}$	$2.57e^{-07}$	-3.44	0.001
Constant	**30.5788**	**10.89007**	**2.81**	**0.005**

Source: Researcher's own compilation, 2022,

As shown in Table 4.9, the explanatory variables cashflows from investment activities and cashflows from financing activities were statistically significant at the 1% significance level in the regression results. To test whether the variables were statistically significant, a check was done on the p-value. If the p-value was more than 0.05, the variables were assumed not to be significant. On the other hand, if the p-value was less than 0.05, the variables were concluded to be significant.

4.8.2.1 To determine the relationship between cashflows from operating activities and share prices of general mining firms listed on the JSE from 2015 to 2020.

Table 4.9 shows that cashflows from operating activities had a statistically weak relationship at 1% significance level with the share prices of general mining firms listed on the JSE between 2015 and 2020. This is consistent with research undertaken by Bala (2017), who found that there was insufficient information to draw any conclusions about a relationship between cashflows from operational, financing, and financing operations and the returns on equity for financial institutions between 2010 and 2015. This implies that cashflows generated from operating activities had no impact on the share prices of general mining firms.

4.8.2.2 To determine the relationship between cashflows from investing activities and share prices of general mining firms listed on the JSE from 2015 to 2020.

According to results illustrated in Table 4.9 from the period between 2015 and 2020, the p-value is 0.01, which is less than 0.05, and this entails that there is a statistically significant relationship between cashflows from investment activities and share prices of general mining firms listed on JSE. This is consistent with the results of Mundia (2016), who examined the

relationship between free cash flow and share prices of non-financial enterprises listed on the Nairobi Stock Exchange (NSE) in Kenya and concluded that free cash flow had a significant impact on the share price. Furthermore, the results imply that the null hypothesis on hypothesis 2, which says there is no significant relationship between cashflows from investments and share prices of general mining firms listed on JSE, must be rejected.

4.8.2.3 To determine the relationship between financing activities and share prices of general mining firms listed on the JSE from 2015 to 2020.

Table 4.9 indicates a statistically significant relationship at 1% significance level between cashflows from financing activities and prices of shares of general mining firms listed on the JSE from 2015 to 2020. This is consistent with the results of Ghasemi and Noorifard's (2015) study, which examined 130 companies listed on the Tehran Stock Exchange between 2009 and 2013. They found that there was a correlation between a company's free cash flow and the level of its yearly share profit, and that companies in the same industry that had higher cashflows had higher rates of annual share returns.

4.9 CONCLUSION

Chapter Four presented the results of the statistical analysis of the relationship between cashflows and share prices of general mining firms registered on the JSE between 2015 and 2020. The SPSS version 25 was used for statistical analysis. The study adopted the panel data analysis technique to obtain robust results, which involved the computation of the entire variables per individual cross-section and period. The study's data came from the twelve general mining firms' annual financial reports published on the Iress (SA) website.

The results point to a significant link at 1% significance level between share prices of general mining firms listed on the JSE from 2015 to 2020 and cashflows from financing and investment operations. While cashflows from operational activities had a weak correlation with share prices, cashflows from investing activities had a statistically significant relationship. Also, at a 1% level of significance, the results show a statistically significant association between share prices and cashflows from financing activities within the same time period. To maximize profits and achieve superior financial performance in the mining

industry, investors and businesses should pay particular attention to their financing and investment activities. To make wise investment choices and raise shareholder value, it is essential to maintain track of the cashflows from diverse activities. In the next chapter, Chapter Five, a summary of earlier chapters, the study's main findings, conclusions and suggestions for future related research will be discussed.

CHAPTER FIVE

FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter provided and examined the study findings on the relationship between cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020. The results obtained demonstrate the existence of a varying nature of relationships between individual cashflows and the share prices of these firms. In addition, the results revealed that cashflows from investment activities and cashflows from financing activities were statistically significant variables at 1% significance level of the general mining companies listed on the JSE from 2015 to 2020. Conversely, the findings demonstrate that throughout the same time period, there was no significant correlation between cashflows from operating activities and the share prices of any mining corporations.

From the outset, this study aimed to measure associations between cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020. The secondary objectives which were espoused by the study to obtain robust results, were to ascertain the extent of the relationship between cashflows from operating activities and share prices of general firms listed on the JSE, to determine the existence of the relationship between cashflows from investing activities and share prices of general mining firms listed on the JSE and to determine the existence of the relationship between cashflows from financing activities and share prices of general mining firms listed on the JSE from 2015 to 2020.

This chapter is divided into nine sections. Firstly, section 5.2 summarises the key ideas of the previous chapters. Then, the conclusion of both the study's primary and secondary objectives is elaborated in section 5.3. A conclusion of the study is given in section 5.4. Subsequently, section 5.5 provides a recommendation based on the study findings, and section 5.6 explains the study constraints, including the associated mitigations done to minimise the constraints. Section 5.7 provides the study's validity and reliability issues and

how they were addressed. Finally, the study's contribution to the body of knowledge is discussed in section 5.8, and section 5.9 provides suggestions for future study and section 5.9 concludes the chapter.

5.2 SYNOPSIS OF EARLIER CHAPTERS

Chapter One introduced the study's seminal theories and frameworks underpinning this study. The introduction of this chapter explained how previous studies had given considerable attention to the relationship involving a firm's cashflows and the prices of shares since the seminal work by Jensen (1986). This chapter briefly explained the Free Cash Flow Hypothesis by Jensen (1986), which argues that firm executives are inclined to waste excess cash on unprofitable projects or use the excess cash for their benefits when they have excess cash. Because of this, the theory by Jensen (1986) contends that the availability of cashflows may increase agency costs. However, other schools of thought argue that some excess can boost profitability in some cases (Nguyen & Nguyen, 2018:211). Among other things, the share prices of a firm are part of a firm's performance, and the available studies indicate a relationship between cashflows and share prices. Based on the available studies and theoretical frameworks, this study anticipated the existence of a relationship involving cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020.

The next part of the discussion provided a general overview of the JSE. A detailed explanation was given regarding its brief history, leading role players, and how the JSE ranks among other stock exchanges in the world. It was mentioned that the JSE traces its origins to the first Witwatersrand Gold Rush of the 1800s and is now rated the 19th biggest bourse globally.

In the following section, an explanation was given regarding the critical economic role of the South African mining industry. It was reported that the mining industry employed 500 000 people directly and another 800 000 indirectly in 2018. As a result, R356 billion was contributed to South Africa's GDP in 2018. In addition, this industry helps other firms like transportation, consultation, and financial services and is a pivotal contributor to the South African economy.

The chapter further elaborated on the JSE sector classification. It was clarified that the JSE employs the Industry Classification Benchmark classification to categorise the entire firms listed on the JSE according to industry, super sector, sector and sub-sector. It was explained that the general mining firms that are the focus of this study fall under the FTSE/JSE General Mining Index (J154). A list of twelve general mining firms whose financial statements stretching from 2015 to 2020 is available on the Iress (SA) website was chosen for the study to form the basis of this study, which sought to probe the relationship between their cashflows and share prices during that period.

This study problem was provided and explained that although studies have been done around the world regarding the relationship between cashflows and share prices, in South Africa, arguably, a comparative study is yet to be conducted, which creates a gap. Also, previous studies in other countries have provided contrasting results, thus making it worthwhile to carry out such a study in the South African context. As a result, it was indicated in this chapter that the study's goal was to examine the relationship between cashflows and share prices of general mining corporations listed on the JSE from 2015 to 2020.

Furthermore, the study's hypotheses, including the null and alternative hypotheses, were discussed. Three hypotheses were generated to assist in investigating the relationship between cashflows and share prices of general mining firms listed on the JSE. The chapter also discussed the objectives of the study. A primary objective was discussed, and three sub-objectives were also explained to gain more robust results. It was expounded that the study's primary aim was to explore the relationship between cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020.

The study methodology of the chapter was also briefly discussed, comprising the study's adopted techniques and procedures in terms of the study design, study population, sampling, collection, data analysis and hypothesis testing. Given the small population size, the study decided to sample all population members, that is, all the twelve general mining firms. Finally, the chapter concluded by giving a layout for the thesis framework, thus indicating that the thesis consisted of 5 chapters, with each chapter beginning with an introduction and with a conclusion.

Chapter Two focused on the review of the literature connected to the study, with a significant emphasis on the theoretical frameworks, sub-theories and previous empirical studies regarding the relationship between cashflows and share prices. Initially, the main theories of the study were discussed in detail, starting with the Agency Theory (Jensen & Meckling,1976), which explains that challenges associated with agency costs result from a situation where managers act in their interests instead of shareholders' interests because of the segregation of control and ownership in firms. It was elucidated that this Agency Theory is grounded on the requirement that executives need to be motivated to pursue their interests, the presence of free cash flow and the absence of governance control measures to monitor and control these managers. The next theory discussed was the Free Cash Flow Hypothesis (Jensen, 1986), which explains that free cash flow refers to the surplus cash available once the entire shareholders have been paid and that the availability of free cash flow facilitates executives to explore prospects that may result in an improvement in the shareholder value. Such additional investments may lead to both the shareholder value and the value of the firm (Jensen, 1986).

Several sub-theories linked to the relationship involving cashflows and share prices were delineated. These included the Financial Leverage Theory, which explains that financial leverage appertains to using debt in a business's capital composition. Following Jensen and Meckling's (1976) findings, leverage plays a significant part in diminishing agency costs. The Dividend Policy was also explained, and it was clarified that the aim of giving dividends to shareholders is to reduce excess cashflows, which may result in managers engaging in activities that may not be in the interest of shareholders (Jensen, 1986). The last sub-theory discussed was the Efficient Market Hypothesis by (Fama, Fisher, Jensen & Roll, 1986) which argues that whenever new evidence is available to market users, their assumptions will be updated immediately. Therefore, they will react immediately, and a share price at time *t* fully reflects all the available information at time $t - 1$.

Regarding the empirical studies, it was explained that the relationship between cashflows and share prices had been the focus of previous studies in several countries, but the findings were inconclusive. Therefore, based on these previous studies, there has yet to be a consensus on whether there is a relationship between cashflows and share prices. The conflicting results provided unclear evidence, and debatably no known studies to the researcher had been performed in South Africa in this sector. This gap inspired the objectives of this study.

Chapter Three focused on laying out the study's study methodology. The study adopted a quantitative approach regarding the exploration of the relationship between cashflows and share prices of general mining firms listed on JSE from 2015 to 2020. It was explained that since the population size was small, the sample would consist of all members of that population, that is, all general mining firms listed on the JSE. For data collection, it was revealed that the secondary data concerning cashflows and share prices of the general mining firms would be collected from the Iress (SA) website and would cover the period from 2015 to 2020. A summary of previous studies and statistical models used to establish relationships between variables was provided. Finally, a detailed explanation regarding the study's inferential statistics was provided.

The study employed the panel data regression analysis technique to obtain robust results and measure the association between the cashflows and share prices of the twelve general mining firms listed on the JSE. The core benefit of panel data analysis is its capability to take into consideration heterogeneity on an individual basis. Various panel data analytical models were discussed in this chapter. The validity and reliability concerns related to the study's methodology were also discussed. Chapter Three ended by analysing the ethical considerations of the study.

Chapter Four outlined the observed outcomes and evaluations of the relationship between cashflows and share prices of general mining firms listed on the JSE for 2015 – 2020. The study used statistical techniques, namely correlation analysis, descriptive analysis and regression analysis, which were performed using the SPSS version 25 statistical package to apprehend the study question and study purposes. The results obtained from the statistical analyses are presented in Chapter Four. In addition, to check for stationarity of the study variables' data, the ADF unit root test was applied. To ensure the study achieved vigorous results, the following tests were also used: the Hausman test to establish the best panel data regression model, the Breusch – Pagan Lagrange Multiplier test to determine between the OLS model and the random effects regression model, the Pesaran's test to check for cross-sectional independence and the Wooldridge test to test for correlation in the panel data. The Wooldridge test results revealed a first-order correlation between cashflows and prices of shares of general mining firms listed on the JSE from 2015 to 2020, and the random effect model failed all the diagnostic tests, therefore, the FGLS model was fitted into the data, and

the results were interpreted. The findings showed a strong connection involving cashflows obtained from investing and financing activities and share prices of general mining firms listed on the JSE from 2015 to 2020. However, the findings revealed that there was no relationship between cashflows from operating activities and share prices of general mining firms listed on the JSE from 2015 to 2020. Therefore, these findings answered the study's question, "What is the nature of the connection regarding cashflows and share prices of the general mining firms listed on the JSE from 2015 to 2020?' The study outcomes revealed that the relationship between cashflows and share prices of the general mining firms listed on the JSE varies according to the type of cashflows.

Chapter Five's goal was to bring the study to a close by presenting a discussion based on the study's findings. The chapter initially discussed the study's objectives, a recap of all the previous chapters, a conclusion of study objectives and both recommendations and limitations of the study.

Table 4.1 in Chapter Four provides results of the study's variables' calculated measures of central tendency, dispersion and relative dispersion, and these results showed that data were normally distributed. Table 4.2 displays the findings of the correlation analysis between the cashflows and the share prices, thus showing an inverse relationship between the cashflows from investing activities and share prices. The results also showed that cashflows from operating had a weak and non-significant relationship with the share prices. Table 4.3 shows the findings of the ADF test done to determine the stationarity of the cashflows and the share prices data. The panel unit root test outcomes of the ADF test indicated that all the variables were integrated. That is, they are stationary at a level at first difference. The Hausman test was used to conclude which model was better between the random effects and fixed effects models. The findings in Table 4.4 suggest that the random effects model was the most suitable model for analysing the data. Finally, the Breusch and Pagan Lagrange Multiplier test was used to select between the random effects model and the Ordinary Least Squares model. The findings provided in Table 4.5 indicated that the Random Effects model was the preferable option. The random effects model was selected as the more suitable panel data analysis model to analyse the relationship between the cashflows and share prices of the general mining firms listed on the JSE from 2015 to 2020 reached from the results of both the Hausman and the Breusch Pagan Lagrange Multiplier tests.

Nevertheless, before the interpretation of the random effects model could be construed, diagnostic tests were done to ascertain cross-sectional dependence, serial autocorrelation, and heteroscedasticity. The results of Pesaran's diagnostic test to check for cross-sectional dependence are displayed in Table 4.6, and they confirmed that there was no cross-sectional reliance between the variables. Then, data were tested for autocorrelation using the Wooldridge test, and the findings in Table 4.7 demonstrate that the data has auto-correlation tendencies. Finally, the Wald test for panel groupwise was also done to test for heteroscedasticity in the data, and the findings in Table 4.8 show the presence of panel groupwise heteroscedasticity.

Because the data failed all diagnostic tests, it was decided to fit it into the FGLS model. Table 4.9 shows that the model had no autocorrelation and displayed heteroscedasticity. Results displayed in Table 4.9 demonstrate that the cashflows from investing and financing activities had a substantially significant relationship with the share prices of the general mining firms listed on the JSE from 2015 to 2020. However, the results show that the cashflows from operating activities had a weak relationship with share prices throughout the same era.

5.3 CONCLUSION OF THE STUDY

As explained earlier, the study's preliminary determination was to investigate the relationship between cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020. The results of this study revealed a statistically significant relationship at 1% significance level of the association between cashflows generated from investing and financing activities and share prices but a weak relationship between cashflows from operating activities and share prices, thus implying that the relationship between cashflows and share prices is dependent on the type of the cashflows. This is most likely because a mining firm can boost its performance through financing activities by making acquisitions during periods when mineral prices are low. Mining firms can also boost their share prices through investment activities such as investment in development projects. These findings support the findings of Wang (2010) and Gregory (2005), who found that cashflows and agency costs had distinct connections. This study’s findings are inconsistent with Jensen's (1986) Free Cash Flow Hypothesis, which claims that surplus cashflows waste firm resources. Furthermore, a study by Nguen and Nguen (2018) found the existence of a positive

relationship between free cash flow and a firm's profitability, thus indicating lack of evidence supporting the Free Cash Flow Hypothesis.

5.4 POLICY RECOMMENDATIONS

According to the study's results, significant implications arise for both mining executives and investors in the mining industry. It is recommended that mining executives should focus more on cashflows from investing and financing activities since these cashflows have a significant impact at 1% significance level on the associated share prices of the firms. Despite the high volatility of mining shares caused by unstable mining commodity prices, investing in mining shares can be profitable in the long term. Potential investors are advised to invest in mining firms with healthy cashflows from investing and financing activities since these cashflows provide a good indication of the performance of the company's shares.

5.5 STUDY CONSTRAINTS

The conclusions drawn from the results of this study should be interpreted within certain limitations. Firstly, it should be acknowledged that this research was confined to examining only the twelve general mining firms that were listed on the JSE during the period of 2015 to 2020. Therefore, it is challenging to generalise the study findings to other mining sectors or industries. Moreover, the temporal scope of the study was restricted to a period of six years. It can be argued that more reliable results could have been obtained if the study had covered a longer time horizon.

The study used secondary data, which is also a significant constraint since the accuracy of secondary data cannot be verified. Data used for this study were obtained from the Iress (SA) website. However, the researcher mitigated the constraints associated with the use of secondary data by investigating several issues, like the purpose in which the original purpose for which the data were collected and the type of questions that were asked in gathering the data. The reason this data was used is that questions asked when data were collected were linked to the relationship between cashflows and share prices.

The other constraint faced by the researcher was the lack of previous studies regarding the relationship between share prices and cashflows in the South African context, which forced

the study to rely on studies done in other countries regarding the relationship between cashflows and the prices of shares.

5.6 VALIDITY AND RELIABILITY

To maximise the validity of the results of the study, panel regression models were applied to analyse data from the twelve general mining firms listed on the JSE from 2015 and 2020. To determine which model best reflected the relationship between cashflows and share prices, the panel regression models, that is, the pooled ordinary least square regression model, fixed effects model, and random models, were fitted to the data. The Hausman test was used to decide which model between the fixed Effects and the random effects model was better suited for the data and the obtained results revealed that the random effects model was the most applicable option. The Breusch - Pagan Lagrange multiplier test was performed to decide between the random effects and the OLS regression models, and from the results, it was revealed that the random effects model was the most applicable.

5.7 CONTRIBUTION TO THE BODY OF KNOWLEDGE

Cashflows analysis is primarily used to evaluate a firm's solvency, liquidity, and investment prospects. It is rarely used to forecast future stock returns. Because it directly tackles the question of whether accounting data offer investors valuable and relevant information, examining the relationship between cashflows and returns is a worthy endeavour. This study includes a comparison of accruals and cashflows. Whether cash is collected or paid, the accrual method of accounting records income and costs at the time they are generated or incurred. As these transactions involve looking forward, there are frequently later modifications made to the sums, as well as tax implications and write-offs. On the other hand, the cashflows data give a sense of how a firm derives value from its operations. According to the pertinent accounting regulations, the International Financial Reporting Standards, South African firms are obligated to disclose business operations and submit to an audit as required by the IFRS. The manager's judgment and the firm's specifics will determine how to calculate "Cashflows from Operating Activities," nevertheless.

Either the direct or indirect technique can be used to compute the amount. Most organisations use the indirect technique because it calculates cashflows by comparing changes in asset and

liability accounts to earnings. The essential firm operations and their contribution to cashflows are more clearly outlined in the direct approach. In financial literature, the share price is believed to be related to cashflows. Following the foundational work by Jensen and Meckling (1976), several investigations have been performed to explore the relationship between cashflows and share prices. However, to the researcher's knowledge, no such study has been performed in the South African setting, thus highlighting the need for such a study. This refers to the gap within the financial-related literature this study proposes to fill. Therefore, this study aimed to offer fresh perspectives on this subject for a rising economy with a very complex financial system.

This study aims to shed light on the variables influencing share returns and examine if cashflows offers further insight into share price behaviour beyond profitability metrics. It makes theoretical and practical sense to consider using cashflows to forecast future share performance. Additionally, it adds to the body of study on anomalies or their absence, thus supporting semi-strong form efficiency. By providing an empirical analysis of the relationship between cashflows and prices of shares of the general mining firms listed on the JSE in South Africa from 2015 and 2020, this study contributes to previous studies regarding the topic.

Additionally, the study's outcomes can be utilised by mining investors, since it provides information regarding the interdependence between cashflows and share prices. This study sought to clarify the relationship between a listed firm's cashflows and share price to evaluate the benefit of employing cashflows information in the fundamental investment process, given the surprising paucity of literature on the subject. Exploiting mispriced assets from a cashflows standpoint gives a benefit if markets overvalue profits and bottom-line data. Asset allocation, risk management and active portfolio management are all impacted by the occurrence of such an abnormality.

5.8 SUGGESTIONS FOR FUTURE STUDY

Since this study focused only on firms under the general mining classification on the JSE, this class represents just a tiny portion of the total number of firms listed on the JSE.

Therefore, a similar study should be conducted in other areas of the JSE, such as the financial or manufacturing sectors.

This study utilised secondary data, and it is suggested that a future similar study use primary data to maximise the robustness of the achieved results. Furthermore, to attain better results, a similar study, including the entire mining industry, should be conducted, which would provide better results due to the vast number of enterprises in the mining industry. Furthermore, future studies in the area should be done using a more extended period than the six years observed in this study to ensure better results.

5.9 CONCLUSION

Chapter Five provided a synopsis of the study results. A review of each of the previous chapters was initially presented. The study's primary purpose and secondary objectives were then discussed. This study's primary goal was to explore the nature and presence of a relationship between cashflows and share prices of general mining firms listed on the JSE from 2015 to 2020. Based on the study findings, each objective's conclusion was discussed. The study findings revealed that the nature and the incidence of a relationship between cashflows and share prices depended on the type of cashflows, as displayed in Table 4.10. The relationship between cashflows from investments and financing initiatives had a favourable and significant relationship with the share price, as displayed in Table 4.9. On the other hand, Table 4.9 shows that the cashflows generated from operating activities and share prices of general mining firms listed on the JSE from 2015 to 2020 were insignificant.

The constraints associated with the study, which could impact the results of the findings, were also discussed. One of the significant constraints related to this study is arguably the unavailability of previous studies regarding the topic in the South African or African setting. Most of the available studies of this nature were done in Asian countries.

Recommendations regarding future similar studies were considered. Since this study focused only on one sector of the JSE, which contains a few firms, it was recommended that future studies incorporate other sectors with more firms to ensure more robust results.

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APPENDIX A: ETHICS CERTIFICATE

UNISA university of south africa

UNISA DEPARTMENT OF FINANCE, RISK MANAGEMENT AND BANKING ETHICS REVIEW COMMITTEE

Date: 29 OCTOBER 2021

ERC Ref #2021/CEMS/FRMB/013
Name : Mr N Chimuchiti
Student #: 68989830
Staff #:

Dear Mr N Chimuchiti

Decision: Ethics Approval from 01 November 2021 to 31 October 2024

Researcher(s): Name Mr N Chimuchiti

E-mail address 46058117@mylife.unisa.ac.za, telephone 0718914868

Supervisor: Name: Prof D Makina

Email address: makind@unisa.ac.za, telephone 012 429 4832

Working title of research:

The relationship between cash flow and share prices of general mining firms listed on the Johannesburg Stock exchange

Qualification: Masters (Business Management)

Thank you for the application for research ethics clearance by the Unisa DFRB Ethics Review Committee for the above-mentioned research. Ethics approval is granted for the period 01 November 2021 to 30 October 2024

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

*The Negligible **risk application** was **reviewed** by the DFRB Ethics Review Committee 19 October 2021 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 DFRB Committee.
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 fieldwork activities may continue after the expiry date (2024). Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number 2021/CEMS/FRMB/013 *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Yours sincerely,

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane

Signature

Chair of DFRB ERC : Prof K Tsaurai
E-mail: tsaurk@unisa.ac.za
Tel: (012) 429-2140

Executive Dean : Prof T Mogale
E-mail: mogalemt@unisa.ac.za
Tel: (012) 429-4805

APPENDIX B: SPSS STATISTICAL OUTPUTS

		Operations	Investments	Financing	OIFA	Shareprice
N	Valid	70	70	70	70	70
	Missing	2	2	2	2	2
Mean		-919245979.865143100000000	-20290772.903428573000000	-9223.372036854777000	-945840777.557142900000000	65.7797
Std. Error of Mean		948012583.357884000000000	9223.372036854777000	9223.372036854777000	948685363.595120500000000	12.30057
Median		9223.372036854777000	-9223.372036854777000	-2842.145000000000000	-7.000000000000000	15.4600
Mode		-66330694000.000000000000000[a]	.000000000000000	.000000000000000	.000000000000000	.04
Std. Deviation		7931642331.468448000000000	43197048.810708700000000	39094851.713793900000000	7937271214.779827000000000	102.91399
Variance		6291095007434223000000.000	1865985025954749.800	1528407430523534.000	6300027433697243000000.000	10591.289
Skewness		-8.366	-2.199	.806	-8.366	1.798
Std. Error of Skewness		.287	.287	.287	.287	.287
Kurtosis		69.994	4.719	10.579	69.997	2.185
Std. Error of Kurtosis		.566	.566	.566	.566	.566
Range		66507743620.000000000000000	232515190.000000000000000	316792270.000000000000000	66554258948.310000000000000	392.91
Minimum		-66330694000.000000000000000	-191636100.000000000000000	-126932590.000000000000000	-66404517635.420000000000000	.00
Maximum		177049620.000000000000000	40879090.000000000000000	189859680.000000000000000	149741312.890000200000000	392.91

Sum		-64347218590.56001000000000	-1420354103.240000000000000	-441281735.350000000000	-66208854429.000000000000000	4604.58
Percentiles	25	468.750000000000	-17811412.500000000000	-9223.372036854777000	-9223.372036854777000	.9250
	50	9223.372036854777000	-9223.372036854777000	-2842.145000000000000	-7.000000000000000	15.4600
	75	23397655.000000000000	-1892.750000000000000	9223.372036854777000	9223.372036854777000	84.4675

a. Multiple modes exist. The smallest value is shown

	SHAREPRICE	OPERATIONS	INVESTMENT	FINANCING	OIFA
SHARE	1.000000	-0.088028	-0.523483	-0.216607	-0.091881
OPERAT	-0.088028	1.000000	-0.061094	0.207243	0.999979
INVES	-0.523483	-0.061094	1.000000	-0.216787	-0.056676
FINANC	-0.216607	0.207243	-0.216787	1.000000	0.210841
OIFA	-0.091881	0.999979	-0.056676	0.210841	1.000000

RESULTS OF THE AUGMENTED DICK FULLER (ADF) TEST

Null Hypothesis: FINANCING has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.107051	0.0000
Test critical values:	1% level	-3.531592	
	5% level	-2.905519	
	10% level	-2.590262	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINANCING)
Method: Least Squares
Date: 01/06/22 Time: 12:13
Sample (adjusted): 2 72
Included observations: 67 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FINANCING(-1)	-1.001084	0.140858	-7.107051	0.0000
C	-6821423.	4928192.	-1.384163	0.1710

R-squared 0.437279 Mean dependent var -3627360. Adjusted R-squared 0.428622 S.D. dependent var 53143452

S.E. of regression	40170904	Akaike info criterion	37.88458
Sum squared resid	1.05E+17	Schwarz criterion	37.95039
Log likelihood	-1267.133	Hannan-Quinn criter.	37.91062

F-statistic 50.51017 Durbin-Watson stat 1.836555 Prob(F-statistic) 0.000000

Null Hypothesis: FINANCING has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.976180	0.0000
Test critical values:	1% level	-4.100935	
	5% level	-3.478305	
	10% level	-3.166788	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINANCING)
Method: Least Squares
Date: 01/06/22 Time: 12:14
Sample (adjusted): 2 72
Included observations: 67 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FINANCING(-1)	-1.000985	0.143486	-6.976180	0.0000
C	-6864959.	10490430	-0.654402	0.5152
@TREND("1")	1170.521	248433.7	0.004712	0.9963

R-squared 0.437279 Mean dependent var -3627360. Adjusted R-squared 0.419694 S.D. dependent var 53143452

S.E. of regression	40483516	Akaike info criterion	37.91443
Sum squared resid	1.05E+17	Schwarz criterion	38.01315
Log likelihood	-1267.133	Hannan-Quinn criter.	37.95349

F-statistic 24.86657 Durbin-Watson stat 1.836700 Prob(F-statistic) 0.000000

Null Hypothesis: FINANCING has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.961893	0.0000
Test critical values: 1% level	-2.599934	
5% level	-1.945745	
10% level	-1.613633	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINANCING)
Method: Least Squares
Date: 01/06/22 Time: 12:14
Sample (adjusted): 2 72
Included observations: 67 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FINANCING(-1)	-0.983304	0.141241	-6.961893	0.0000

R-squared 0.420693 Mean dependent var -3627360. Adjusted R-squared 0.420693 S.D. dependent var 53143452			
S.E. of regression	40448678	Akaike info criterion	37.88378
Sum squared resid	1.08E+17	Schwarz criterion	37.91668
Log likelihood -1268.107 Hannan-Quinn criter. 37.89680 Durbin-Watson stat 1.808921			

Augmented Dickey-Fuller Unit Root Test on D(FINANCING)

Null Hypothesis: D(FINANCING) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.241037	0.0000
Test critical values:	1% level	-3.542097	
	5% level	-2.910019	
	10% level	-2.592645	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINANCING,2)
Method: Least Squares
Date: 01/06/22 Time: 12:16
Sample (adjusted): 4 72
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FINANCING(-1))	-1.813839	0.250494	-7.241037	0.0000
D(FINANCING(-1),2)	0.215212	0.149057	1.443819	0.1542
C	-3307899.	6390105.	-0.517660	0.6067

R-squared 0.694722 Mean dependent var -4558737. Adjusted R-squared 0.684195 S.D. dependent var 88797288

S.E. of regression	49900991	Akaike info criterion	38.33691
Sum squared resid	1.44E+17	Schwarz criterion	38.44072
Log likelihood	-1166.276	Hannan-Quinn criter.	38.37760

F-statistic 65.99535 Durbin-Watson stat 1.730446 Prob(F-statistic) 0.000000

Null Hypothesis: D(FINANCING) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.228825	0.0000
Test critical values:	1% level	-4.115684	
	5% level	-3.485218	
	10% level	-3.170793	

Augmented Dickey-Fuller Unit Root Test on D(FINANCING)

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINANCING,2)
Method: Least Squares
Date: 01/06/22 Time: 12:16
Sample (adjusted): 4 72
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FINANCING(-1))	-1.813650	0.250891	-7.228825	0.0000
D(FINANCING(-1),2)	0.216220	0.149298	1.448249	0.1530
C	-15656827	15090240	-1.037547	0.3039
@TREND("1")	307053.9	339796.1	0.903642	0.3700

R-squared 0.699033 Mean dependent var -4558737. Adjusted R-squared 0.683193 S.D. dependent var 88797288

S.E. of regression	49980087	Akaike info criterion	38.35547
Sum squared resid	1.42E+17	Schwarz criterion	38.49389
Log likelihood	-1165.842	Hannan-Quinn criter.	38.40972

F-statistic 44.12994 Durbin-Watson stat 1.759414 Prob(F-statistic) 0.000000

Null Hypothesis: D(FINANCING) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.291554	0.0000
Test critical values: 1% level	-2.603423	
5% level	-1.946253	
10% level	-1.613346	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FINANCING,2)
Method: Least Squares
Date: 01/06/22 Time: 12:17
Sample (adjusted): 4 72
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

Augmented Dickey-Fuller Unit Root Test on D(FINANCING)

D(FINANCING(-1))	-1.815048	0.248925	-7.291554
0.0000 D(FINANCING(-1),2)		0.215238	0.148130
1.453034	0.1515		

R-squared 0.693311 Mean dependent var -4558737. Adjusted R-squared 0.688113 S.D. dependent var 88797288

S.E. of regression	49590457	Akaike info criterion	38.30873
Sum squared resid	1.45E+17	Schwarz criterion	38.37794

Log likelihood -1166.416 Hannan-Quinn criter. 38.33586 Durbin-Watson stat 1.720835

Augmented Dickey-Fuller Unit Root Test on INVESTMENTS

Null Hypothesis: INVESTMENTS has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.305745	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INVESTMENTS)
Method: Least Squares
Date: 01/06/22 Time: 12:06
Sample (adjusted): 3 72
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INVESTMENTS(-1)	-1.222835	0.193924	-6.305745	0.0000
D(INVESTMENTS(-1))	0.250732	0.146961	1.706118	0.0931
C	-25398475	6681982.	-3.801039	0.0003

R-squared 0.499451 Mean dependent var -459933.9 Adjusted R-squared 0.483039 S.D. dependent var 61869015

S.E. of regression	44483816	Akaike info criterion	38.10489
Sum squared resid	1.21E+17	Schwarz criterion	38.20609
Log likelihood	-1216.356	Hannan-Quinn criter.	38.14476

F-statistic 30.43304 Durbin-Watson stat 1.982679 Prob(F-statistic) 0.000000

Null Hypothesis: INVESTMENTS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.132319	0.0007
Test critical values:	1% level	-4.175640	
	5% level	-3.513075	
	10% level	-3.186854	

Augmented Dickey-Fuller Unit Root Test on INVESTMENTS

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INVESTMENTS)
Method: Least Squares
Date: 01/06/22 Time: 12:07
Sample (adjusted): 17 72
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INVESTMENTS(-1)	-3.848933	0.749940	-5.132319	0.0000
D(INVESTMENTS(-1))	2.971934	0.682449	4.354807	0.0001
D(INVESTMENTS(-2))	2.395560	0.648720	3.692747	0.0008
D(INVESTMENTS(-3))	2.359201	0.547244	4.311058	0.0001
D(INVESTMENTS(-4))	2.027558	0.488638	4.149411	0.0002
D(INVESTMENTS(-5))	1.611889	0.435696	3.699576	0.0008
D(INVESTMENTS(-6))	1.388732	0.353172	3.932171	0.0004
D(INVESTMENTS(-7))	0.920780	0.345379	2.666002	0.0118
D(INVESTMENTS(-8))	0.702122	0.224322	3.129980	0.0036
D(INVESTMENTS(-9))	0.485942	0.193052	2.517158	0.0169
C	8677591.	16523294	0.525173	0.6030
@TREND("1")	-1645274.	479965.6	-3.427900	0.0016

R-squared 0.791955 Mean dependent var 3277965. Adjusted R-squared 0.722606 S.D. dependent var 51582602
S.E. of regression 27167623 Akaike info criterion 37.29613 Sum squared resid 2.44E+16 Schwarz criterion 37.77791 Log likelihood -827.1629 Hannan-Quinn criter. 37.47573 F-statistic 11.41993 Durbin-Watson stat 1.862465 Prob(F-statistic) 0.000000

Null Hypothesis: INVESTMENTS has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.682638	0.0081
Test critical values: 1% level	-2.603423	
5% level	-1.946253	
10% level	-1.613346	

Augmented Dickey-Fuller Unit Root Test on INVESTMENTS

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INVESTMENTS)
Method: Least Squares
Date: 01/06/22 Time: 12:07
Sample (adjusted): 4 72
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INVESTMENTS(-1)	-0.580507	0.216394	-2.682638	0.0095
D(INVESTMENTS(-1))	-0.187203	0.190899	-0.980639	0.3308
D(INVESTMENTS(-2))	-0.294778	0.151609	-1.944324	0.0567

R-squared 0.418763 Mean dependent var -525049.3 Adjusted R-squared 0.398721 S.D. dependent var 63395894

S.E. of regression	49158567	Akaike info criterion	38.30693
Sum squared resid	1.40E+17	Schwarz criterion	38.41074

Log likelihood -1165.361 Hannan-Quinn criter. 38.34762 Durbin-Watson stat 1.597455

Augmented Dickey-Fuller Unit Root Test on D(INVESTMENTS)

Null Hypothesis: D(INVESTMENTS) has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.425351	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INVESTMENTS,2)
Method: Least Squares
Date: 01/06/22 Time: 12:11
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INVESTMENTS(-1))	-12.13752	1.287752	-9.425351	0.0000
D(INVESTMENTS(-1),2)	10.22520	1.197293	8.540262	0.0000
D(INVESTMENTS(-2),2)	9.154792	1.126321	8.128047	0.0000
D(INVESTMENTS(-3),2)	8.221810	1.013006	8.116250	0.0000
D(INVESTMENTS(-4),2)	7.205087	0.892731	8.070838	0.0000
D(INVESTMENTS(-5),2)	6.191244	0.786113	7.875772	0.0000
D(INVESTMENTS(-6),2)	5.174835	0.646224	8.007802	0.0000
D(INVESTMENTS(-7),2)	4.076019	0.530124	7.688807	0.0000
D(INVESTMENTS(-8),2)	3.001448	0.386343	7.768863	0.0000
D(INVESTMENTS(-9),2)	1.966991	0.250145	7.863404	0.0000
D(INVESTMENTS(-10)	0.883595	0.147778	5.979224	0.0000
C	-5203974.	3239393.	-1.606466	0.1186

R-squared 0.945332 Mean dependent var -1106864. Adjusted R-squared 0.925287 S.D. dependent var 74639540

S.E. of regression	20401782	Akaike info criterion	36.73510
Sum squared resid	1.25E+16	Schwarz criterion	37.23158
Log likelihood	-759.4371	Hannan-Quinn criter.	36.91708

F-statistic 47.16036 Durbin-Watson stat 1.658986 Prob(F-statistic) 0.000000

Null Hypothesis: D(INVESTMENTS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*

Augmented Dickey-Fuller Unit Root Test on D(INVESTMENTS)

Augmented Dickey-Fuller test statistic		-9.557480	0.0000	Test critical values:
1% level	-4.192337			
	5% level		-3.520787	
	10% level		-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INVESTMENTS,2)
Method: Least Squares
Date: 01/06/22 Time: 12:11
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INVESTMENTS(-1))	-12.22323	1.278918	-9.557480	0.0000
D(INVESTMENTS(-1),2)	10.30830	1.189234	8.668013	0.0000
D(INVESTMENTS(-2),2)	9.224591	1.118372	8.248228	0.0000
D(INVESTMENTS(-3),2)	8.275824	1.005519	8.230399	0.0000
D(INVESTMENTS(-4),2)	7.238672	0.885707	8.172762	0.0000
D(INVESTMENTS(-5),2)	6.210675	0.779716	7.965304	0.0000
D(INVESTMENTS(-6),2)	5.185792	0.640896	8.091474	0.0000
D(INVESTMENTS(-7),2)	4.083759	0.525740	7.767646	0.0000
D(INVESTMENTS(-8),2)	3.012071	0.383218	7.859933	0.0000
D(INVESTMENTS(-9),2)	1.971154	0.248082	7.945588	0.0000
D(INVESTMENTS(-10)	0.884546	0.146547	6.035922	0.0000
C	-21397378	13577386	-1.575957	0.1259
@TREND("1")	320851.1	261380.1	1.227527	0.2295

R-squared 0.948032 Mean dependent var -1106864. Adjusted R-squared 0.926528 S.D. dependent var 74639540

S.E. of regression	20231600	Akaike info criterion	36.73206
Sum squared resid	1.19E+16	Schwarz criterion	37.26991
Log likelihood	-758.3733	Hannan-Quinn criter.	36.92921

F-statistic 44.08623 Durbin-Watson stat 1.734395 Prob(F-statistic) 0.000000

Null Hypothesis: D(INVESTMENTS) has a unit root
Exogenous: None
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

				t-Statistic
				Prob.*
Augmented Dickey-Fuller test statistic		-9.067316	0.0000	Test critical values:
1% level	-2.621185			
	5% level		-1.948886	
	10% level		-1.611932	

Augmented Dickey-Fuller Unit Root Test on D(INVESTMENTS)

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INVESTMENTS,2)
Method: Least Squares
Date: 01/06/22 Time: 12:12
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INVESTMENTS(-1))	-11.70127	1.290488	-9.067316	0.0000
D(INVESTMENTS(-1),2)	9.815475	1.199267	8.184559	0.0000
D(INVESTMENTS(-2),2)	8.765837	1.127686	7.773293	0.0000
D(INVESTMENTS(-3),2)	7.865046	1.013249	7.762206	0.0000
D(INVESTMENTS(-4),2)	6.885702	0.892225	7.717451	0.0000
D(INVESTMENTS(-5),2)	5.903392	0.784691	7.523202	0.0000
D(INVESTMENTS(-6),2)	4.938938	0.645165	7.655310	0.0000
D(INVESTMENTS(-7),2)	3.887896	0.530046	7.335015	0.0000
D(INVESTMENTS(-8),2)	2.875814	0.387871	7.414349	0.0000
D(INVESTMENTS(-9),2)	1.892345	0.251980	7.509898	0.0000
D(INVESTMENTS(-10)	0.844141	0.149392	5.650527	0.0000

R-squared 0.940629 Mean dependent var -1106864. Adjusted R-squared 0.921477 S.D. dependent var 74639540
S.E. of regression 20915472 Akaike info criterion 36.77000
Sum squared resid 1.36E+16 Schwarz criterion 37.22511
Log likelihood -761.1701 Hannan-Quinn criter. 36.93682 Durbin-Watson stat 1.581786

Augmented Dickey-Fuller Unit Root Test on OIFA

Null Hypothesis: OIFA has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on SIC, maxlag=10)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.184623	0.0000
Test critical values:	1% level	-3.531592	
	5% level	-2.905519	
	10% level	-2.590262	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OIFA)
Method: Least Squares
Date: 01/06/22 Time: 12:17
Sample (adjusted): 2 72
Included observations: 67 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIFA(-1)	-1.015044	0.124018	-8.184623	0.0000
C	-1.00E+09	1.01E+09	-0.997020	0.3225

R-squared	0.507531	Mean dependent var	-1265650.
Adjusted R-squared	0.499955	S.D. dependent var	1.16E+10
S.E. of regression	8.17E+09	Akaike info criterion	48.51579
Sum squared resid	4.34E+21	Schwarz criterion	48.58160
Log likelihood	-1623.279	Hannan-Quinn criter.	48.54183
F-statistic	66.98805	Durbin-Watson stat	2.062051
Prob(F-statistic)	0.000000		

Null Hypothesis: OIFA has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on SIC, maxlag=10)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.327064	0.0000
Test critical values:	1% level	-4.100935	
	5% level	-3.478305	
	10% level	-3.166788	

Augmented Dickey-Fuller Unit Root Test on OIFA

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OIFA)
Method: Least Squares
Date: 01/06/22 Time: 12:18
Sample (adjusted): 2 72
Included observations: 67 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIFA(-1)	-1.039053	0.124780	-8.327064	0.0000
C	-3.44E+09	2.14E+09	-1.610093	0.1123
@TREND("1")	64469449	49931962	1.291146	0.2013

R-squared 0.520033 Mean dependent var -1265650. Adjusted R-squared 0.505034 S.D. dependent var 1.16E+10

S.E. of regression	8.13E+09	Akaike info criterion	48.51993
Sum squared resid	4.23E+21	Schwarz criterion	48.61864
Log likelihood	-1622.418	Hannan-Quinn criter.	48.55899

F-statistic 34.67129 Durbin-Watson stat 2.067058 Prob(F-statistic) 0.000000

Null Hypothesis: OIFA has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.124036	0.0000
Test critical values:	1% level	-2.599934	
	5% level	-1.945745	
	10% level	-1.613633	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OIFA)
Method: Least Squares
Date: 01/06/22 Time: 12:19
Sample (adjusted): 2 72
Included observations: 67 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OIFA(-1)	-1.000000	0.123092	-8.124036	0.0000

Augmented Dickey-Fuller Unit Root Test on OIFA

R-squared 0.500000 Mean dependent var -1265650. Adjusted R-squared 0.500000 S.D. dependent var 1.16E+10			
S.E. of regression	8.17E+09	Akaike info criterion	48.50112
Sum squared resid	4.41E+21	Schwarz criterion	48.53402
Log likelihood -1623.787 Hannan-Quinn criter. 48.51414 Durbin-Watson stat 2.061537			

Augmented Dickey-Fuller Unit Root Test on D(OIFA)

Null Hypothesis: D(OIFA) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.63824	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OIFA,2)
Method: Least Squares
Date: 01/06/22 Time: 12:19
Sample (adjusted): 3 72
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OIFA(-1))	-1.500004	0.109985	-13.63824	0.0000
C	-1073803.	1.29E+09	-0.000832	0.9993

R-squared	0.750002	Mean dependent var	-1565782.
Adjusted R-squared	0.745969	S.D. dependent var	2.05E+10
S.E. of regression	1.03E+10	Akaike info criterion	48.98503
Sum squared resid	6.61E+21	Schwarz criterion	49.05250
Log likelihood	-1565.521	Hannan-Quinn criter.	49.01161
F-statistic	186.0016	Durbin-Watson stat	2.408060
Prob(F-statistic)	0.000000		

Null Hypothesis: D(OIFA) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.52838	0.0001
Test critical values:	1% level	-4.107947	
	5% level	-3.481595	
	10% level	-3.168695	

Augmented Dickey-Fuller Unit Root Test on D(OIFA)

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OIFA,2)
Method: Least Squares
Date: 01/06/22 Time: 12:20
Sample (adjusted): 3 72
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OIFA(-1))	-1.500035	0.110881	-13.52838	0.0000
C	-1.62E+08	2.89E+09	-0.055812	0.9557
@TREND("1")	4136203.	66636729	0.062071	0.9507

R-squared 0.750017 Mean dependent var -1565782. Adjusted R-squared 0.741821 S.D. dependent var 2.05E+10

S.E. of regression	1.04E+10	Akaike info criterion	49.01622
Sum squared resid	6.61E+21	Schwarz criterion	49.11742
Log likelihood	-1565.519	Hannan-Quinn criter.	49.05609
F-statistic	91.50849	Durbin-Watson stat	2.408170
Prob(F-statistic)	0.000000		

Null Hypothesis: D(OIFA) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.74779	0.0000
Test critical values:	1% level	-2.601596	
	5% level	-1.945987	
	10% level	-1.613496	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OIFA,2)
Method: Least Squares
Date: 01/06/22 Time: 12:21
Sample (adjusted): 3 72
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OIFA(-1))	-1.500004	0.109109	-13.74779	0.0000

Augmented Dickey-Fuller Unit Root Test on D(OIFA)

R-squared 0.750002 Mean dependent var -1565782. Adjusted R-squared 0.750002 S.D. dependent var 2.05E+10			
S.E. of regression	1.02E+10	Akaike info criterion	48.95378
Sum squared resid	6.61E+21	Schwarz criterion	48.98752
Log likelihood -1565.521 Hannan-Quinn criter. 48.96707 Durbin-Watson stat 2.408060			

Augmented Dickey-Fuller Unit Root Test on OPERATIONS

Null Hypothesis: OPERATIONS has a unit root
Exogenous: Constant
Lag Length: 9 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.588587	0.0000
Test critical values:	1% level	-3.584743	
	5% level	-2.928142	
	10% level	-2.602225	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPERATIONS)
Method: Least Squares
Date: 01/06/22 Time: 12:01
Sample (adjusted): 17 72
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPERATIONS(-1)	-3.142576	0.562320	-5.588587	0.0000
D(OPERATIONS(-1))	2.330603	0.475867	4.897588	0.0000
D(OPERATIONS(-2))	1.878651	0.486461	3.861870	0.0005
D(OPERATIONS(-3))	1.707383	0.377598	4.521697	0.0001
D(OPERATIONS(-4))	1.708906	0.377738	4.524054	0.0001
D(OPERATIONS(-5))	1.169899	0.316425	3.697242	0.0008
D(OPERATIONS(-6))	1.165197	0.261916	4.448739	0.0001
D(OPERATIONS(-7))	0.695509	0.238148	2.920488	0.0062
D(OPERATIONS(-8))	0.600630	0.150425	3.992879	0.0003
D(OPERATIONS(-9))	0.426578	0.133732	3.189804	0.0031
C	91825959	17896862	5.130841	0.0000

R-squared 0.770043 Mean dependent var -5845756. Adjusted R-squared 0.702408 S.D. dependent var 60533494

S.E. of regression	33022203	Akaike info criterion	37.67185
Sum squared resid	3.71E+16	Schwarz criterion	38.11347
Log likelihood	-836.6165	Hannan-Quinn criter.	37.83648

F-statistic 11.38537 Durbin-Watson stat 1.950017 Prob(F-statistic) 0.000000

Null Hypothesis: OPERATIONS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*

Augmented Dickey-Fuller Unit Root Test on OPERATIONS

Augmented Dickey-Fuller test statistic		-7.348710	0.0000
Test critical values:	1% level	-4.175640	
	5% level		-3.513075
	10% level		-3.186854

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPERATIONS)
Method: Least Squares
Date: 01/06/22 Time: 12:02
Sample (adjusted): 17 72
Included observations: 45 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPERATIONS(-1)	-4.183805	0.569325	-7.348710	0.0000
D(OPERATIONS(-1))	3.182811	0.477582	6.664434	0.0000
D(OPERATIONS(-2))	2.726665	0.484915	5.622969	0.0000
D(OPERATIONS(-3))	2.348093	0.373952	6.279125	0.0000
D(OPERATIONS(-4))	2.350538	0.374185	6.281746	0.0000
D(OPERATIONS(-5))	1.671708	0.308646	5.416266	0.0000
D(OPERATIONS(-6))	1.591203	0.256885	6.194211	0.0000
D(OPERATIONS(-7))	1.050320	0.229370	4.579143	0.0001
D(OPERATIONS(-8))	0.795583	0.141441	5.624831	0.0000
D(OPERATIONS(-9))	0.573754	0.123030	4.663510	0.0000
C	1.93E+08	32735143	5.908592	0.0000
@TREND("1")	-1409863.	400234.9	-3.522589	0.0013

R-squared 0.832882 Mean dependent var -5845756. Adjusted R-squared 0.777176 S.D. dependent var 60533494

S.E. of regression	28574345	Akaike info criterion	37.39710
Sum squared resid	2.69E+16	Schwarz criterion	37.87887
Log likelihood	-829.4346	Hannan-Quinn criter.	37.57670

F-statistic 14.95142 Durbin-Watson stat 2.389607 Prob(F-statistic) 0.000000

Null Hypothesis: OPERATIONS has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.403084	0.0000
Test critical values:	1% level	-2.603423	
	5% level		-1.946253
	10% level		-1.613346

Augmented Dickey-Fuller Unit Root Test on OPERATIONS

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPERATIONS)
Method: Least Squares
Date: 01/06/22 Time: 12:03
Sample (adjusted): 4 72
Included observations: 61 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPERATIONS(-1)	-1.001387	0.227428	-4.403084	0.0000
D(OPERATIONS(-1))	0.001406	0.185695	0.007574	0.9940
D(OPERATIONS(-2))	0.001407	0.131307	0.010714	0.9915

R-squared 0.499989 Mean dependent var 2955129. Adjusted R-squared 0.482748 S.D. dependent var 1.21E+10

S.E. of regression	8.71E+09	Akaike info criterion	48.66125
Sum squared resid	4.40E+21	Schwarz criterion	48.76507

Log likelihood -1481.168 Hannan-Quinn criter. 48.70194 Durbin-Watson stat 2.067779

Augmented Dickey-Fuller Unit Root Test on D(OPERATIONS)

Null Hypothesis: D(OPERATIONS) has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.554614	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPERATIONS,2)
Method: Least Squares
Date: 01/06/22 Time: 12:04
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPERATIONS(-1))	-9.116647	1.065699	-8.554614	0.0000
D(OPERATIONS(-1),2)	7.412712	0.982804	7.542414	0.0000
D(OPERATIONS(-2),2)	6.545807	0.921031	7.107044	0.0000
D(OPERATIONS(-3),2)	5.845327	0.830797	7.035804	0.0000
D(OPERATIONS(-4),2)	5.126385	0.723664	7.083925	0.0000
D(OPERATIONS(-5),2)	4.350887	0.639044	6.808435	0.0000
D(OPERATIONS(-6),2)	3.586869	0.509541	7.039419	0.0000
D(OPERATIONS(-7),2)	2.769973	0.412598	6.713499	0.0000
D(OPERATIONS(-8),2)	2.072972	0.294597	7.036642	0.0000
D(OPERATIONS(-9),2)	1.353325	0.186479	7.257239	0.0000
D(OPERATIONS(-10)	0.622390	0.114605	5.430728	0.0000
C	-4226075.	4488697.	-0.941493	0.3540

R-squared 0.926157 Mean dependent var 1843661. Adjusted R-squared 0.899081 S.D. dependent var 90732632
S.E. of regression 28823774 Akaike info criterion 37.42626 Sum squared resid 2.49E+16 Schwarz criterion 37.92273 Log likelihood -773.9514 Hannan-Quinn criter. 37.60823 F-statistic 34.20589 Durbin-Watson stat 2.449131 Prob(F-statistic) 0.000000

Null Hypothesis: D(OPERATIONS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*

Augmented Dickey-Fuller Unit Root Test on D(OPERATIONS)

Augmented Dickey-Fuller test statistic	-8.442447	0.0000
Test critical values: 1% level	-4.192337	
5% level	-3.520787	
10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPERATIONS,2)
Method: Least Squares
Date: 01/06/22 Time: 12:04
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPERATIONS(-1))	-9.157172	1.084658	-8.442447	0.0000
D(OPERATIONS(-1),2)	7.449034	1.000077	7.448463	0.0000
D(OPERATIONS(-2),2)	6.577841	0.936832	7.021367	0.0000
D(OPERATIONS(-3),2)	5.873571	0.844930	6.951548	0.0000
D(OPERATIONS(-4),2)	5.152149	0.736192	6.998378	0.0000
D(OPERATIONS(-5),2)	4.374629	0.650300	6.727096	0.0000
D(OPERATIONS(-6),2)	3.605796	0.518515	6.954085	0.0000
D(OPERATIONS(-7),2)	2.784892	0.419784	6.634102	0.0000
D(OPERATIONS(-8),2)	2.079384	0.299068	6.952884	0.0000
D(OPERATIONS(-9),2)	1.356822	0.189248	7.169536	0.0000
D(OPERATIONS(-10)	0.623460	0.116225	5.364232	0.0000
C	-12426141	19701368	-0.630725	0.5332
@TREND("1")	161885.1	378423.1	0.427789	0.6720

R-squared 0.926620 Mean dependent var 1843661. Adjusted R-squared 0.896255 S.D. dependent var 90732632
S.E. of regression 29224460 Akaike info criterion 37.46758 Sum squared resid 2.48E+16 Schwarz criterion 38.00543 Log likelihood -773.8193 Hannan-Quinn criter. 37.66473
F-statistic 30.51674 Durbin-Watson stat 2.457097 Prob(F-statistic) 0.000000

Null Hypothesis: D(OPERATIONS) has a unit root
Exogenous: None
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.520534	0.0000
Test critical values: 1% level	-2.621185	
5% level	-1.948886	
10% level	-1.611932	

Augmented Dickey-Fuller Unit Root Test on D(OPERATIONS)

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPERATIONS,2)
Method: Least Squares
Date: 01/06/22 Time: 12:05
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPERATIONS(-1))	-9.029139	1.059692	-8.520534	0.0000
D(OPERATIONS(-1),2)	7.334760	0.977514	7.503483	0.0000
D(OPERATIONS(-2),2)	6.479754	0.916671	7.068790	0.0000
D(OPERATIONS(-3),2)	5.792009	0.827345	7.000718	0.0000
D(OPERATIONS(-4),2)	5.085181	0.721015	7.052806	0.0000
D(OPERATIONS(-5),2)	4.319883	0.637024	6.781348	0.0000
D(OPERATIONS(-6),2)	3.565713	0.508111	7.017582	0.0000
D(OPERATIONS(-7),2)	2.754855	0.411529	6.694196	0.0000
D(OPERATIONS(-8),2)	2.065281	0.293943	7.026116	0.0000
D(OPERATIONS(-9),2)	1.349747	0.186099	7.252856	0.0000
D(OPERATIONS(-10)	0.621125	0.114387	5.430019	0.0000

R-squared 0.923975 Mean dependent var 1843661. Adjusted R-squared 0.899450 S.D. dependent var 90732632
S.E. of regression 28770917 Akaike info criterion 37.40776 Sum squared resid 2.57E+16 Schwarz criterion 37.86286 Log likelihood -774.5629 Hannan-Quinn criter. 37.57457 Durbin-Watson stat 2.397685

Augmented Dickey-Fuller Unit Root Test on SHAREPRICE

Null Hypothesis: SHAREPRICE has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.574740	0.0000
Test critical values: 1% level	-3.571310	
5% level	-2.922449	
10% level	-2.599224	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SHAREPRICE)
Method: Least Squares
Date: 01/06/22 Time: 12:21
Sample (adjusted): 15 72
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SHAREPRICE(-1)	-3.171427	0.568892	-5.574740	0.0000
D(SHAREPRICE(-1))	1.724552	0.475639	3.625760	0.0008
D(SHAREPRICE(-2))	1.458257	0.374282	3.896143	0.0004
D(SHAREPRICE(-3))	1.637622	0.309017	5.299463	0.0000
D(SHAREPRICE(-4))	1.504431	0.312737	4.810534	0.0000
D(SHAREPRICE(-5))	1.245166	0.319164	3.901332	0.0004
D(SHAREPRICE(-6))	0.759349	0.256815	2.956792	0.0052
D(SHAREPRICE(-7))	0.351905	0.155168	2.267900	0.0288
C	228.0591	43.88383	5.196881	0.0000

R-squared 0.755522 Mean dependent var -5.555102 Adjusted R-squared 0.706626 S.D. dependent var 163.9332

S.E. of regression	88.79277	Akaike info criterion	11.97489
Sum squared resid	315366.2	Schwarz criterion	12.32237
Log likelihood	-284.3849	Hannan-Quinn criter.	12.10673

F-statistic 15.45173 Durbin-Watson stat 1.711784 Prob(F-statistic) 0.000000

Null Hypothesis: SHAREPRICE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.186654	0.0000

Augmented Dickey-Fuller Unit Root Test on SHAREPRICE

Test critical values:	1% level	-4.186481
	5% level	-3.518090
	10% level	-3.189732

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SHAREPRICE)
Method: Least Squares
Date: 01/06/22 Time: 12:22
Sample (adjusted): 30 72
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SHAREPRICE(-1)	-11.36844	1.237496	-9.186654	0.0000
D(SHAREPRICE(-1))	9.478379	1.150181	8.240769	0.0000
D(SHAREPRICE(-2))	8.540119	1.039280	8.217344	0.0000
D(SHAREPRICE(-3))	7.709268	0.882373	8.736974	0.0000
D(SHAREPRICE(-4))	6.795116	0.768184	8.845691	0.0000
D(SHAREPRICE(-5))	5.867527	0.678194	8.651691	0.0000
D(SHAREPRICE(-6))	4.807316	0.614791	7.819436	0.0000
D(SHAREPRICE(-7))	3.792312	0.525164	7.221201	0.0000
D(SHAREPRICE(-8))	2.738984	0.416277	6.579719	0.0000
D(SHAREPRICE(-9))	1.893746	0.266951	7.093982	0.0000
D(SHAREPRICE(-10))	0.878093	0.140810	6.236023	0.0000
C	385.6879	51.16986	7.537404	0.0000
@TREND("1")	9.318682	1.257327	7.411503	0.0000

R-squared 0.926039 Mean dependent var -1.316047 Adjusted R-squared 0.896455 S.D. dependent var 161.5639

S.E. of regression	51.98873	Akaike info criterion	10.98458
Sum squared resid	81084.85	Schwarz criterion	11.51704
Log likelihood	-223.1685	Hannan-Quinn criter.	11.18093

F-statistic 31.30168 Durbin-Watson stat 1.034010 Prob(F-statistic) 0.000000

Null Hypothesis: SHAREPRICE has a unit root
Exogenous: None
Lag Length: 8 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.642534	0.4336
Test critical values:	1% level	-2.615093	
	5% level	-1.947975	
	10% level	-1.612408	

Augmented Dickey-Fuller Unit Root Test on SHAREPRICE

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SHAREPRICE)
Method: Least Squares
Date: 01/06/22 Time: 12:23
Sample (adjusted): 16 72
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SHAREPRICE(-1)	-0.117999	0.183646	-0.642534	0.5244
D(SHAREPRICE(-1))	-0.911818	0.200652	-4.544288	0.0001
D(SHAREPRICE(-2))	-0.683618	0.205834	-3.321214	0.0020
D(SHAREPRICE(-3))	-0.049155	0.188086	-0.261344	0.7952
D(SHAREPRICE(-4))	-0.023108	0.177258	-0.130365	0.8970
D(SHAREPRICE(-5))	-0.231903	0.175382	-1.322273	0.1940
D(SHAREPRICE(-6))	-0.708078	0.181528	-3.900658	0.0004
D(SHAREPRICE(-7))	-0.754688	0.177465	-4.252594	0.0001
D(SHAREPRICE(-8))	-0.636322	0.141196	-4.506671	0.0001

R-squared 0.723692 Mean dependent var 0.698723 Adjusted R-squared 0.665522 S.D. dependent var 163.9558
S.E. of regression 94.82229 Akaike info criterion 12.11230
Sum squared resid 341668.1 Schwarz criterion 12.46659
Log likelihood -275.6391 Hannan-Quinn criter. 12.24562 Durbin-Watson stat 2.091553

Null Hypothesis: D(SHAREPRICE) has a unit root
Exogenous: Constant
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.79005	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SHAREPRICE,2)
Method: Least Squares
Date: 01/06/22 Time: 12:24
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SHAREPRICE(-1))	-13.69151	0.992854	-13.79005	0.0000
D(SHAREPRICE(-1),2)	11.53315	0.950060	12.13940	0.0000
D(SHAREPRICE(-2),2)	10.31545	0.861843	11.96906	0.0000
D(SHAREPRICE(-3),2)	9.162760	0.735925	12.45067	0.0000
D(SHAREPRICE(-4),2)	8.088064	0.627416	12.89106	0.0000
D(SHAREPRICE(-5),2)	7.034866	0.553777	12.70343	0.0000
D(SHAREPRICE(-6),2)	5.875613	0.503297	11.67425	0.0000
D(SHAREPRICE(-7),2)	4.652459	0.435109	10.69264	0.0000
D(SHAREPRICE(-8),2)	3.354105	0.334115	10.03879	0.0000
D(SHAREPRICE(-9),2)	2.191376	0.206308	10.62185	0.0000
D(SHAREPRICE(-10),	1.015590	0.089002	11.41085	0.0000
C	9.681071	6.864707	1.410267	0.1687

R-squared 0.982452 Mean dependent var 0.996429 Adjusted R-squared 0.976018 S.D. dependent var 283.3324

S.E. of regression	43.87716	Akaike info criterion	10.63562
Sum squared resid	57756.14	Schwarz criterion	11.13210
Log likelihood	-211.3480	Hannan-Quinn criter.	10.81760

F-statistic 152.6927 Durbin-Watson stat 2.645899 Prob(F-statistic) 0.000000

Null Hypothesis: D(SHAREPRICE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-13.68216	0.0000
Test critical values: 1% level	-4.192337	
5% level	-3.520787	
10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SHAREPRICE,2)
Method: Least Squares
Date: 01/06/22 Time: 12:25
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SHAREPRICE(-1))	-13.69007	1.000578	-13.68216	0.0000
D(SHAREPRICE(-1),2)	11.52884	0.957467	12.04098	0.0000
D(SHAREPRICE(-2),2)	10.31001	0.868578	11.87000	0.0000
D(SHAREPRICE(-3),2)	9.157780	0.741680	12.34735	0.0000
D(SHAREPRICE(-4),2)	8.085346	0.632307	12.78706	0.0000
D(SHAREPRICE(-5),2)	7.030986	0.558109	12.59787	0.0000
D(SHAREPRICE(-6),2)	5.868292	0.507310	11.56748	0.0000
D(SHAREPRICE(-7),2)	4.641290	0.438757	10.57828	0.0000
D(SHAREPRICE(-8),2)	3.343166	0.337043	9.919113	0.0000
D(SHAREPRICE(-9),2)	2.182374	0.208274	10.47836	0.0000
D(SHAREPRICE(-10),	1.011523	0.089865	11.25600	0.0000
C	30.69108	29.44874	1.042187	0.3059
@TREND("1")	-0.417145	0.568330	-0.733984	0.4689

R-squared 0.982772 Mean dependent var 0.996429 Adjusted R-squared 0.975644 S.D. dependent var 283.3324

S.E. of regression	44.21841	Akaike info criterion	10.66483
Sum squared resid	56702.78	Schwarz criterion	11.20268
Log likelihood	-210.9615	Hannan-Quinn criter.	10.86198

F-statistic 137.8611 Durbin-Watson stat 2.683604 Prob(F-statistic) 0.000000

Null Hypothesis: D(SHAREPRICE) has a unit root
Exogenous: None
Lag Length: 10 (Automatic - based on SIC, maxlag=10)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-13.50505	0.0000
Test critical values:	1% level	-2.621185	
	5% level	-1.948886	
	10% level	-1.611932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(SHAREPRICE,2)
Method: Least Squares
Date: 01/06/22 Time: 12:28
Sample (adjusted): 31 72
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SHAREPRICE(-1))	-13.56512	1.004448	-13.50505	0.0000
D(SHAREPRICE(-1),2)	11.40866	0.960919	11.87266	0.0000
D(SHAREPRICE(-2),2)	10.19588	0.871233	11.70281	0.0000
D(SHAREPRICE(-3),2)	9.055779	0.743588	12.17849	0.0000
D(SHAREPRICE(-4),2)	7.990855	0.633487	12.61409	0.0000
D(SHAREPRICE(-5),2)	6.944744	0.558782	12.42836	0.0000
D(SHAREPRICE(-6),2)	5.791534	0.507661	11.40826	0.0000
D(SHAREPRICE(-7),2)	4.578789	0.438797	10.43487	0.0000
D(SHAREPRICE(-8),2)	3.297423	0.336937	9.786470	0.0000
D(SHAREPRICE(-9),2)	2.155514	0.207975	10.36430	0.0000
D(SHAREPRICE(-10),	1.000338	0.089741	11.14700	0.0000

R-squared 0.981289 Mean dependent var 0.996429 Adjusted R-squared 0.975253 S.D. dependent var 283.3324

S.E. of regression	44.57147	Akaike info criterion	10.65219
Sum squared resid	61585.09	Schwarz criterion	11.10730

Log likelihood -212.6960 Hannan-Quinn criter. 10.81901 Durbin-Watson stat 2.469910

APPENDIX C: LANGUAGE EDITING CERTIFICATE

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Reference number 1000686

SACE REGISTERED

09 November 2022

The Relationship Between Cash Flow And Share Prices Of General Mining Firms Listed On The Johannesburg Stock Exchange

This serves to confirm that I edited substantively the above document including a Reference list. The document was returned to the author with various tracked changes intended to correct errors and to clarify meaning. It was the author's responsibility to attend to these changes.

Yours faithfully

Dr. K. Zano

Ph.D. in English
kufazano@gmail.com/kufazano@yahoo.com
0631434276

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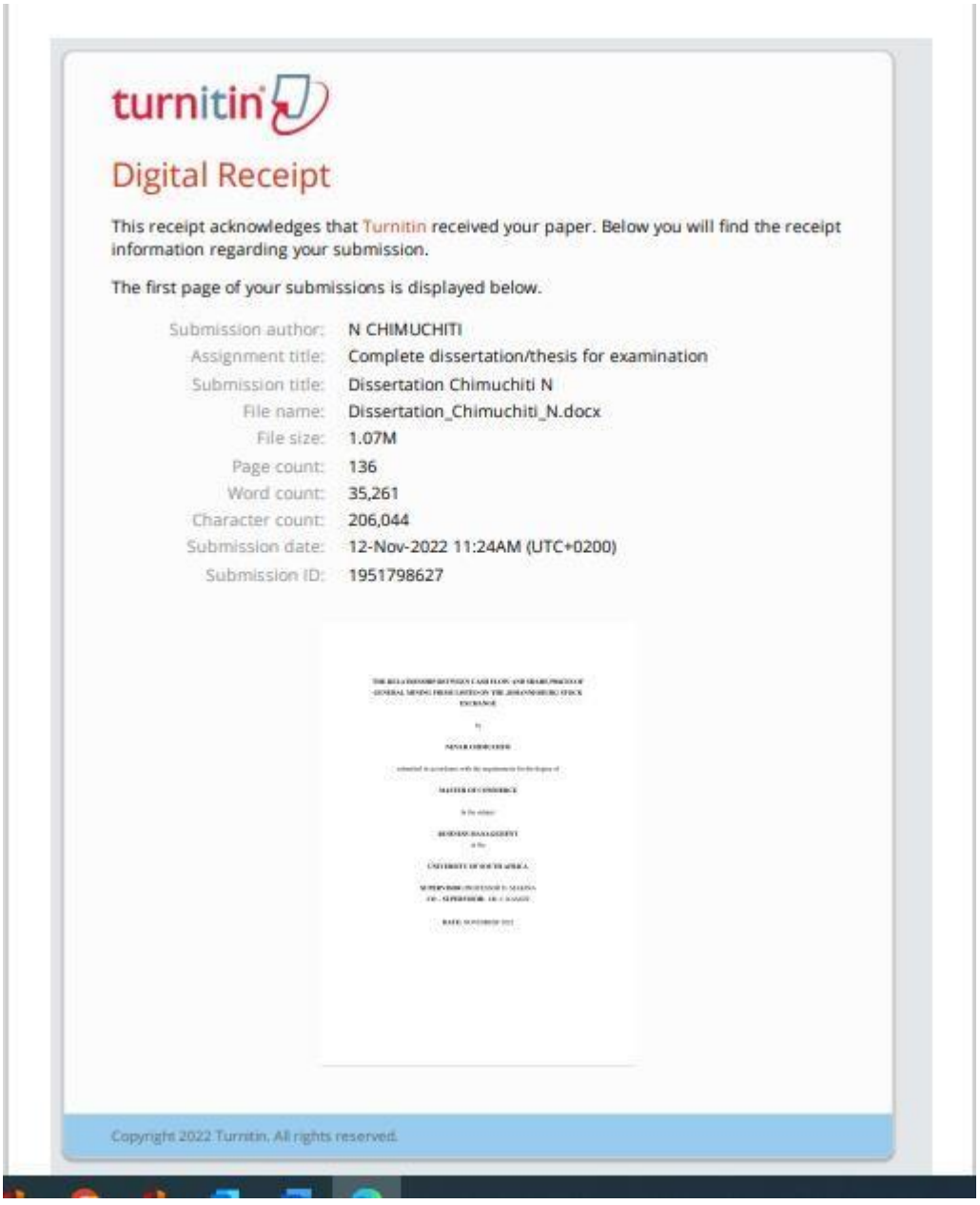

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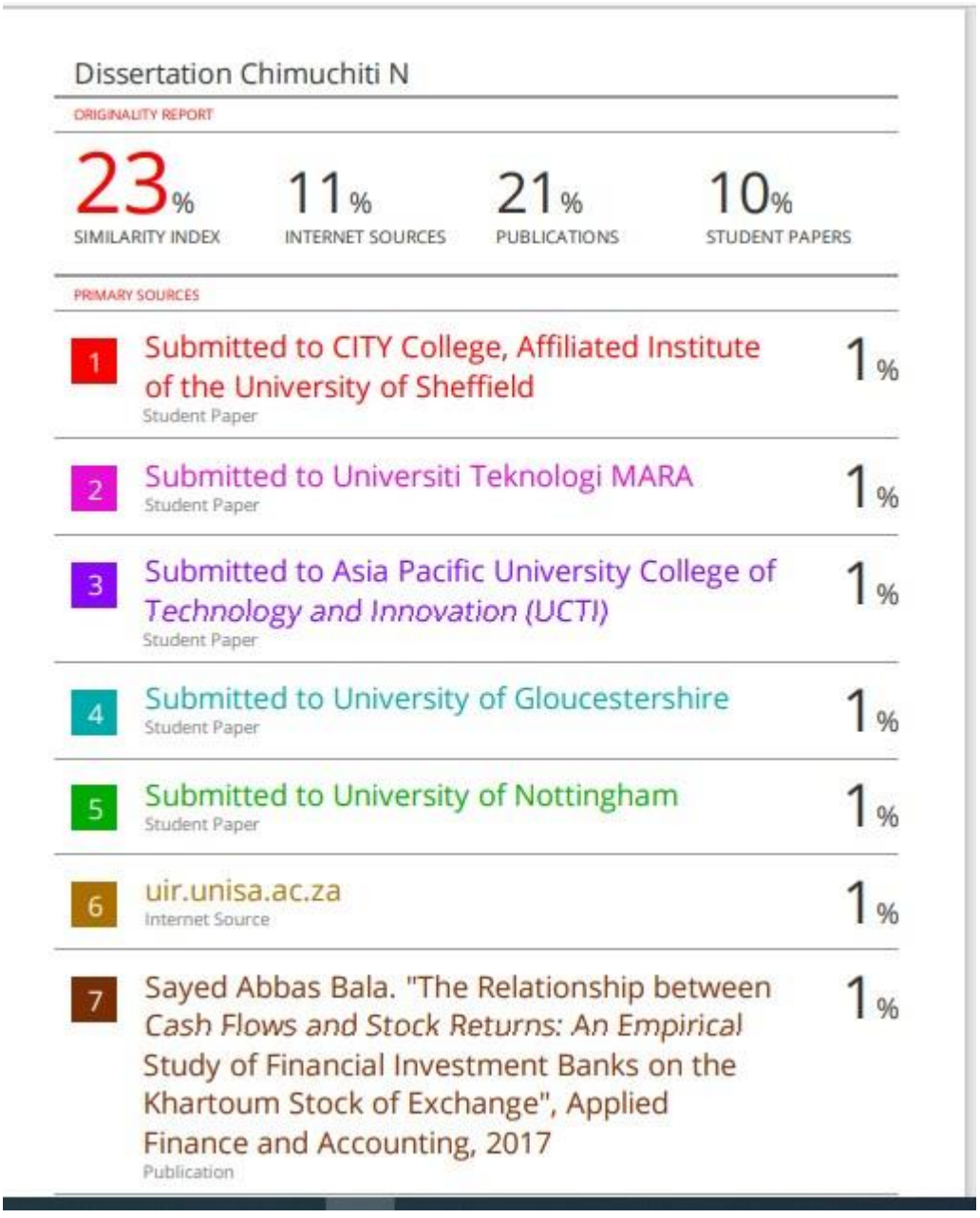

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