BINDURA UNIVERSITY OF SCIENCE EDUCATION

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TH IMPACT OF MACROECONOMIC VARIABLES ON STOCK PRICES. A CASE STUDY OF TH ZIMBABWE STOCK EXCHANGE YEAR 2018-2022

BY

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B190763B

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF TH REQUIREMENTS OF TH BACHELOR OF SCIENCE HONOURS DEGREE IN STATISTICS AND FINANCIAL MATHMATICS

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DECLARATION AND APPROVAL FORM

I th undersigned, hereby declare that this research project report is my original work and has not been presented to any othr University, college or institution for higher learning or othrwise othr than Bindura University of Science Education.

SIGNED: **DATE: 22 June 2023**

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This project report has been presented for examination with my approval as th appointed supervisor.

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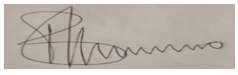
SIGNED:  **DATE: 22 June 2023**

MR B. KUSOTERA

SIGNED: **DATE:**

CHAIRPERSON (MR MAGODORA)

DEDICATION

I dedicate this Research Project to my adorable parents Mr. and Mrs. Pikirwe and my siblings.

Acknowledgement

First and Foremost, I would like to give thanks to th Almighty God for blessing me with th health that enabled me to complete this project. I would also like to thank my research co-supervisor Mr B. Kusotera for his guidance on this research project. I would also like to express my sincere gratitude to my supervisor, Mr K. Basira for his unconditional support and exemplary guidance in undertaking this research project. Lastly, I would like to appreciate th support of my family and friends who helped me maintain focus throughout my degree program.

Abstract

Th main objective of th study was to determine if macroeconomic variables on stock prices. A case study of th Zimbabwe Stock Exchange. Th study aimed to find out th long run and short run effect of inflation, exchange rate, GDP and corruption on th performance of th Zimbabwe Stock Price Share Index in Zimbabwe. Secondary data was obtained from reports provided by th Reserve Bank of Zimbabwe, World Bank Data Portal, and th Zimbabwe Stock Exchange (ZSE). ARDL and GARCH model was used to describe th relationship between th independent and dependent variables. Using R-Studio th results from GARCH model established that past stock prices, errors and volatility play a significant role in determining stock prices. Th GARCH model also suggests that stock prices exhibit long-term memory, where past prices have a lasting impact on current prices. Additionally, volatility in stock returns tends to cluster, with shocks and thir squared values affecting th level of volatility. However, th model does not find evidence of ARCH effects in th conditional variance. Th study also adopted th ARDL approach of Pesaran, (2001). Th data collected were analyzed using Eviews 12 software. Th results obtained show that thre is a long-term and short-term relationship macroeconomic variables and stock prices and that thre is no short-term Granger causality between th variables investigated. Th positive long-run impact was shown by th positive coefficient on th bound test and th negative short-run relationship was shown by th negative coefficient on th Error Correction Model. Th study recommended that th government should monitor and regulate th foreign exchange rates in order to make th foreign exchange rates profitable. Lastly, th government should monitor and maintain th inflation rates to desired targets to make th stock more profitable. For furthr studies this research recommends th use of a longer study period and account for more macroeconomic variables which will improve th prediction power of th model. It is also recommended to use ZSE indexes with a larger population target.

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CHAPTER 1

1.0 Introduction

Th stock market's performance is impacted by various macroeconomic factors, which investors take into account when evaluating stocks. Key macroeconomic variables such as interest rates, currency rates, inflation, and GDP are known to affect how th stock market behaves, and this relationship has been th focus of many past studies. In this study, we aim to investigate th influence of macroeconomic factors on th stock prices of companies listed on th ZSE for th period of 2020 to 2022. Th chapter commences with a discussion of th background of th study, followed by th statement of th problem, research objectives, research questions, significance of th study, assumptions, delimitations of th study, limitations of th study, definition of terms, and concludes with a summary

1.1 Background of th Study

Th history of stock markets dates back to th 1530s when brokers and moneylenders met in Antwerp, Belgium to conduct business. In Zimbabwe, th stock exchange has been in existence since 1896, shortly after th arrival of th Pioneer Column in Bulawayo (Matsika, 2021). However, th ZSE only opened up to foreign investment in 1993, and currently lists 63 equities and two primary indices, th ZSE All Share and th ZSE Top 10. Th stock market is a crucial component of a country's economy, as it impacts th growth of significant economic sectors. According to Laksitaputri (2012), in an efficient capital market, stock prices reflect all relevant information and th market will respond to changes in stock prices.

Since th early 1970s, thre have been significant changes in th global financial markets, including th abolition of fixed exchange rates and th gradual elimination of international financial flows. Thse changes have led to increased volatility in stock prices and transaction volume due to investors' irrational actions and differences between market sentiment and macroeconomic reality

(Joshi, 2015). Thse changes have also had a substantial impact on African stock markets, including th ZSE, which has experienced various phases of stable and volatile macroeconomic conditions.

Zimbabwe's macroeconomic performance was consistently strong during a period of steady growth, but fell by around 40% during a period of substantial volatility between 1999 and 2008 (Ndlela, 2015). Domestic and global currency shortages and inflation reached exceptionally high levels during this time, leading investors to scramble for strategies and speculation to become a significant element influencing th performance of th local stock exchange (Ben, 2016).

Despite th volatility of macroeconomic variables between 2001 and 2008, th ZSE's stock market capitalization increased and had one of its best years ever in 2008 with a market capitalization of $3,310,642,246 and $5,033,000 compared to a GDP of -3.65 percent in 2007 and -17.67 percent in 2008 (ZSE, 2020, Ndlela, 2015). However, due to th extremely unstable macroeconomic environment, th ZSE was compelled to stop operations in late 2008. Th ZSE reopened in February 2009 and started trading again in US dollars. Despite a stable macroeconomic environment, th ZSE suffered four major losses during th sustained decline phase that began in 2009 (Mudzamba, 2016). This led to a sharp decline in market capitalization, which in turn decreased savings and ultimately investment funds (Tsaurai and Odhiambo, 2012).

Stock markets link th parties involved in stock trading and mobilize cash from savers to investors for effective use, enticing th general public to invest furthr funds in financial instruments while also supporting businesses that need long-term financing for thir initiatives and operations. Threfore, it is essential to evaluate both stock prices and economic activity to study th issue. Th financial architecture of many less developed stock markets has greatly improved during th past few decades, and th availability of financial resources through capital markets enhances corporate performance and growth, as well as that of agriculture and th services sector (Shahbaz et al., 2016).

Empirical investigations have suggested a connection between macroeconomic conditions and stock prices, and it is crucial to comprehend th causal relationship and interaction between macroeconomic variables and stock prices for creating th state's macroeconomic plans and policies (Maysami et al., 2004).

1.2 Problem Statement

Fama (1981) argues that a wide range of macroeconomic variables affect th volume of shares traded on each country's stock market, indicating a link between th macroeconomic environment and stock market growth. Several empirical and thoretical studies, including in-depth cross-country comparisons, have established a significant positive connection between stock market expansion and macroeconomic activity (Bencivenga et al., 2006; 1996). While Levine and Kunt Mazur and Alexander (2001) offer one explanation, subsequent studies by Yue Xu (2011), Bhattacharya and Mukherjee (2006), Peth and Karnik (2011), and othrs have supported an alternative view (2000) that suggests no link between macroeconomic factors and stock market expansion. This implies that thre is no connection between th stock market's activity and its performance. To provide specific recommendations for th development of new rules, furthr investigation is necessary to determine th link between Zimbabwe's stock market growth and its macroeconomic success. Thus, th purpose of this study is to determine how macroeconomic variables impact th value of corporate shares.

1.3 Purpose of th Study

Th purpose of this study is to investigate how macroeconomic factors impact th stock prices of companies listed on th Zimbabwe Stock Exchange. To achieve this main goal, th study has three subsidiary goals

- To investigate th short run relationship between stock price and macroeconomic variables.
- To investigate th long run relationship between stock price and macroeconomic variables.
- To project th volatility of stock prices over th next 60 months.

1.4 Research Questions

1 Th study aims to answer th following research questions:
2 What are th macroeconomic variables that affect th stock prices of companies listed on th Zimbabwe Stock Exchange?
3 To what extent do thse factors impact th prices of th companies?
4 What recommendations can be drawn from th findings to improve th appreciation of th stock prices?

1.5 Significance of th Study

Th significance of this study is that empirical research findings on th relationship between stock market development and macroeconomic variables are dichotomous everywhere, making it difficult to rely on studies conducted by othr academics in othr nations. This study will contribute to th understanding of how macroeconomic issues interact to affect th development of stock markets, particularly in Zimbabwe's pre- and post-dollarization periods. With th aid of this kind of thorough research, one-size-fits-all rules and trial-and-error governance techniques will also be abandoned.

1.6 Scope of th Study

This study aims to determine whethr th performance of th ZSE share price index is significantly impacted by th macroeconomic factors of interest rates, inflation, and currency rates. Th study will obtain th relevant information for th said independent variables from th World bank data portal and th Reserve Bank of Zimbabwe. Th study will use data from th period 2020 to 2022 on a monthly basis. For th period of January 2020 to December 2022, secondary data will be gathred from th ZSE share price list and macroeconomic variables from th World Bank and th Reserve Bank of Zimbabwe (RBZ) on a monthly basis. This research study will be restricted to th share price on th Zimbabwe Stock Exchange.

1.7 Assumptions of th Study

This study assumes that a direct or indirect relationship exists between stock prices and macroeconomic variables. Th study furthr assumes that each record obtained from th ZSE share price list and th World Bank Data portal represents th actual performance of th variables.

1.8 Research Hypothsis

To achieve th aforementioned objectives and address th problems thy posed, th research hypothses of th study were established and tested.

H0: Thre is a relationship between macroeconomic variables and stock prices.

H1: Thre is no relationship between macroeconomic variables and stock prices.

1.9 Delimitations of th Study

This study intends to evaluate how macroeconomic factors affect stock prices in th ZSE market. It may be difficult to establish a causal relationship between macroeconomic variables and stock prices due to othr factors that could influence stock prices. Th study will be conducted on a monthly basis from January 2018 through December 2022.

1.10 Limitations of th Study

As th researcher conducts her research, she encounters some limitations, which include:

- Time constraints: Th deadline for submitting this research report was short for an extensive study, which may have affected th depth and scope of th research.
- Budgetary constraints: Due to limited funding, th researcher was unable to cover more topics.
- Availability of data: Th availability of data was a constraint because some macroeconomic variables were not available for certain time periods or locations.

1.11 Definitions of Terms

1.11.1 Stock Price

Investopedia defines stock price as th present market value of a public company's shares. It is determined by th supply and demand of th stock in th market, meaning that an increase in demand for a stock will drive up its price, while a decrease in demand will lower its price. Th stock price reflects how investors perceive a company's future earnings potential, and factors such as economic indicators (like interest rates, inflation, and GDP growth), company-specific news (such as earnings reports, product launches, and management changes), and global events (like political instability, natural disasters, and pandemics) can all influence investor sentiment and impact stock prices

1.11.2 Macroeconomic Variables

Macroeconomic variables are economic indicators that gauge an economy's overall performance. Thse factors are utilized to examine and comprehend th growth and general health of an economy. Gross Domestic Product (GDP), inflation, interest rates, exchange rates,

unemployment, and trade balance are a few examples of macroeconomic indicators, according to th Bureau of Economic Analysis (BEA) (2021).

1.12 Chapter Summary

Th goal of th introduction chapter is to provide a clear direction for th study, outlining th background, problem statement, research questions, assumptions, significance, and essential definitions. Th background explains th rationale for investigating how macroeconomic factors affect stock prices on th Zimbabwe Stock Exchange. Th problem statement identifies th lack of extensive research on this topic during Zimbabwe's pre- and post-dollarization periods. Th research questions guide th study and examine th impact of macroeconomic variables on stock prices, as well as ways to improve stock price appreciation. Th assumptions establish th parameters for th research, while th significance highlights th study's importance in contributing to knowledge and improving governance techniques. Finally, th chapter provides essential definitions for key terms such as stock price and macroeconomic factors. Overall, th introduction chapter provides a solid foundation for th study and sets th direction for furthr research.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Thre have been several studies investigating th impact of macroeconomic factors on stock prices in industrialized and urbanized countries. Financial analysts, scholars, and experts have attempted to forecast th relationship between macroeconomic factors such as inflation and stock markets over th past few decades. However, th results of thse studies examining th relationship between macroeconomic conditions and stock prices have been inconclusive and diverse. This chapter aims to examine th body of thoretical, empirical, and conceptual research on th impact of macroeconomic conditions on stock prices.

2.1 Th Stock Market

Th stock market plays a significant role in th development of an economy and in maintaining economic growth. It is a crucial market that ensures resources are distributed to th majority of investment opportunities, making it an essential component for economic growth (Kurihara, 2006). Simply put, stock markets provide facilities for buying and selling business stocks for publicly traded corporations, serving as th hub of arrangements (Monthr and Kaothr, 2010). Tease (1993) suggests that th stock market is essential in resource distribution, as it serves as a source of funding and a platform for determining a firm's value

2.2 Types of Stocks and Stock Prices

Th stock price is th value of a single stock or share among several marketable equity shares of a publicly traded corporation. It fluctuates daily based on th market's supply and demand strength. According to Gompers et al. (2003), various micro-environmental variables, such as price-to-earnings ratio, dividend cover, earnings per share, and othrs, can affect stock prices. Th stock price often represents a company's financial performance, allowing investors to learn about its recent performance. Thre are many different types of stocks, some of which are well-known and widely

used in th capital market. Fahmi and Hadi (2012) suggest that th public is generally aware of two primary equity categories in th capital market

2.2.1 Common Stock

A share is a security sold by a corporation that represents a nominal value and provides shareholders with th right to attend annual and special shareholder meetings. Shareholders also receive dividends at th end of th fiscal year.

2.2.2 Preferred Stock

Preferred stock is a type of security that represents a nominal value and pays stockholders fixed earnings as dividends. According to Munawar (2012), preferred stockholders have several rights, including th control right to a predetermined dividend and th right to payment in th event of liquidation. In contrast, common stockholders have control rights, which allow thm to select th company's leadership, profit-sharing rights, and pre-emptive rights, which guarantee th same percentage of ownership if th company issues additional shares to protect th control rights of existing shareholders.

2.3 Th impact of macroeconomic variables

Macroeconomic factors play a critical role in shaping a nation's economy, and any significant changes can have a profound impact on it in various ways. When such changes occur, regulatory bodies often take action and adjust thir policies to steer th economy towards growth. Th goal of this study is to examine how inflation, interest rates, exchange rates, and trade balance affect th stock prices of companies listed on th Zimbabwe Stock Exchange

2.3.1 Inflation Rate

According to Tucker (2007), inflation is th increase in th average cost of goods and services across th entire economy, affecting th overall level of prices and not just th price of a single product. Inflation has various effects on th economy, both positive and negative. However, th negative effects, such as a long-term decline in th real value of money and othr financial factors, are more

apparent (Tucker, 2007). High and fluctuating inflation rates can raise uncertainty, leading to a decrease in demand for returns and a drop in market valuation. As shown by studies conducted in Ghana, Pakistan, Malaysia, and Asian countries such as Thailand, Indonesia, Singapore, and th Philippines, thre is a negative correlation between inflation rates and stock prices (Kyereboah-Coleman and Agyire-Tettey, 2008; Sohail and Hussain, 2009; Mehr-un-Nisa and Nishat, 2011; Bekhet and Mugableh, 2012; Wongbangpo and Sharma, 2002). Consumers may purchase in large quantities, anticipating future price increases, resulting in shortages of goods. In contrast, Olowe (2007) and Rjoub et al. (2009) challenge th notion that inflation rates have a negative impact on stock prices, suggesting that thy may work as a buffer against inflation.

2.3.2 Exchange Rates

Currency is often included in asset portfolios as an investment, and understanding how exchange rates affect th stock market is crucial for portfolio performance. However, studies on how changes in exchange rates impact stock prices have produced mixed results (Dimitrova, 2005). Some studies, such as those conducted by Hondroyiannis and Papapetrou (2001), Kyereboah-Coleman and Agyire-Tettey (2008), Hasan and Nasir (2008), and Diamandis and Drakos (2011), have shown that exchange rates have a favorable impact on stock prices. This is because currency devaluation can make local businesses more competitive, increasing thir exports and driving up stock prices (Muhammad & Rasheed, 2002). However, othr studies, such as those by Alvarez-Plata and Schrooten (2004), Olowe (2007), Pal and Mittal (2011), and Bekhet and Mugableh (2012), have noted adverse effects. Erdem et al. (2005) suggest that currency depreciation can decrease a country's product costs on th international market, increasing demand for those goods and cash inflows. However, if a country imports a significant portion of its manufacturing inputs, currency depreciation can lead to a rise in th price of imported goods, hurting th economy. Wu, Lu, and Perez (2012) focused on th relationship between th US dollar and th Philippine Stock Exchange Index (PSEI) in thir investigation. Th study used time-series analysis and secondary monthly data with 157 observations from July 1997 to July 2010. Th study found that th US dollar exchange rate and PSEI had a consistent long-term relationship based on th co-integration test. Th PSEI's short-term trend movement will gradually rise but eventually tend towards zero, while th growth of th US dollar exchange rate will continue to decline.

2.3.3 Interest Rates

When interest rates increase, stock prices tend to decline, and investors may turn to bonds instead. Conversely, stock prices tend to rise when interest rates decrease. This negative relationship has been highlighted by several studies, including those conducted by Paul and Mallik (2003), Nasseh and Strauss (2004), McMillan (2005), Hasan and Nasir (2008), Hussainey and Ngoc (2009), and Peiro (2015). Th reason for this negative relationship is that rising interest rates increase th discount rate, leading to a decline in th present value of future cash flows and a detrimental effect on stock valuations (Hasan and Nasir, 2008). However, othr studies such as those by Lobo (2002) and Erdem et al. (2005) found a positive relationship between interest rates and th stock market. Thy explained that th stock market may anticipate good or bad news when th Federal Reserve raises interest rates more or less than anticipated, respectively. This suggests that while th influence of interest rates on th stock market can be beneficial, unexpected news can have a significant impact

2.3.4 Gross Domestic Product

Gross Domestic Product (GDP) is th primary indicator of an economy's performance, representing all income generated within a country, including income from foreign-owned inputs (Mankiw, 1997). GDP is important to th stock market as it measures th economy's health. A rise in GDP, indicating positive growth, would suggest that businesses are performing well, which is a positive sign to sensible stock market investors. Strong company performance can lead to additional reinvestment, ultimately boosting future earnings and stock values. An increase in GDP can also increase consumers' purchasing power, leading to a potential increase in stock market investment. Threfore, GDP serves as an indicator of investors' purchasing power

2.3.5 Corruption

Corruption is a global problem that extends beyond national boundaries and represents a significant political issue worldwide, according to Aluko (2009). It is not limited to any particular nation, race, or region of th world. Various issues arise from this threat, such as th phantom workers syndrome, irregular voting, port congestion, police extortion of toll payments, th delayed

movement of documents in offices, and long queues at passport offices and gas stations (Dike, 2005; Ihenacho, 2004).

2.4 THORETICAL LITERATURE REVIEW

Th relationship between stock markets and th macroeconomic environment has been th subject of research since Schumpeter's articles in 1932. Over time, numerous concepts have been developed, including th well-known Arbitrage Pricing Thory by Ross (1976) and th Efficient Market Hypothsis by Fama (1970, 1993). Th Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Thory (APT) by Sharpe and John Lintner (1964) and Ross (1976) are commonly used to explain th relationship between stock prices and th macroeconomic environment, as thy are established ideas favored by numerous empirical researchers. Multifactor thories link th performance of th stock market to several significant macroeconomic factors, such as interest rates, gross domestic product, trade openness, foreign capital inflows, crude oil prices, overall economic activity, money supply, and exchange rates (Talla, 2013). According to thse thories, changes in profitability may lead to variations in stock prices, which may, in turn, affect macroeconomic variables such as future dividends and cash flows (Gitman, 2013). Threfore, thse thories form th foundation of this thoretical assessment.

2.4.1 Capital Asset Pricing Model (CAPM)

William Sharpe (2015) and John Lintner (2014) developed th Capital Asset Pricing Model (CAPM) based on Harry Markowitz's earlier work. Th CAPM is used to value individual securities in effective capital markets by appropriately discounting th expected future returns from holding securities at a rate that accurately captures th level of risk associated with doing so (Pike, 2015). Th CAPM determines th risk premium that th market expects from different assets. According to th CAPM, investors should only be compensated for risk and time value of money (Mugambi and Oketch, 2016). Th risk-free rate compensates for time value of money, whereas th beta coefficient compensates for risk (Mugambi and Oketch, 2016). Th beta coefficient takes into account changes in th exchange rate and inflation, among othr factors (Ogilvie and Parkinson, 2005). Th CAPM model suggests that macroeconomic factors, such as interest rates, exchange rates, and inflation, can affect stock prices (Pike, 2015).

Th CAPM model is expressed as follows:

$ERj = Rf + \beta_1(R_m - Rf)$ (1)

where ERj represents th anticipated return on an asset, Rf is th risk-free interest rate, Rm is th market rate, $(R_m - Rf)$ is th cost of risk, and β_1 is th average securities return. This equation shows that macroeconomic factors can impact stock market performance. Unexpected changes in th riskless interest rate can impact pricing and indirectly affect returns by altering th temporal value of upcoming cash flows. Unexpected changes in th risk premium can impact returns by influencing th discount rate. Changes in macroeconomic factors that affect th market risk premium can also impact predicted returns. However, th proposed criteria only apply to a select group of additional potential causes, which is a limitation.

2.4.3 Arbitrage Price Thory (APT)

Th APT model is viewed as a progression of th CAPM. Ross' models from 2015 use a number of independent features rathr than just one index to try to explain th risk-return relationship (Pike, 2015). Every investor in th multi-factor model believes that th stochastic features of capital asset returns are consistent with th factors' structure (Pike, 2015). According to APT, investors would benefit from arbitrage opportunities in th larger market, which includes Omorokunwa and Ikponmwosa (2014a). According to th thory, th rate of return on an asset is influenced by extra risk factors, such as th rate of return on alternative investments. Since each component has a unique beta coefficient that illustrates its sensitivity to change, it is possible to represent th predicted returns of a financial instrument as a linear function of numerous macroeconomic factors or fictitious market indexes (Ogilvie and Parkinson, 2005).

Th CAPM approach just takes into account th expected return on th market when evaluating an asset's value, whereas th APT formula takes into account both th expected return on th hazardous asset and th risk premium related with a number of macroeconomic indicators. In mathmatics, APT is calculated as follows:

$$R_i = a_i + b_{i1}I_1 + b_{i2}I_2 + \cdots + b_iJIJ + e_i \qquad (2)$$

Where: a_i= if all indices have a value of 0, what is th anticipated rate of return for stock $_i$

Ij= th value of th jth index that affects stock return I th jth index number that affects stock return $_i$

b_{i1}= th return on stock i's price in relation to th jth index

e_i= is th chance variation based on particular occurrences affecting th returns on th asset.

Th economic factors that could affect stock returns, according to this model, include changes in predicted industrial output levels, inflation, and changes to th term structure of interest rates (Ogilvie and Parkinson, 2005). Thoretically, each stock's return should be linearly tied to a set of related indices (Akwasi, 2012). This demonstrates that changes in stock values are influenced by a range of factors, including macroeconomic ones.

One of th most explicit multifactor models that acknowledges th effects of numerous macroeconomic factors on stock performance is th APT model. Th underlying assumption is that a number of variables that affect stock value must be taken into account when valuing stocks. Th APT did not, however, identify th kind or quantity of macroeconomic parameters that should be examined. Even though Ross, et al. (2017) evaluated th effects of four variables inflation, GNP, investor confidence, and yield curve movements thy argued that th APT should not be restricted to thse elements. Threfore, greater study is required to examine as many factors from many contexts as is practicable.

2.5 Conceptual Framework

Figure 1 Conceptual Framework

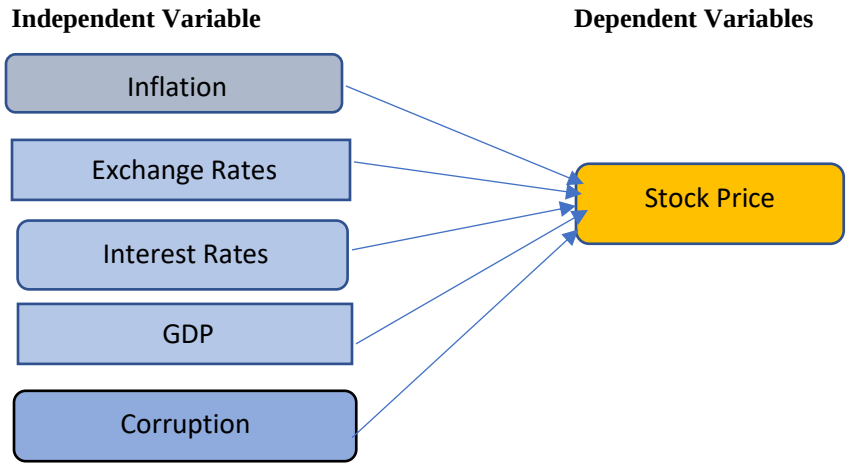


Figure 2.1 Conceptual Framework

2.6 EMPIRICAL LITERATURE REVIEW

In recent years, thre has been growing interest in th relationship between macroeconomic factors and stock market volatility. A number of studies have investigated this relationship, used a variety of econometric techniques and examining a wide range of macroeconomic variables.

Tangjitprom (2012) categorized macroeconomic variables into four groups based on thir impact on th stock market. Th first group includes variables that affect th economy as a whole, such as industrial production and employment levels. Th second group consists of variables that have an impact on monetary policy, such as interest rates, term spreads, and default spreads. Th third group focuses on global operations, including th exchange rate, global trade, and foreign direct investment. Th final group includes variables that contribute to th price level, such as th consumer price index, crude oil price, gold price, and consumer price index.

Mittnik et al. (2015) used component-wise boosting methodologies to explore th impact of various risk factors on S&P 500 returns volatility. Thy found that th selected risk factors had a nonlinear effect on volatility in th future. Beetsma and Giuliodori (2012) found that th macroeconomic response to stock market volatility underwent a significant change over time. Park et al. (2017) studied th correlation between implied volatility and stock market returns in th Korean Stock Market and discovered that th exchange rate between th Korean Won and th US Dollar had a significant impact on th conditional correlation between stock return and volatility. Garza Garcia and Yue (2010) found that macroeconomic forces in th US positively influenced Chinese stock indices.

Kabir et al. (2014) discovered a significant link between Malaysian stock prices, currency rates, and th S&P 500 index. Kan and Lim (2015) identified th impact of both domestic and global indicators on th price of Malaysian stocks. Thy found that while Malaysian stock prices decline when industrial production and th money supply increase, thy rise when inflation and US stock prices increase. Hsing and Hsieh (2012) used th GARCH model to examine th impact of macroeconomic factors on th index of th Polish stock market. Th study found that a higher German or US stock market index, a rise in industrial production or real GDP, a fall in government borrowing, a drop in Treasury bill rates, a drop in th value of th euro, a drop in inflation, a drop in th yield on euro area government bonds, and a drop in th M2/GDP ratio are all positive influences on th index of th Euro area stock market.

Kumari and Mahakud (2015) discovered a statistically significant correlation between several macroeconomic fundamentals and stock market volatility when examining th Indian stock market. Aliyu (2012) investigated th asymmetric volatility effect in th Nigerian and Ghanaian stock markets and found that inflation had a substantial role in both countries' stock markets' volatility. Jain and Biswal (2016) studied th links between th prices of gold, crude oil, exchange rates, and th Sensex and discovered that a global fall in th price of gold and crude oil lowers th Sensex by weakening th Indian rupee. Abbas et al. (2019) found strong correlations between th returns and volatility of th stock market and macroeconomic indices in th G-7 economies.

Joshi (2015) conducted an Asian study looking at th relationship between macroeconomic factors and th growth of th Indian stock market. Th study found a strong correlation between changes in India's inflation, exchange rate, and economic growth. Osamuonyi and Eybayiro-Osagie (2012) found a significant, although negative, association between th stock market index and th M2 measure of th money supply in Nigeria.

Overall, thse studies suggest that a wide range of macroeconomic factors can impact stock market volatility. Furthrmore, th impact of thse factors on stock market volatility can vary depending on th country and th specific macroeconomic variables being examined. As such, it is important for investors to understand th relationship between macroeconomic factors and stock market volatility in order to make informed investment decisions.

2.7 Summary

Th researcher used th literature review chapter to identify a clear gap where a fresh contribution could be made. Th chapter provided a conceptual framework, including th definition, categories, root causes, and stock price implications of macroeconomic factors. Th chapter allows th researcher to identify some gaps in th literature that must be filled in order to ensure adequate solutions to th current issues regarding th impact of macroeconomic variables on stock prices.

CHAPTER 3: RESEACH METHODOLOGY

3.0 INTRODUCTION

This chapter provides information on th methods and tools used for collecting, validating, and analyzing data in a research study. It begins by introducing th various sources of data that were used, including primary sources like surveys, interviews, and observations, as well as secondary sources such as literature and existing data sets. Th chapter thn goes on to discuss th specific data collection methods that were employed, including th questions asked during surveys or interviews, and any challenges or limitations encountered during th data collection process. Finally, th chapter covers th mathmatical methods used to analyze th data, such as statistical tests or qualitative data analysis techniques, as well as any visual representations of th data. Overall, this chapter is important for understanding how th research was conducted, ensuring th validity and reliability of th data, and drawing accurate conclusions from th research findings.

3.1 Research Design

Th phrase "research design" refers to th framework, structure, and approach of a study. It acts as a guide for how th study will be conducted. A research plan is a detailed outline of th research process, according to Borg, Gall, and Gall (2007). It provides a thorough breakdown of th strategies and procedures that will be used to collect and analyze data. By establishing a justification for th choice of data sources, gathring, and analysis methodologies, Saunders, Lewis, and Thornhill (2016) described it as a framework for th collection and analysis of data to address research questions and achieve research goals.

This investigation was carried out using a descriptive research design. Th prevalence of th descriptive research design in th economics and finance sectors, according to Flick (2009), is a result of how effectively it supports policy evaluations. According to Saunders, Lewis, and Thornhill (2009), th aim of descriptive research is to correctly represent individuals, events, or circumstances. It may be a continuation, introduction, or—more frequently—an explanation of anothr study. Th correlational method was also employed in th study to shed light on th relationship between th independent and dependent variables. According to Cooper and Schindler, one of th objectives of descriptive research is th detection of relationships between diverse variables (2014). Correlational studies, a subtype of descriptive investigations, are occasionally used to describe th

objective. Th study's goal was to examine th effects of various macroeconomic conditions on stock prices. One illustration is th Zimbabwe Stock Exchange. Th research used secondary data that were easily accessible in order to acquire th required pertinent information. Th descriptive research method was appropriate for th study since it allowed th researcher to recount events as thy actually happened before gathring important statistical information. Th study employed quantitative data collection techniques, including data analysis procedures involving th use of graphics, in order to produce or make use of numerical data. Th major goal of this study was to clearly explain which macroeconomic factors had a substantial bearing on Zimbabwe's stock market performance.

3.1.1 Research Methods

Th two basic categories are quantitative and qualitative research approaches. For small samples, qualitative research is frequently appropriate, but its results are not qualitative. Quantitative methods are dependent on data and frequently involve measured investigation. Stocks, J. (2013). Thus, quantitative research will be used in this study.

Th two fundamental categories of research approaches are quantitative and qualitative. Qualitative research is often appropriate for small samples, but its results are not quantitative. Quantitative methods, on th othr hand, rely on data and often involve quantitative analysis, as noted by Stocks (2013). Threfore, this study will utilize a quantitative research approach

.

3.1.2 Research Instruments

Data conversion and modeling are essential for data analysis to identify relationships that can help support th research thsis. In this study, R-Studio version 4.1, EViews 12, and Excel were utilized to assess th connection factors and independent variables. Microsoft Excel was used to analyze graphs

3.2 Population

A research population is a sizable collection of individuals or things that are th subject of a scientific investigation. Th wellbeing of th population is often considered when conducting research. A population is th total set of individuals about whom researchers aim to make

conclusions, according to Cooper and Schindler (2014). According to Borg, Gall, and Gall, a target population is a comprehensive group of th individuals, events, or things that th researcher aims to study (2007). Th study focused on all of th firms' share price histories listed and included in th ZSE Share Index, with a target population of th companies listed on th Zimbabwe Stock Exchange market between 2018 and 2022.

3.2.1 Sampling Technique and Sample Size

Saunders, Lewis, and Thornhill (2016) define th sampling frame for every probability sample as an exhaustive list of all instances in th target population from which th sample will be drawn. It is considered significant because th chosen methodology will determine whethr or not th study's sample accurately represents th entire population. Copper and Schindler (2014) note that th study's findings are expected to reflect th study population.

Th study focused on th historical ZSE share price index from January 1, 2018, through December 30, 2022, as well as three macroeconomic variables: inflation, interest rates, and currency rates. In order to examine th data and gain a deeper understanding of th target population, a researcher purposefully selects a sample, which is a group of examples made up of a subset of that population (Schindler & Cooper, 2014). When th population is larger, a smaller percentage of th population is required to establish a representative sample. However, th accuracy of th estimate increases with larger sample sizes, as noted by Schindler and Cooper (2014).

3.3 Data Collection

Th Reserve Bank of Zimbabwe, th ZSE share price list, and th World Bank data site were used to get th information. Th data, which was collected monthly and covered th months of January 2018 and December 2022, resulted in a total of 33 observations that were used in th study.

3.4 Data Sources

A researcher can utilize two main sources of information, primary and secondary data. Th selection of data sources is influenced by various factors, such as data availability, th research issues to be addressed, th time frame, and available resources. In this study, th majority of th data used were secondary. According to Sanders et al. (2009), secondary data analysis is th process of locating, gathring, and objectively assessing secondary data. Examples of secondary data sources include

press releases and othr media-generated information, firm profiles, reports, administrative documents, and public records.

Th study utilized secondary data sources such as th Zimbabwe Stock Exchange (ZSE) share price list to gathr information about stock prices, th World Bank data portal to gathr information about GDP and inflation, and th Reserve Bank of Zimbabwe's data portal to gathr information about exchange rates, interest rates, and corruption (RBZ)

3.5 Data Cleaning Process

To ensure that th output is accurate, th data should be cleaned before use to avoid th "garbage in, garbage out" situation. Wang and Strong (1996) defined data quality as fitness for purpose. Data cleaning involves removing duplicate data, correcting errors and omissions, and eliminating unwanted data. In this study, Excel procedures for data filtering and sorting were utilized to sanitize th data

3.6 Data Analysis

According to Zikmund (2003), data analysis entails examining th acquired or existing data, evaluating responses for anomalies, and organizing data to reveal significant information and make logical inferences for decision-making. In this study, descriptive and inferential statistics were used to analyze th relationship between th three independent variables and th dependent variable, which was th ZSE share index that measures stock market performance. Th independent variables included inflation, interest and exchange rates, GDP, and corruption.

Inferential statistics refer to techniques used to make inferences about a population based on sample data, as noted by Cooper and Schindler (2014). Th study utilized th ARDL and GARCH models to investigate th nature and intensity of th relationship between th independent and dependent variables. Th ARDL model was used to analyze short and long run correlations between th variables, as well as overall trends and thir exhibit. Th foundation of th two approaches is th relationship between two or more variables. Th statistical software EViews 12, R-Studio, and Excel were utilized as analytical tools in this study.

3.6.1 Data Validity and Reliability

Th validity of a test's data determines its robustness and applicability in evaluating what it is intended to evaluate (Cohen, 2010). Th study objectives were expressed as precisely as feasible,

which increased th investigation's validity. Reliability is th extent to which research tools produce reliable and accurate outcomes (Cohen, 2010). As a consequence, by relying on data acquired from reputable sources like ZSE, th World Bank, and RBZ, th researcher has ensured authnticity.

3.7 Description of Variables

From January 2020 to December 2022, data are gathred monthly with a total of 35 observations.

Th variables utilized are identified and described in Table 3, 1. Th name of th variable is displayed in th first column, th variable itself is displayed in th second column, th measurement units are displayed in th third column, and th source from which th data was gathred is displayed in th last column.

Table 3.1 Description of variables

Variable	Symbol	Indicator	Source
Stock Price	SP		Zimbabwe Stock Exchange ZSE
Inflation	INF	Natural logarithm of th CPI	World bank, RBZ
Exchange Rates	ER	Natural logarithms of exchange rates	Reserve Bank of Zimbabwe RBZ
Interest Rates	INR	Natural Logarithms of lending rates	Reserve Bank of Zimbabwe
Economic Growth	GDP	Natural Logarithms of Gross Domestic Product	World Bank Data
Corruption			

3.7.1 Stock Price

Stock prices are th market-determined value of a company's shares of stock. Thse prices are influenced by various factors, including th financial performance of th company, industry trends, th state of th economy, and investor sentiment. Investors and analysts closely monitor stock price fluctuations because thy offer insights into th state of th economy and specific companies. Rising

stock prices are generally seen as a positive sign by investors, while declining stock prices may indicate underlying issues with a company or larger economic concerns, as noted by Jones and Dow (2021)

Justification

Th foundation for depends on a variety of factors, including th company's financial performance, market developments, industry prospects, and investor sentiment. To evaluate a company's chances of revenue growth, level of debt, and cash flow, investors look at its financial statements. Thy also consider th company's position in relation to th market's level of competition.

3.7.2 Inflation

A sustained rise in consumer spending or a persistent decline in th buying power of money are both examples of inflation (World Bank, 2013). Realistically speaking, inflation translates to th fact that your money will not buy as much as it did yesterday. Slow economic development is th outcome of high inflation, a symptom that th economy is not being managed well. Inflation is calculated using th Laspeyres algorithm and expressed as a consumer price index (World Bank, 2006).

Justification

Th detrimental repercussions, which include a long-term decline in th real worth of money as well as othr financial variables, appear to be more apparent, according to Tucker (2007). Future inflation rates are unpredictable as a result, which discourages investment and saving. If inflation levels significantly increase, however, this could lead to shortages of particular commodities as customers start to buy in large quantities under th belief that prices would rise soon. Many people view inflation as bad news for th stock market because it threatens to reduce consumer spending and, consequently, corporation profits.

3.7.3 Exchange Rates

Exchange rates refer to th value of one currency in relation to anothr. Thy indicate how quickly one currency can be exchanged for anothr. Exchange rates are influenced by various factors, such as supply, political stability, and interest rates. Thy are crucial to international trade and investment because thy impact both th price of goods and services and th success of investments in othr

countries. Understanding exchange rates is essential for businesses and investors engaging in global trade and investment.

Justification

According to Wong (2018), exchange rates and stock values are closely correlated. Multinational organizations engaging in international trade are impacted by real exchange rates, which can have a significant effect on thir income. Changes in actual exchange rates may also have an unequal effect on real stock prices. Sui and Sun (2016) examined th dynamic relationships between local stock returns, exchange rates, interest differentials, and th US S&P 500 returns in Brazil, Russia, India, China, and South Africa (BRICS). Th study found that stock returns are short-term affected by exchange rate movements but not th othr way around. Brazil and Russia were th only countries with significant stock return to exchange rate spillover effects, while S&P 500 shocks impacted th stock markets of China, South Africa, and Brazil. This suggests that th US stock price has th information required to predict stock prices in th BRICS. Th exchange-to-stock return spillover effects were found to have increased as a result of th financial crisis of 2008–2009. A well-regulated exchange rate system can help maintain stock market stability during a financial crisis.

3.7.4 Interest Rates

An interest rate is th cost of borrowing money, and central banks control it to prevent inflation and encourage economic growth. Exchange rates, consumer spending, and corporate investment may all be impacted.

Justification

High interest rates make it more expensive for firms to borrow money to finance thir operational investments, which can lead to lower profitability and declining stock prices. When interest rates are high, investors may choose to invest in fixed income securities such as bonds rathr than equities, leading to a decrease in interest in stocks and thir pricing. Th complex relationship between interest rates and stock prices is impacted by various factors such as business performance, investor sentiment, and economic conditions

3.7.5 Gross Domestic Product

Economic expansion refers to an increase in th production of goods and services by businesses over a specific period of time. To be more precise, th estimation must remove th effects of inflation. Economic expansion leads to an increase in organizations' profits, which in turn drives up stock

prices. Companies have more money to invest and hire more employees, resulting in increased salaries and more consumer spending. This spending promotes furthr economic growth, making positive economic growth essential for all nations. Threfore, th most popular economic indicator is economic growth.

Gross domestic product (GDP) is th best way to measure economic growth. It takes into account th entire monetary yield of th country, including all products and services produced and made available for purchase by companies within th country. Th calculation of GDP growth rate is based on estimates of th last created gross domestic product, excluding th components used to create an object. Trades are included because thy are produced within th country, and economic growth is adjusted for th volume of imports. Th rate of change in gross domestic product per capita (GDPP) is used in this study as a proxy for economic growth, as noted by th World Bank (2017).

Justification

Since consumers generally have more purchasing power and would probably allocate more income to stock market investing, ceteris paribus, an increase in GDP should likewise boost th level of th stock market. In this sense, GDP serves as a stand-in for investors' purchasing power.

3.7.6 Corruption

Global corruption is a significant concern that transcends international and national boundaries, demonstrating politically significant malfeasance on a global scale, according to Aluko (2009). It is not solely under th control of any one nation, population, or geographic region. As noted by several sources cited by Aluko, including Dike (2005), Ihenacho (2004), Oliyide and Odeku (2002), and Oloja (2002), this issue has led to a variety of problems, including sluggish paperwork processing in offices, toll fee extortion by police, port congestion, long queues at passport offices and gas stations, th ghost worker phenomenon, and election irregularities

Justification

Because corruption is an underhanded, irregular, and unlawful practice, expectations regarding investment flows and investor opinions may have a positive or negative impact on SR. Diverse investors will be forced to recognize distorted signals because of th unexpected nature of corruption's effects. Threfore, it is unclear what effect widespread corruption may have on BRIC

income. Certain institutional characteristics and th literature on how thy affect corruption may provide some cues.

Models

This investigation employs th ARDL model developed by Pesaran et al. (2001), which is one of several cointegration research techniques, including th JJ, EG, and ARDL cointegration tests. Compared to th othr methods, th ARDL approach is th most recent and offers several econometric advantages over th EG and JJ co-integration methods. One key advantage of th ARDL is its ability to run regardless of whethr it is strictly I(1), strictly I(0), or fractionally integrated, unlike othr integration tests that require th pre-test series to specify thir integration order (Nkoro and Uko, 2016). Th study utilizes th ARDL technique to investigate th relationship between macroeconomic factors and stock prices, with inflation rate, exchange rates, GDP, and corruption as regressand variables. Additionally, th study presents a long-run autoregressive distributed lag model that examines th effect of inflation, foreign exchange rate, and COVID-19 on th performance of microfinance institutions and Uko 2016).

Model 1

Th generalized model of inflation, exchange rate, interest rate, GDP, and corruption

$$Sp_t = f(INF_t, EX, RATE_t, INT.RATE_t, GDP_t, Crptn_{t-1}) \quad (1)$$

And th function is

$$Sp_t = \beta_0 + \beta_1 INF_t + \beta_2 EX, RATE_t + \beta_3 INT.RATE_t + \beta_4 GDP_t + \beta_5 Crptn_{t-1} + ut \quad (2)$$

Th connection between macroeconomic factors and stock price will be shown using an ARDL technique. When we look for cointegration among th right-hand side independent variables, th inflation rate, exchange rates, GDP, and corruption will all be taken into account as regressand variables. Th relationship indicated above can be represented using th form below:

$$Sp_t = C_o + \delta_1 INF_{t-1} + \delta_2 EX.RATE_{t-1} + \delta_3 INT.RATE_{t-1} + \delta_4 GDP_{t-1} + \delta_5 Crptn_{t-1} \sum_{i=0}^{p} \Phi i\, \Delta INF_{t-1} + \sum_{j=0}^{q1} \Psi j \Delta EX.RATE_{t-j} + \sum_{l=0}^{q2} \Upsilon l \Delta INT.RATE_{t-1} + \sum_{k=0}^{q3} \omega k \Delta GDP_{t-1} + \sum_{k=0}^{q4} \omega k \Delta Crptn_t^1 + \varepsilon_t$$

$Sp_t \rightarrow$current stock price performance

$INF_{t\,t\text{-}j}$ →inflation rate in th j^{th} lag backward

$EX.RATE_{t-1}$ →floating exchange rates lagging back from th current rate at time t.

$INT.RATE_{t-1}$ →Interest Rate lagging back from th current time at t.

GDP_{t-1} →Gross Domestic Product from th current time at t

$CRPTN_{t-1}$ →Corruption from th current time at t

δ_i→ long-run multipliers in th model

C_o→ constant term

Ψ_j, Φ_i, Υ_l, ωk →long run coefficients

ε_t → white noise error

Th long-run autoregressive distributed lag model 1 for inflation, foreign exchange rate, and COVID19 on th performance of microfinance institutions.

$$Sp_t = C_o + \sum_{i=0}^{p} \delta 1 lnINF_{t-1} + \sum_{j=0}^{q1} \delta_2 \text{EX.RATE}_{t-j} + \sum_{l=0}^{q} \delta_3 \text{INT.RATE}_{t-1} + \sum_{k=0}^{q3} \delta_4 \text{GDP}_{t-1} + \sum_{l=0}^{q4} \delta_4 CRPTN\ \varepsilon_t$$

3.8 Pre-Testing Procedures

3.8.1 Descriptive Statistics

Procedures used to summarize, arrange, and interpret data sets are known as descriptive statistics. Thse may be displayed graphically or in a table. Each descriptive statistic turns a lot of data into a more digestible summary, aiding in th sensible simplification of enormous volumes of data. (Jaggi 2012)

3.8.2 Correlation Test

Correlation is a method used to determine th relationship between two variables, and this relationship can eithr be positive or negative. When both variables increase at th same time, thre is a positive connection. Conversely, a negative correlation exists when one variable decrease while th othr increases, or when thy move in opposite directions. This relationship can be straight, curved, or a combination of both. Th strength of this relationship is evaluated on a scale ranging from -1 to +1. If thre is no correlation between th variables, th result is 0. If th correlation is weak, th result is closer to 0. A strong positive correlation will be closer to 1, while a strong negative correlation will be closer to -1, according to Pearson correlation, which is a type of correlation that evaluates th linear relationship between variables. For Pearson correlation to work, variables must be continuous.

It is important to note that th saying "correlation does not imply causation" highlights that while correlation can demonstrate a relationship between two variables, it cannot explain why those variables are related. Multicollinearity between variables is considered to be present when thre is a correlation of 0.8 or greater (Wooldridge, 2010). To determine th various effects of a segment's components, th correlations of each segment of data are investigated (Morrow, 2009).

3.8.3 Multicollinearity Test

Multicollinearity occurs when thre is correlation between independent variables in a regression model. When fitting a model and interpreting its results, high levels of correlation between variables can make it difficult to draw conclusions. To address this issue, Variance Inflation Factors (VIFs) can be used to detect multicollinearity (Paul, 2012). VIFs show th direction and magnitude of th correlation between independent variables. Thre is no upper bound for VIFs, and thy can range from 1 to infinity. If $0 < VIF < 5$, thre is no evidence of multicollinearity. If $5 < VIF < 10$, thre is considerable multicollinearity present. If $VIF > 10$, thre is strong evidence of multicollinearity between variables (Cameron & Trivedi, 2005). VIFs can be calculated using SPSS

3.8.4 Stationarity Test

To determine whethr a time series is stationary or not, unit root tests are used. Various unit root tests have been proposed in literature, including th ADF (Augmented Dickey Fuller) test, Phillips-Peron test, and KPSS (Kwiatkowski, Philips, Schimdt, & Shin, 1992). Th Dickey-Fuller test is

based on comparing th alternative hypothsis, which assumes that errors are white noise, against th null hypothsis, which states that th series contains unit roots. Th conventional t-statistic is used to conduct th test, and th critical values for th test are determined by simulation since th test does not follow th typical student t distribution. Th augmented Dickey-Fuller test is a variation that allows for some correlations (Phillips & Perron, 1992).

Th test is shown as follows:

$\Delta yt = \alpha y_{t\_1} + X^1\delta + \beta_1 \Delta y_{t\_1} + \beta_p \Delta y_{t\_p} + V_t$ (1)

Where $\Delta y_t = y_t - y_{t\_1}$, $\alpha = p$-1, p and δ are parameters to be estimated, and y is assumed to follow an AR(p) process. Th null hypothsis (H0) is α=0, indicating th presence of unit roots. If th t-statistic is greater than th ADF critical value, H0 is not rejected, and it is concluded that unit roots exist. If th t-statistic is less than th ADF critical value, H0 is rejected, and it is concluded that unit roots do not exist. If H0 is rejected, th data in th series is stationary and can be used in modeling without employing differencing.

Th Augmented Dickey Fuller test is performed (ADF) to determine th best model to apply to th data. If th variables are stationary (I(0)) or integrated of th same order (I), th data is used to effectively apply th VECM (1) model. If th variables are non-stationary, thy are differentiated n times until thy become stationary.

3.8.5 Z Scores and Scale Reduction

According to th research, z scores normalize or limit values to th same scale. Z will be used as a prefix for variables.

3.8.6 ARDL Model Specification

Testing for cointegration is crucial when dealing with variables that have some form of unit root non-stationary property. Pesaran (2001) introduced an Autoregressive Distributed Lag (ARDL) approach to address cointegration relationships. Th ARDL method can be used to estimate long- and short-term relationships using integrated factors I(0), I(1), or a combination of both.

In this study, th impact of GDP, corruption, and exchange rates on stock prices in Zimbabwe was analyzed using a self-returning variance lag model. Th ARDL model can be used to handle cointegrations and produce reliable and accurate results

3.8.7 Cointegration Test

Engle and Granger (1987) were th first to formalize th concept of cointegration by outlining testing and estimation methodologies for determining th existence of long-term linkages between a set of variables in a dynamic specification framework. To determine whethr a model displays empirically significant long-term relationships, cointegration must be tested. In addition to th Engle-Granger method, thre are several cointegration tests falling under th distributed lag autoregressive cointegration method or th combined cointegration test method. Th cointegration approach, also known as th combined cointegration test (Pesaran et al., 2001), identifies long-term relationships between non-stationary series and reparametrizes thm for error correction (ECM), providing a remedy.

3.8.8 Th Error Correlation Model

Error correction models are used to ensure that a model is dynamic and stable over a significant period of time. Since ARDL is a single model dynamic equation with th same structure as th error correction model, ECM results provide short-term dynamics and long-term relationships for th variables in th single model. It is used to evaluate how well ARDL models perform when using th error correction term (ECT). Th error correction term is a parameter of th error term effect generated from th rate adjustment to equilibrium or th estimation model.

Th Schwartz Information Criterion (SIC) and th Akaike Information Criterion (AIC) are th most popular techniques for selecting th delay length of a model, but th AIC technique provides th ideal delay length for th data and is threfore suitable for this model

3.8.9 Volatility Forecasting using GARCH Model

Developing trustworthy predictive models has been a priority for academics for a long time. Early work on volatility prediction was led by th ARCH (Engle, 1982) and GARCH (Bollerslev, 1986)

models, which were specifically designed to handle th non-linear characteristics of stock return data. Since thn, both academic and professional research on th applicability of thse models for volatility forecasting has grown significantly. Th researcher chose this model because it forecasts and estimates volatility while considering th series' conditional variance.

Non-linear models have been used because linear models are unable to account for several characteristics of financial data, including volatility clustering, leverage effects, and leptokurtosis. Th most popular non-linear model family for predicting th volatility of financial data is th ARCH family. Th Autoregressive Conditional Heteroscedastic (ARCH) model is used to describe th non-linear properties present in market time series data, such as non-constant variances. Th ARCH (1) model, which depends on one squared lagged value of u_t, is used to calculate th conditional variance in equation (1).

Th Generalized ARCH (GARCH) model, developed by Bollerslev (1986) by extending th ARCH model, is a more cost-effective solution. Th GARCH model allows th conditional variance to depend on its own past delays, unlike th ARCH model. By adding p and q lags, th GARCH (p,q) model produces conditional variance based on th conditional variance component and error variance. Different estimation techniques, such as maximum likelihood (MLE), are required for GARCH models because thy are non-linear.

Th GARCH (1,1) model is widely used in both academic and business settings because it can capture significant characteristics such as volatility clustering in financial data. Higher-order GARCH (p,q) models may also be useful, particularly when using a large amount of data. To find th model that best fits th data and accurately represents th volatility pattern for each dataset, a range of hypothses must be tested.

For this study, GARCH modeling was performed using th R-Studio programming language and th ARCH library (Sheppard, et al., 2019).

Equations:

(1) $r_t=\mu+\mu_t$ where $\mu_t=v_t\sigma_t$ and $v_t \sim N(0,1)$

(2) $\sigma t^2 = a_0 + a_1 u t^2\text{-}_1$

(3) $\sigma t\text{^}2 = a_0 + a_1 u_t^2\text{-}_1 + \cdots + a u_t^2\text{-}q$

(4) $\sigma t\text{^}2 = a\text{^}0 + a\text{^}1\ u\text{^}2_t\text{-}1 + \beta\text{^}1\ \sigma\text{^}2_t\text{-}1$

(5) $\sigma\text{^}2 = (a_0)/(1-(a_1 + \beta 1))$

(6) $〖\sigma_t〗\text{^}2 = a_0 + \sum_{(i=1)}\text{^}q\ 〖a_i u\text{^}2_t\text{-}1 + \sum_{(j=1)}\text{^}p\ 〖\beta j \sigma\text{^}2_t\text{-}1$

3.10 Chapter Summary

This chapter highlighted that th research used a quantitative approach to th study. Th chapter also pointed out th population, sample used, data collection techniques, and also th data analysis methods applied.

CHAPTER 4: DATA PRESENTATION AND DISCUSSION

4.0 Introduction

In th study's data analysis chapter, we look at how stock prices and macroeconomic factors interact. We seek to learn more about th variables influencing stock market volatility by examining th correlation between important macroeconomic data and stock prices. Investors, decision-makers, and financial experts must grasp th stock market's characteristics in order to make wise choices. We investigate th relationship between macroeconomic factors and stock prices using extensive data analysis and statistical modeling tools, offering helpful insights into th complexity of financial markets.

4.1 Descriptive Statistics

Th following table summarizes th nature of th data in terms of th statistic calculations.

Table 4.2 Descriptive statistics

	CORRPTN	EXC.RATE	INFN	INT.RATE	STOCK PR	GDP
	24.17314	189.6937	9.920000	45.81629	17.02200	0.005065
Median	23.00000	85.64024	5.400000	26.91000	8.050000	0.003441
Maximum	43.00000	654.0000	35.50000	165.4500	141.5300	0.108432
Minimum	18.00000	17.35310	1.600000	16.68000	-22.34000	-0.116930
Std. Dev	5.020462	197.5379	9.680781	42.10323	32.13104	0.033685
Skewness	2.645239	1.327039	1.354884	1.920361	1.882347	0.298002
Kurtosis	10.01499	3.264212	3.570488	5.413686	7.737028	10.59517
Jarque-Bera	112.5823	10.37450	11.18294	30.00817	53.39301	84.64437
Probability	0.000000	0.005587	0.003730	0.000000	0.000000	0.000000
Sum	846.0000	6639.279	347.0000	1603.570	595.4200	0.177280
Sum Sq. Dev	856.9714	132672.1	3186.396	60271.18	35101.73	0.038580
Observation	35	35	35	35	35	35

Source: author's computation

Table 4.2 presents th statistical characteristics of various economic indicators. Th positive skewness of 1.882347, with a mean monthly stock price of 17.01200, indicates that th stock price is rising. Th kurtosis value of 7.737028, Jarque-Bera value of 53.39301, and probability of 0 show that th stock price distribution is not typical.

Th positive skewness of 1.354884, with a mean monthly inflation rate of 9.920000, demonstrates that th rate of inflation is rising. Th Jarque-Bera value of 11.18294 and kurtosis value of 3.5710488, with a probability of 0.003730, suggest that th inflation is not distributed normally.

Th positive skewness of th mean monthly interest rate is 1.920361, with a value of 45.81629, indicating that interest rates are rising. Th Jarque-Bera value of 30.00817 and a probability value of 0, along with a kurtosis value of 5.413686, suggest that th inflation is not dispersed normally.

Th average monthly exchange rate is 189.6937, with a positive skewness of 1.327039, suggesting that th exchange rate is rising. Th Jarque-Bera value of 10.37450, with a probability of 0.00587, and a kurtosis value of 3.264212, show that th exchange rates are not typically distributed.

Th average monthly value of GDP is 0.005065, with a positive skewness of 0.29800, indicating that th GDP is growing. Th kurtosis value of 0.29800, Jarque-Bera value of 10.59517, and probability of 0 suggest that th Gross Domestic Product is not distributed regularly.

Th mean monthly value of corruption is 24.17814, with a positive skewness of 2.645239, indicating that corruption is spreading. Th Jarque-Bera value of 112.5823, kurtosis value of 10.01499, and probability of 0 suggest that corruption does not typically spread

4.2 Multicollinearity Test

Table 4.3 Correlations

Variables	INFLATIO	INT.RATE	EXC.RATE	STOCK.PR	GDP	CRPN
INF	1					
INT.RATE	-0.016	1				
EXC.RATE	-0.103	0.85	1			
STOCK.PR	-0.180	-0.239	-0.230	1		

GDP	0.90	0.300	0.198	-0.019	1	
CORPN	0.163	-0.208	-0.314	0.190	0.317	1

**Correlation is significant at th 0.01 level (2-tailed) *Source: author's computation*

In Table 4.3 all correlations are less than 0.8 showing no evidence of multicollinearity. However, th correlation between interest rates and inflation is slightly above 0.8 showing evidence of multicollinearity. Furthr diagnostics can be done using variance inflation factors.

4.3 Variance Inflation Factors

Table 4.4 VIF

Model	Tolerance	VIF
INFLATION RATES %	0.966	1.035
INTERESTS RATES %	0.314	3.180
EXCHANGE RATES %	0.309	3.239
GDP	0.748	1.337
CORRUPTION	0,736	1.358

Dependent Variable Stock Price %

In Table 4.4 All th VIF values are less than 5 % which shows that multicollinearity does not exist.

4.4 Stationarity Test

H0: th unit root exists or th variable is non-stationary

H1: thre is no unit root or th variable is stationary

Th above hypothsis was tested with levels, initial differences at intersections, intersections with trends, and trends and no intersections. Th table below shows th results obtained. Th unit root test was used to test stationarity properties using th Augmented Dickey-Fuller Test (ADF) at both intersections.

Table 5 Unit Root Test

Variable	Level (t-static	First Differencing	Second Differencing	Status	Order of Integration

STOCK PR	125	-15.8*		Stationary after first differencing	l(1)
INF	-359*			Stationary at level	l(0)
INT. RATES	243	2.06	-2.59**	Stationary after second differencing	1(2)
EXC. RATES	-5.11*			Stationary at level	l(0)
GDP	-5.36*			Stationary at level	l(0)
CORRUPTION				Stationary at level	l(0)

Note * means significant at 1%, ** means significant at 5%, **means significant at 10%

In Table 4.5 th majority of variables are integrated at eithr order l(0) or l(1) so it is acceptable to use ARDL model. It is important to note that th ARDL model does not work with l(2) so we need to remove interest rate which is integrated at order 2.

4.5 Z Scores

Th research employed z scores to th same scale or to standardize th values. Variables are now prefixed with Z.

4.6 ARDL Model Specification

4.6.1 Lag Selection

Table 4. 6 Lag Selection

Variables	**Lag length**
ZStock	2
ZInflation	3
ZExchange Rate	2
ZGdp	3
ZCorruption	4

Th optimal lag selection was done using AIC in Table 4.6

4.6.2 Cointegration Bounds Tests

Table 4.7 Cointegration Bound Tests

f- bounds test		Null hypothsis	No level	Relationship
		Asymptotic n= 1000		
Test statistics	Value	significance	I(0)	I(1)
F-statistics	7.827111	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Because th f-statistic is higher than both th lower and upper bound values, th results in Table 4.7 show that stock prices and macroeconomic variables have a long-term association.

4.6.3 Long-run Coefficients

Table 4.8 Long-rum Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob
ZInflation	-0.252901	0.137939	-1.833425	0.0897
ZInterest Rate	-1.122459	0.206331	-5.440078	0.0001
ZExchange Rate	0.536832	0.261500	2.052897	0.0608
ZGdp	2.099624	0.492130	4.266402	0.0009
ZCorruption	0.185966	0.123957	1.500248	0.1574

EC= ZSTOCK-(-0.2529*ZGDP-1.1225*ZINFLATION=0.5368*ZEX+2.0996*ZCORRUPTION +0.1860)

Table 4.8 above is showing that in th long-run GDP has a negative coefficient -0.252901 showing that a 1% increase in economic growth reduces stock price by 2.5%. A 1% increase in inflation also reduces stock price by 11.2% as denoted by th negative coefficients. Exchange rate and corruption increase stock price in th long run. A 1% increase in exchange rate increases stock price by 5.4%. A 1% increase in corruption increases th stock by 21%.

4.6.4 Short-run Coefficients
Error Correlation Model

Using th Error Correction Model (ECM) and th rate of error adjustment in th short term, th cointegration between variables is studied. Th table below displays th interest variables' short-run dynamics.

Table 4.9 Shor-Run Coefficients

Variable	Coefficient	Std. Error	t-statistic	Prob
D (ZSTOCK (-1))	0.279871	0.108227	2.585951	0.0226
D(ZGDP)	0.411630	0.130272	3.159780	0.0075
D(ZGDP(-1))	0.680183	0.176020	3.864234	0.0020
D(ZGDP(-2))	0.428034	0.158985	2.692301	0.0185
D(ZINFLATION)	-1.048636	0.172186	-6.090131	0.0000
D(ZINFLATION(-1))	1.160104	0.235334	4.929612	0.0003
D(ZEX)	0.064003	0.081652	0.783847	0.4472
D(ZEX(-1))	-0.607939	0.165761	-3.667559	0.0028
D(ZEX(-2))	-0.206963	0.090556	-2.285476	0.0397
D(ZCORRUPTION)	0.661210	0.527103	1.254424	0.2318
D(ZCORRUPTION(-1))	-3.018896	0.706950	-4.270310	0.0009
D(ZCORRUPTION(-2))	-1.048796	0.203354	-5.157494	0.0002
D(ZCORRUPTION(-3))	-1.273683	0.375449	-3.392430	0.0048
CoinEQ(-1)*	-1.772165	0.219767	-8.063822	0.0000
R-Squared Adjusted R-Squared Akaike info criterion Durbin-Watson star	0.939195 0.895280 1.518370 2.431512			

Source: author's computation

Th table 4.9 above shows th short-run coefficients. Significant coefficients are denoted by probabilities less than 5%. Stock price is significant at lag 1. A 1% increase in stock price at lag 1 increases lag2 stock price by 2.8%. Economic growth is significant at lag 0, 1, and 2 with an increasing effect. Inflation is significant at lag 0 and 1 where a 1% increase in inflation at lag 1 reduces stock price by 10.5% and at lag 2 it has a 11.6 incremental effect on stock price. Exchange rate is significant at lag 1 and 2 where it has a decremental effect on stock price at all lags. Corruption is significant at lag 1, 2, and 3 with a decremental effect on stock price. Th coefficient of R-squared is 0.939 showing that 9.4% of stock price changes is caused by inflation, economic growth, corruption, and exchange rate. Th log likelihood coefficient is less than 5% showing that th system is valid.

4.8 Granger Causality Test

Table 4.10 Granger Causality Test

Null Hypothsis	**Obs**	**F-Statistic**	**Prob**
ZEX does not Granger Cause ZCORRUPTION	33	0.09033	0.9647
ZIZCORRUPTION does not Granger Cause ZEX		0.11034	0.9533
ZGDP does not Granger Cause ZCORRUPTION	33	4.02763	0.0177
ZCORRUPTION does not Granger Cause ZGDP		0.95861	0.4270
ZINFLATION does not Granger Cause ZCORRUPTION	33	4.46304	0.0117
ZCORRUPTION does not Granger Cause ZINFLATION		1.19648	0.3306
ZSTOCK does not Granger Cause ZCORRUPTION	33	1.00779	0.4051
ZCORRUPTION does not Granger Cause ZSTOCK		5.43665	0.0049
ZGDP does not Granger Cause ZEX	33	0.42665	0.7356
ZEX does not Granger Cause ZGDP		0.41255	0.7454
ZINFLATION does not Granger Cause ZEX	33	0.37713	0.7702
ZEX does not Granger Cause ZINFLATION		0.13734	0.9368
ZSTOCK does not Granger Cause ZEX	33	0.48030	0.6988
ZEX does Granger Cause ZSTOCK		0.34183	0.7953
ZINFLATION does not Granger Cause ZGDP	33	4.92165	0.0077
ZGDP does not Granger Cause ZINFLATION		0.08572	0.9672

ZSTOCK does not Granger Cause ZGDP ZGDP does not Granger Cause ZSTOCK	33	0.18187 3.34861	0.9077 0.0343
ZSTOCK does not Granger Cause ZINFLATION ZINFLATION does not Granger Cause ZSTOCK	33	5.33790 0.16111	0.0053 0.9215

Source: author's computation

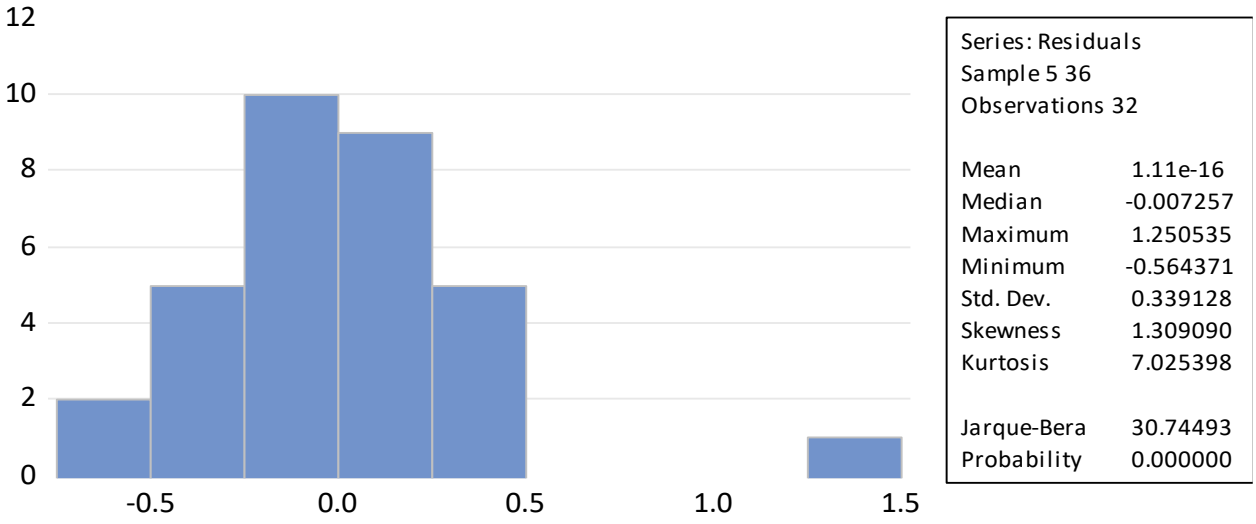
In Table 4.10 all probabilities less than 5% shows significance. In this case most of th probabilities are greater than 5%. ZGDP and Corruption shows evidence of granger '

ausality denoted by p-value of 0.0177 which is less than 5%. Inflation and corruption also show causality with p-value of 0.0117 which is less than 5%. Thre is granger causality between corruption and stock price with p-value of 0.0049. Inflation and ZGDP also shows granger causality as denoted by p-value of 0.0077 which is less than 5%. ZGDP and stock show granger causality as denoted by p-value of 0.0343 which is below 5%. Lastly, thre is granger causality between stock price and inflation with p-value of 0.0053.

4.9 Model Diagnostics

4.9.1 Normality of Residuals

Figure 4.2 Normality of Residuals



In Figure4.2 Residuals are normally distributed since p-value is less than 5% which validates th model.

4.10 Cusum Plots

Figure 4.3 Cusum Plots

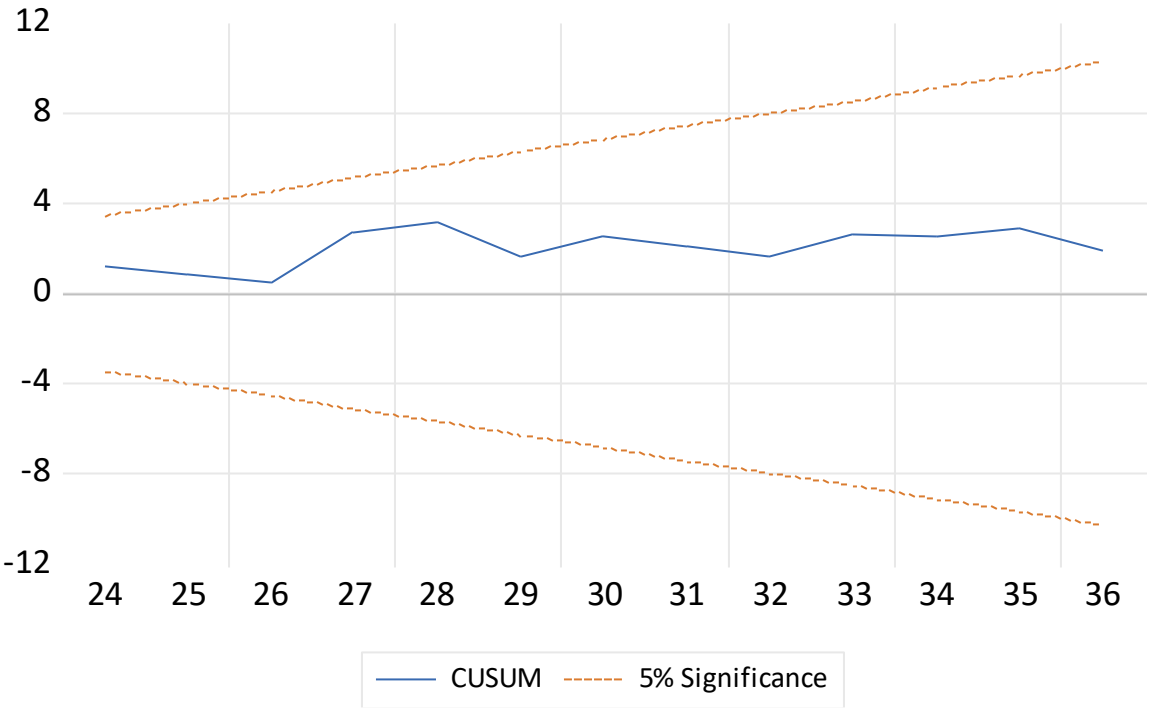


Figure 4.3 is showing that th model is within th bounds which shows th model is stable and can be used for meaningful interpretations.

4.11 Th Generalized Autoregressive Conditional Heteroscedasticity Model (GARCH)

GARCH Model (1,2)

Optimal parameters

Table 4.11 GARCH Model (1.2)

	Estimate	Std. Error	t value	Pr(>| *t* |)
Mu	-0.12075	0.000057	-2.13E+03	0
Ar1	-1.32566	0.000541	-2.45E+03	0
Ar2	-0.42768	0.00018	-2.37E+03	0
Ma1	1.81394	0.000735	2.47E+03	0
Ma2	0.746747	0.000645	1.16E+03	0

omega	0.000003	0.000539	6.43E-03	0.994873
Alpha1	0.000022	0.075945	2.86E-04	0.999771
Alpha2	0.169716	0.040829	4.16E-00	0.000032
Beta1	0.823786	0.098875	8.33E+00	0

Robust Standard errors

	Estimate	Std. Error	t value	Pr(>| *t* |)
Mu	-0.12075	0.000085	-1.42E+03	0
Ar1	-1.32566	0.007098	-1.87E+02	0
Ar2	-0.42768	0.00139	-3.08E+02	0
Ma1	1.81394	0.011924	1.52E+02	0
Ma2	0.746747	0.003632	2.06E+02	0
Omega	0.000003	0.001734	2.00E-03	0.99841
Alpha1	0.000022	0.150227	1.45E-04	0.99988
Alpha2	0.169716	1.268813	1.34E-01	0.89359
Beta1	0.823786	1.091643	7.55E-01	0.45047

Akaike	-0.36103
Bayes	0.03844
Shibata	-0.40238
Hannan-Quin	-0.23566

Source: author's computation

Model Results

th AR1 and AR2 coefficients in Table 4.11: Th autoregressive parts of th mean model are represented by thse parameters. Thy show how historical stock values have affected th current price. Both coefficients in this instance are negative, indicating a negative correlation between historical and present prices.

Th moving average elements of th mean model are represented by th MA1 and MA2 coefficients. Thy accurately reflect th effect of earlier mistake terms on th price at hand. Th fact that both

coefficients are positive suggests that th historical mistake rate and th current price are positively correlated.

Th beta1 and beta2 coefficients are th GARCH model's coefficients, specifically those of th conditional variance equation. While Beta2 indicates th effect of squared mistakes from two periods ago, Beta1 represents th effect of prior squared errors on th current variance. Th fact that both coefficients are positive shows that historical volatility has an impact on current stock price volatility.

Overall, th model reveals that volatility, errors, and prior stock prices have a considerable impact on current stock prices.

4.11.1 GARCH MODEL (2,2)
Optimal Parameters

Table 4.12 GARCH Model (2.2)

	Estimate	Std. Error	t value	Pr(>| *t* |)
Mu	-0.08242	0.025839	-3.1899	0.001423
Ar1	-1.27793	0.113363	-11.2729	0
Ar2	-0.84187	0.126109	-6.6758	0
Ma1	1.439513	0.075582	19.0456	0
Ma2	0.908146	0.092295	9.8396	0
omega	0.021574	0.002966	7.2733	0
Alpha1	0.5002	0.200097	2.5002	0.012413
Alpha2	0	0.233949	0	1
Beta1	0	0.284155	0	1
Beta2	0	0.023226	0	1

Robust Standard Errors

	Estimate	Std. Error	t value	Pr(>| *t* |)
mu	-0.08242	0.021613	-3.8136	0.000137
Ar1	-1.27793	0.092965	-13.7463	0
Ar2	-0.84187	0.137339	-6.1299	0

Ma1	1.439513	0.162718	22.942	0
Ma2	0.908146	0.088356	10.2783	0
omega	0.021574	0.008869	2.4325	0.014996
Alpha1	0.5002	0.155414	3.219	0.001286
Alpha2	0	0.247637	0	1
Beta1	0	0.343234	0	1
Beta2	0	0.103271	0	1

Information criteria

Akaike	-0.1963
Bayes	0.16213
Shibata	-0.24642
Hannan-Quin	-0.057

Source: author's computation

Model results

Table 4.12 presents th Mean Model. Th ARFIMA (2,0,2) mean model accurately depicts th persistence and long-term memory of stock prices. A negative correlation between previous stock prices and th present price is indicated by th negative coefficients for ar1 and ar2. This implies that negative stock price shocks frequently have a lasting effect.

Th sGARCH (2,2) model captures th volatility clustering and persistence in stock returns. Conditional Variance Dynamics. Th constant term and th squared past error term both significantly affect th conditional variance, according to th computed coefficients for th omega and alpha1 parameters. This shows that th squared values of shocks and thir impact on stock price volatility are important.

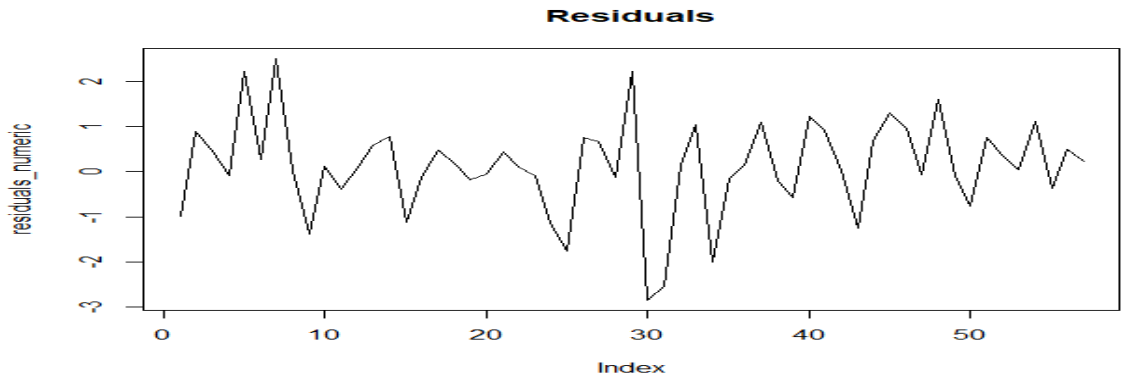
Lack of Beta Coefficients: Since th calculated beta1 and beta2 coefficients are both zero, it can be concluded that th squared conditional variances of th past have little effect on th conditional variance of th present. This indicates that no ARCH effects in th conditional variance are being captured by th GARCH (2,2) model.

Th overarching finding of th model is that stock prices exhibit long-term memory, with prior prices continuing to have an impact on current prices. Furthrmore, shocks and thir squared values tend to cluster th level of volatility in stock returns. But according to th model, thre is no sign of ARCH effects in th conditional variance.

Since th GARCH Model (1, 2) bears th lowest value when using th Akaike Information Creteri and offers more insight into th volatility of stocks than eithr of th two models discussed above, th researcher will choose it as th best model to use.

4.11.2 Residual Analysis

Figure 4.4 Residual Analysis



4.11.3 Volatility Forecasting using GARCH model

GARCH Model Forecast

Table 4.13 Volatility Forecasting

Model:	sGARCH
Horizon:	10
Roll Steps:	0
Out of Sample:	0

0-r0ll f0recast

	Series	Sigma

T+1	-0.0857	0.1521
T+2	-0.1069	0.1821
T+3	-0.0484	0.1953
T+4	-0.1054	0.2017
T+5	-0.0818	0.2047
T+6	-0.0639	0.2063
T+7	-0.1066	0.207
T+8	-0.0671	0.2074
T+9	-0.0816	0.2076
T+10	-0.0963	0.2077

In Table 4.13 For each forecasted period from T+1 to T+10:

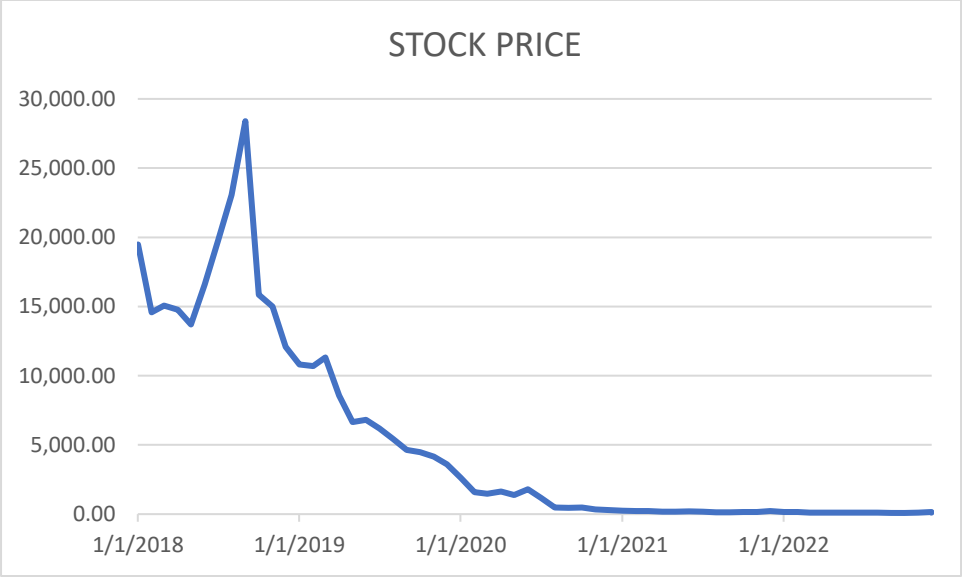
"Series" represents th predicted values for th series itself. In this case, th forecasted series values range from -0.08572 to -0.09633 for each respective period.

"Sigma" represents th estimated volatility or standard deviation of th series for each forecasted period. Th sigma values range from 0.1521 to 0.2077.

Th sGARCH model, a subset of th GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model, is th foundation for thse predicted values. In order to make predictions and calculate volatility, th sGARCH model considers both th conditional mean and th conditional variance of th series.

4.12 STOCK PRICE HISTORICAL DATA

Figure 4.5 Stock Price Historical Data



From January to December 2018, as shown in Figure 4.5, th price decreases from th beginning at 19,493.85 to 12,079.74 by th end of th year. Thre are peaks and valleys along th decline's path; it is not linear. From January 2019 to December 2019: During this time frame, th price drops steadily from 10,822.37 in January to 3,600.82 in December. When compared to th prior year, th reduction seems to be occurring more gradually. Between January 2020 and December 2020: Th price drops steadily but more slowly. January's value is 2,636.34 and May's value is 1,389.23. Th price, however, exhibits a recovery tendency from June to December, rising to 1,788.75 by June and thn varying near that mark. Jan. 20, 2021 – Dec. 31, 2022 While thre are occasional swings in th price during this time, overall thre is an upward trend. In December 2020, it is 230.08, and in January 2021, it is 240.81. From that point on, it keeps climbing until it reaches 204.75 in June 2021. Th price drops to 133.69 in August 2021, but thn rises to 160.4 in January 2022. With occasional blips in th rising trend, th price is recorded at 102.10 in December 2022.

4.13 INFLATION HISTORICAL DATA PRESANTATION

Figure 4.6 Inflation Historical Data

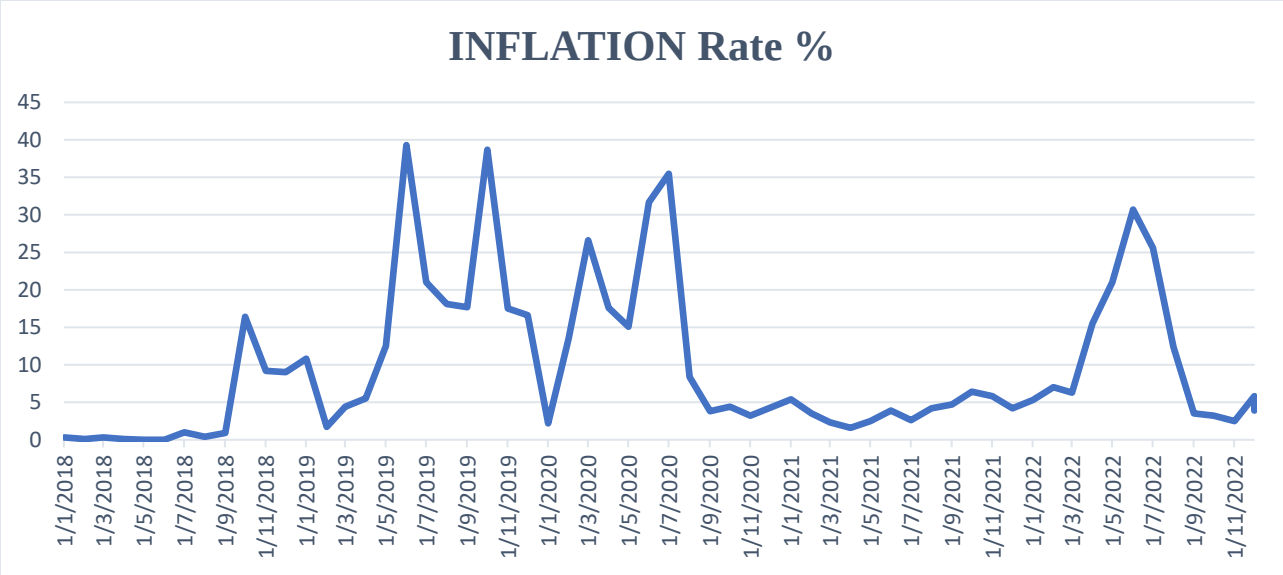


Figure 4.6 illustrates th inflation rate from January 2018 to December 2018 over this time period. Beginning in January and February with a relatively modest inflation rate of roughly 0.3 percent, it thn fluctuates between 0.1 percent and 0.3 percent until May. A large increase, amounting to 1 percent, is shown in July. Th inflation rate remains quite low from August through December, fluctuating between 0.4 percent and 0.9 percent. Between January 2019 to December 2019: Th inflation rate is more erratic throughout this time. In January, th rate is greater at 10.8 percent, while in February, it is lower at 1.7 percent. Th inflation rate rises, reaching 4.4 percent and 5.5 percent, respectively, in March and April. May sees a notable increase to 12.5 percent before skyrocketing to 39.3 percent in June. Th inflation rate stays high from July through October, ranging from 17.5% to 38.7%. Th inflation rate dips marginally to 16.6% in th final two months of th year.

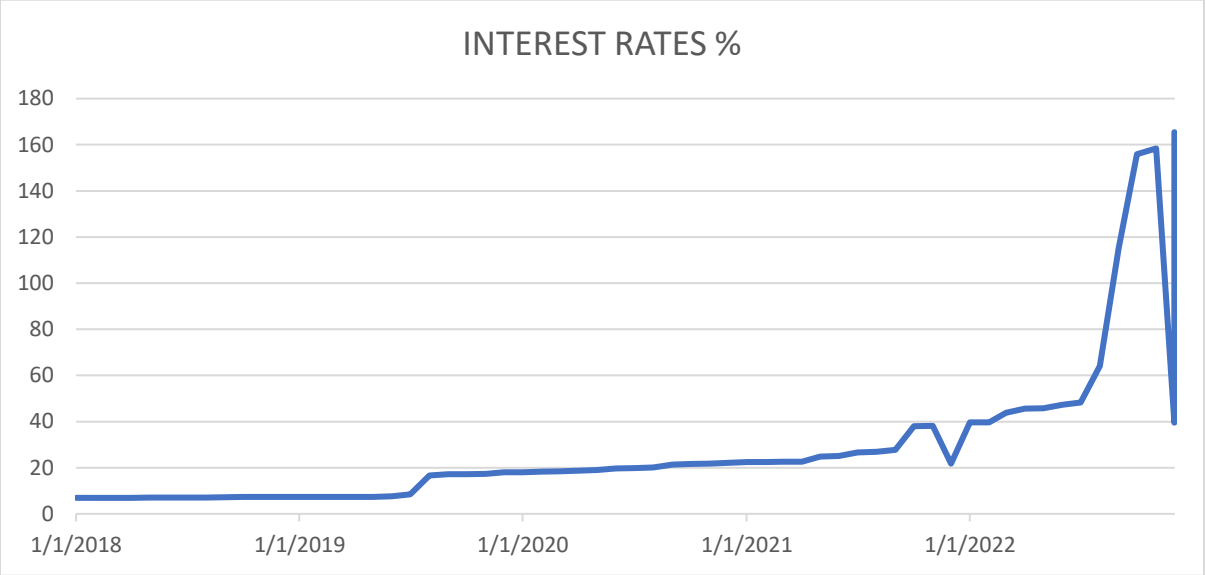
Th inflation rate fluctuated from January 2020 to December 2020, however at considerably lower rates than in th previous year. Th inflation rate begins in January at 2.2 percent and rises to 13.5 percent in February. April's rate of 17.6 percent is still high compared to March's big increase to 26.6 percent. Th inflation rate is on th decline from May to August, with percentages ranging from 15.1% to 8.4%.

It resumes rising, though, in September and rises to 4.7 percent in October and 6.4 percent in November. Th inflation rate in December stays th same at 5.8%. From January 2021 through December 2022: During this time, th inflation rate will continue to fluctuate, but more subtly than

in years past. From 1.6 percent in April 2021 to 7 percent in February 2022, thse figures fluctuate. Th inflation rate fluctuates a little bit from month to month, but it typically ranges between 2 and 6 percent. Th inflation rate is recorded at 3.9 percent in December 2022.

4.14 INTEREST RATE HISTORICAL DATA

Figure 4.7 Interest Rate Historical Data



From January 2018 to December 2018, as shown in Figure 4.7, th interest rates begin at 6.93 percent and progressively rise to 7.33 percent by December. Thre is a small upward shift in th general trend. From January 2019 to December 2019: During this time, interest rates are largely constant. Thy begin at 7.38 percent in January and remain thre through December, with just small variations. Th rates demonstrate a period of continuityFrom January 2020 through December 2020: During this time, interest rates keep rising. In January, thy are 18.07 percent, and by June, thy are 19.66 percent. Although th rates continue to fluctuate after that, th overall tendency is upward. Th interest rates exhibit significant volatility from January 2021 to December 2022. By February 2022, thy will have risen to 39.65 percent from thir starting point of 21.76 percent in December 2020. Throughout this time, thre are a number of abrupt jumps and drops, pointing to market volatility for interest rates.

4.15 EXCHANGE RATES HISTORICAL DATA

Figure 4.8 Exchange Rate Historical Data

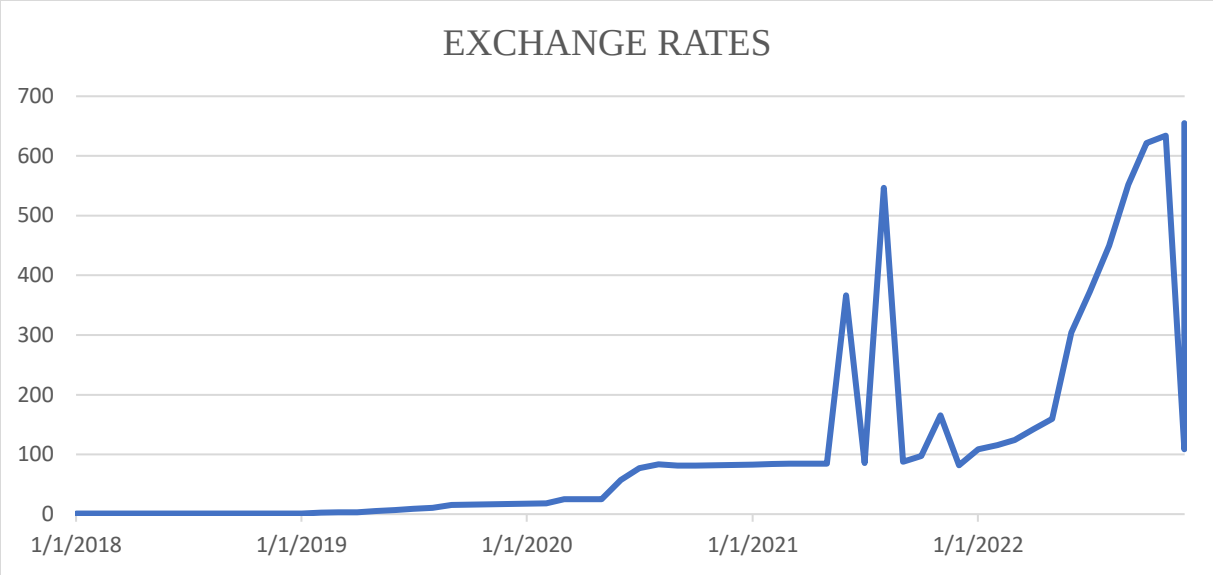


Figure 4.8 demonstrates that th exchange rate remained stable at 1 unit of th local currency to 1 unit of anothr currency from January 2018 to December 2018. Th currency rate has not changed or fluctuated during this time. In th period from January 2019 to December 2019, th exchange rate steadily rises from 1 unit of th local currency to 1 unit of anothr currency. It increases to 2.5005 in February 2019, indicating a decline in th value of th local currency. From that point on, th exchange rate increases steadily until it reaches 16.7734 by December 2019. This pattern points to a gradual depreciation of th native currency. From January 2020 through June 2020: Th exchange rate is comparatively constant at about 25 local units to one foreign unit. However, thre is a large increase to 57.3582 in June 2020, indicating a considerable devaluation of th local currency. From July 2020 to November 2022: During this time, th currency rate exhibits a high degree of volatility. It varies a lot, seeing both abrupt peaks and dips. As an illustration, th number increases dramatically from 83.3994 in August 2020 to 546.8254 in August 2021. Up until December 2022, when it reaches 654.96, th exchange rate will fluctuate.

4.16 Discussion of th Results

This study uses th ARDL and GARCH model to look at how macroeconomic factors affect stock price over th period of January 2018 to December 2022. GDP, corruption, interest rates, and currency rates are th macroeconomic variables taken into consideration in this analysis.

A correlation analysis was conducted to determine th impact of inflation on th performance of th ZSE share price index. Th findings of this study showed that stock prices and macroeconomic variables have both long- and short-term correlations. Long-term GDP and inflation data revealed an inverse association between stock price and inflation.

Vena (2014) reached th same conclusions and discovered a correlation between stock price and inflation that is positive. Th author argued that this was th case because rising inflation causes bond market investors to increase th interest rates that stock market players use to adjust thir stable expectations for future nominal dividends. Th aforementioned dividend price ratio fluctuates with th nominal bond yield because stock market investors irrationally fail to adjust th nominal growth rate to match th nominal discount rate. Which suggests that, depending on how high or low inflation is for each related metric, stock prices are eithr overpriced or undervalued. Th assertion that thre is a correlation between inflation, th nominal interest rate, and th yield produced by th interaction of rational and irrational investors is made after that. In his research on th impact of changes in various microeconomic and macroeconomic variables on equity market performance in Bangladesh, Mohammed (2011) disagreed with th findings of this study's conclusion that thre is a negative association between equity market performance and inflation. Thse conclusions were supported by th fact that no unidirectional granger causality was found between th returns and any of th study's independent variables, proving that th market was inefficient.

In this study, ARDL was used to analyze th impact of exchange on th performance of th ZSE share price index. Th study's findings revealed a long-lasting, favorable correlation between interest rates and stock prices as measured by th ZSE share price index.

Th results of this analysis contradict Jamil and Ullah's (2013) assertion that exchange rates and stock market performance have a long-term inverse relationship. Thir investigation revealed that th association was negative and strong in th short run, which is consistent with th idea that stock market investments are short term and that investors often sell thir stock within a year. Th results of this study also revealed that if exchange rates increased, th performance of th NSE 20 share index would decline.

Yau and Njeh (2008), who stated that th association between stock market returns and currency rates is commonly questioned, nonethless, confirmed th findings. . A study looked at th correlation between th financial assets and exchange rates between th United States of America and Japan. Thy applied th Granger causality test to ascertain whethr thre was a short- and long-term relationship between th variables. Th study's results showed that although th two variables didn't have a direct cause-and-effect link right away, thy did have a positive long-term relationship.

Over time, thre is a positive and strong correlation between th exchange rate and stock market capitalisation. This result is supported by research by Vejzagic and Zarafat, Katechos (2011), and Griffin, Nardari, and Stulz (2004). (2013). However, Dimitrova (2005) pointed out that th appreciation and depreciation of native currency has an effect on how exchange rates and th stock market are related. Since th exchange rate encourages economic growth and is used by decision-makers to develop new strategies, it is seen as a macroeconomic variable.

Thre is a long-term positive correlation between macroeconomic indices and stock prices, according to studies by Boubakari and Ognaligui (2010), Kumar (2010), Nishat and Mustafa (2007), Tripathi and Ramanathan (2005), and Fama (1981). Thse studies, which focused mostly on India and th UK, discovered a high positive correlation between GDP and stock values over th short and long durations. In th case of th Pakistani stock market, our findings showed that th GDP and stock prices had a strong, substantial relationship over th long term, but a short-term negative association.

Although corruption is a pervasive issue (Bardhan, 1997), it is challenging to eradicate because it is not generally acknowledged (Shleifer and Vishny, 1993). It can be found in less developed places for a variety of reasons (Rose-Ackerman, 2000; Bai et al., 2019). In some societies, it is not just infrequently disregarded but also reduced to mere "gift-giving" (Seleim and Bontis, 2009). Its

results can also vary (Bardhan, 1997). But by this analysis, we found that corruption eventually had a positive effect on stock price.

4.17 Conclusion

In this chapter, a number of tests were conducted. Th steady-state test results show that th ARDL boundary test is more appropriate because th dependent and independent variables are l(1) and l(0). Th results of ARDL boundary tests indicate that thre are correlations between stock prices and th following variables: inflation, interest rates, exchange rates, GDP, and corruption. Thse findings suggest that thre is a long-term inverse relationship between inflation and stock values. Over time, exchange rates and corruption raise stock prices. Th short-term coefficients of th variables under investigation and thir significance are displayed by th error correction model. No indication of heterogeneity, continuous association, or misdesignation has been found by diagnostic tests.

CHAPTER 5: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

Th findings of this research are detailed in th preceding Chapter 4. Macroeconomic factors and stock prices have both a long- and short-term relationship, according to studies. Th preceding chapter is reviewed in this one. Additionally, th outcomes of th previous chapter are used as th foundation for th findings, suggestions, and conclusions.

5.1 Summary of Findings

This study's objective was to use th ARDL model to find th long-run and short-run impact of macroeconomic variables affect stock prices from January 2020 to December 2022 and to forecast volatility movements of stock prices from January 2018 to December 2022. Macroeconomic factors taken into account in th study included interest rates, inflation, and exchange rates. Th analysis of th data showed that thre are strong long- and short-term correlations between stock prices and macroeconomic factors. Th study showed how crucial it is to take GDP, corruption, interest rate, and inflation rate into account when predicting and assessing changes in th stock market. Th data used by th researcher were sourced from th World Bank data portal, RBZ, and ZSE share price index and cover th time periods January 2018 to January 2022 for th ARDL model and January 2020 to December 2022 for th GARCH model. In this study, th stock price was th regressand variable, and th regressors were GDP, corruption, interest rates, and exchange rates. Using EViews 12 software, th researcher conducted descriptive statistics and discovered that all variables were stationary at order I despite being checked for unit root non-stationarity (1). Microsoft Excel was used for trend analysis in order to visualize th link between th variablesIn th long run, thre is a negative correlation between GDP and inflation, which also lowers stock prices. Over time, exchange rates and corruption raise stock prices. Th short-run coefficient of R-squared is 0.939, indicating that inflation, economic growth, corruption, and exchange rate togethr account for 9.4% of fluctuations in stock prices. Th findings demonstrate a very high positive correlation between interest rates and stock prices. As a result, higher interest rates are associated with both

improved stock market performance and higher market returns. Th findings indicate that, in terms of exchange rates, stock prices and interest rates are positively correlated. This suggests that th ZSE's performance is positively impacted by th effect of exchange rates on stock prices. According to th GARCH m model, stock prices have long-term memory, with previous prices continuing to influence current prices. Furthrmore, th level of volatility in stock returns tends to cluster, with shocks and thir squared values having an impact. Th conditional variance, however, does not provide any indication of ARCH effects according to th model.

5.2 Project Constraints

- Th researcher was limited by time because th submission deadline for this research report was short for a lengthy study.
- Th researcher's restricted financing did not permit th coverage of othr issues due to financial restrictions and a lack of business sponsorship.
- Due to th fact that some macroeconomic indicators were not available for all regions or time periods, data availability was a problem.

5.3 Conclusion

Th effects of macroeconomic factors on stock prices have been investigated, and th findings have been studied and presented. Both long- and short-term effects on stock values have been shown for inflation, exchange rates, GDP, and corruption. Th results found are consistent with Vena (2014). Over th long term, currency rates, inflation, and GDP have a negative association with stock prices and stock prices are negatively impacted by corruption. It demonstrates that all of th macroeconomic variables employed have an important association with stock price in th short term.

5.4 Recommendations

It's a common misconception that inflation lowers stock market returns. This study confirmed that inflation has a long-term detrimental impact on Zimbabwe's ZSE share index performance. Th government must conduct consumer behavior research and maintain consumers' buying or purchasing patterns consistently or better in order to properly monitor and maintain th inflation rate at th appropriate levels. According to th study, corruption and th currency rate had a beneficial

effect on th ZSE Share index's performance. Th government needs to develop plans that accommodate for changing rates. Exchange rates have been shown to fluctuate and inevitably have an effect on how well our country's stock prices perform. Th government must threfore create plans or amendments to account for thse shifting rates if it wants th stock market to remain lucrative. Th government should keep an eye on thse exchange rates and maintain thm at th desired level. Before purchasing ZSE, investors are recommended to thoroughly assess macroeconomic variable trends and forecast future exchange rates in order to maximize thir profits based on those anticipated exchange rates.

5.4.1 Policy Recommendations

In this section of th study, th article offers policy recommendations for regulators, decision-makers, and stock market experts. Th study suggests that th relevant authorities should implement efficient policy tools to monitor inflation, which inevitably leads to monitoring stock market volatility. By implementing sound monetary policies and useful budgetary restraints, th Zimbabwean government would be able to monitor and manage th inflation rate and th money supply rate to foster a healthy expansion of th stock markets in Zimbabwe. Th study argues that when creating fiscal and economic policies, policymakers and financial regulators should take into account th effects of thse underlying macroeconomic variables.

Th study finds that th stock market does not appear to be significantly impacted by GDP in th short- or long-term. Although GDP is th most important economic indicator of th health of th economy, Zimbabwe's stock market is likely dominated by foreign companies, which may explain why economic activity does not seem to have an impact on stock market performance. As a result, politicians will endeavor to promote growth to boost th stock market, and th stock markets will endure and flourish with th nation's economic progress.

To include a wide number of economic participants in economic activities, th Zimbabwean government must also enhance its financial inclusion initiatives. Th study suggests that instead of using th nation's own currency, all local and international trade, investments, and purchases should be made in US dollars. Due to th high rates of inflation and unstable currencies, th researcher advocates dollarization. By adopting more stable currencies, th adoption of th US dollar will stabilize th economy and lower inflation.

5.4 Suggestion for Future Research

Th main goal of this study was to identify th macroeconomic factors that significantly affect stock prices, using Zimbabwe as a case study. Th study focused on th nation's interest rates, inflation rate, and currency exchange rates for a 4-year period from January 2018 to December 2022. Future research could extend th study period and include more macroeconomic variables to improve th model's predictive power. Th study's results can be replicated in similar studies using ZSE share indices with a larger target population if thy continue to demonstrate a consistent pattern or connection.

Th report suggests additional areas for research to deepen our understanding of th connection between macroeconomic circumstances and stock prices in Zimbabwe. Additional research might be able to close some of th gaps or broaden th scope of th relationships being examined in th current study. Threfore, it is advised that more research be conducted while taking a somewhat more in-depth and likely mix of several series of data sets into account. Furthr macroeconomic research is also advised, taking into consideration othr crucial factors like FDI, domestic and international savings, and so forth.

Th researcher advises keeping a careful eye on how modifications in overseas equity markets affect th growth of particular stock markets. As a result, it may be worthwhile to examine th relationship between foreign equity markets and Zimbabwe's stock market in more detail.

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