Novelty Journals

ISSN 2394-7322

International Journal of Novel Research in Marketing Management and Economics
Vol. 11, Issue 3, pp: (82-93), Month: September - December 2024, Available at: www.noveltyjournals.com

The Impact of Changes in Interest Rates on Zambian Stock Prices in Zambia

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DOI: https://doi.org/10.5281/zenodo.14191123

Published Date: 20-November-2024

Abstract: **This paper's primary objective was to examine how interest rate volatility affects stock in Zambia. The study examined monthly data from the Lusaka Securities Exchange (LuSE) over the 2000–2023 time period. Procedural tests, such as stationarity, integration, autocorrelation, heteroscedasticity and multicollinearity were done before conducting the ARDL model. The study's findings demonstrated that stock prices in Zambia were directly impacted by fluctuating interest rates. Stock prices decreased when interest rates rise and vice versa. According to the standard, which holds that stock prices and interest rates have an inverse relationship, Zambia was found to have a negative association. This may be the result of higher borrowing costs. Businesses find it more costly to borrow money to fund their operations as interest rates rise. This may result in lower earnings and profits, which may then cause stock values to drop. Expectations from investors may also contribute to this, as they may grow more risk averse and sell equities in favor of safer assets like bonds. As a result of a decline in demand, stock prices may fall. It is crucial to remember that there are numerous variables that might affect the intricate relationship between interest rates and stock prices, such as investor expectations, market sentiment, and economic conditions. Stock prices may suffer as a result of higher interest rates, although this is not always the case. In certain cases, rising interest rates may indicate a robust economy, which could result in higher stock prices and more profits and earnings for businesses. In conclusion, there are many facets and complexities to the relationship between interest rates and stock prices. The relationship between growing interest rates and stock prices is not always clear-cut and can be influenced by a variety of circumstances. For example, rising interest rates may result in lower consumer spending, higher borrowing costs, and other effects. When making investment decisions, investors should carefully weigh the unique issues impacting individual companies as well as the larger economic backdrop. It was also found that other elements such as the money supply, lending rate, exchange rate, and consumer price index affected stock prices.**

Keywords: **Interest Rates, Zambian Stock Prices, money supply, lending rate, exchange rate.**

1. INTRODUCTION

The stock market is the primary source of firm funding. Additionally, the stock price is the value that a share is trading on the market. According to Suiter (2009), interest rates are a crucial monetary policy tool that is taken into account when addressing variables like inflation, unemployment, and investment. Favorable interest rates indicate increased economic activity, which in turn spurs economic expansion. Lower interest rates are generally advantageous because they reduce the cost of borrowing. Higher interest rates, on the other hand, make borrowing more costly, which deters both individuals and businesses from taking out loans.

1.1 Study background

A crucial area of research in financial economics is the connection between interest rate volatility and stock prices especially in developing nations like Zambia. Given the important influence interest rates have on market behavior investment choices and economic activity, it is imperative that investors policymakers and financial analysts comprehend

how changes in interest rates impact stock prices. During the past few decades Zambia's economy has experienced significant changes including growth periods inflationary difficulties and swings in foreign investment.

Zambia's economic stability is impacted by both internal and external factors because it is a developing nation that depends on industries like mining, agriculture and services. To control inflation and promote economic growth the Bank of Zambia and the Zambian government have used a variety of monetary policy tools to manage interest rates. Nonetheless, periods of high-interest rate volatility have characterized Zambia's financial landscape with ramifications for the stock market and the larger economy.

There is still a dearth of empirical research explicitly addressing how interest rate volatility affects Zambian stock prices despite the significance of this relationship. The insights that can be applied to the Zambian context are limited because a large portion of the literature that is currently available has concentrated on more general economic indicators or has been based on data from more developed markets. Given Zambia's particular economic difficulties such as exchange rate swings, inflationary pressures and shifts in the price of commodities globally, it is imperative to investigate the precise relationship between interest rate volatility and stock prices in this context.

1.2 Research objectives

The study's primary goal is to investigate how Zambian stock prices are affected by fluctuating interest rates. The second objective is to evaluate additional elements that affect stock pricing. Lastly, the study aims to develop policy recommendations that could boost foreign investment.

Research Questions

The first research question is, how do fluctuating interest rates affect stock prices? The second question is, what additional elements influence stock prices?

Research Hypothesis

Hypothesis 1: Interest rates can affect stock returns in a good or negative way.

Hypothesis 2: What impact do interest rates have on Zambian stock returns?

1.3 Study significance

This paper's main goal is to ascertain how stock values are affected by fluctuating interest rates. Therefore, the study's findings will help policymakers regulate interest rates at a level that encourages investment. Other factors influencing stock prices will also be revealed by the investigation. Future researchers that are interested in the same or related areas will find the study useful as well.

2. LITERATURE REVIEW

This chapter will cover relevant literature on the research topic.

2.1 Impact of Monetary Policy on stock price

The objectives of monetary policy are frequently expressed in terms of macroeconomic variables, such as real production and inflation, claim Loannidis and Kontonikas (2007). These variables are indirectly impacted by policy activities. Price stability is the primary objective of monetary policy in many developed and emerging nations (Pailwar 2009).

Essentially, the money supply or interest rate can be used to define important monetary policy. Changes in interest rates, currency rates, or the money supply can all be considered as indicators of monetary policy adjustments (Mankiw 2012).

According to Bernanke and Kuttner (2005), some analysts believe that the stock market is a separate cause of macroeconomic instability that should be addressed by policymakers. Tallin (2015) asserts that stock prices often exhibit pronounced boom-bust cycles and volatility, raising concerns about ongoing deviations from their ultimate standards that, if corrected, might have significant negative effects on the overall economy. According to Loannidis and Kontonikas (2007), stock prices are among the most closely watched asset prices in the economy and are usually thought to be quite sensitive to changes in the economy. Fair (2002) found that news about monetary policy is associated with a third of fluctuations in stock prices.

2.2 Effect of interest rate on economic performance

According to Pattanaik, Behera, and Rajesh (2013), the two factors that determine economic growth are investment and savings. Interest rates have long been considered important factors that influence saving and investing. The bulk of Muslims, however, avoid collecting interest rate income since it is forbidden by Islamic theology to receive interest on savings and investments. Therefore, Mushtaq and Siddiqui (2016) conducted research to assess the impact of religion on an Islamic state's budgetary decisions about saving and investing.

According to the findings of Mushtaq and Siddiqui (2016), societies in Islamic states are indifferent to interest rates on deposits. However, in non-Islamic countries, general expenditure has a significant negative impact on savings, whereas inflation, interest rates, and per capita income have a significant positive impact. While national spending and transfers received have a significant negative impact in Islamic states, per capita income has a significant beneficial impact on savings. Interest rates and inflation turned out to be detrimental to investment in the case study. In contrast, trade has a favorable impact on investment in both Islamic and non-Islamic countries. Furthermore, whereas payments show a favorable influence on investment in Islamic nations, local credit provided by banks has a detrimental effect on investment in non-Islamic states.

2.3 Empirical Literature

Studies conducted in Africa

A study on the impact of monetary policy on stock returns was carried out by Mangani (2009). The Johannesburg Stock Exchange (JSE) was analysed. The findings showed that the monetary policies have an impact on volatility of individual equities and aid in predicting stock market power. Also, an inverse relationship between stock prices and interest rates was discovered. The JSE also proved to be sensitive to the effects of monetary policies.

Okpara (2010) investigated how Nigerian stock market results were affected by monetary policy. The results showed that monetary policy plays a crucial role in determining the long-term returns on the Nigerian stock market. Specifically, a high Treasury bill rate reduces stock market returns, which validates monetary policy's efforts to slow economic development.

Studies conducted abroad

Using the periodic returns of the Kuala Lumpur Composite Index (KLCI), Abd (2011) investigated the influence of interest rate volatility and exchange rate predictability on stock market volatility and return. Using Malaysia Treasury bonds and the monthly exchange rate from 1997 to 2009. They used two Generalized ARCH-based models in their investigation. The first model had no interest rate, while the second model had both an interest rate and an exchange rate. It was found that there was a negative correlation between the returns of the Kuala Lumpur Composite Index, interest rates, and exchange rates.

The impact of monetary policy on stock market returns was examined by Chortareas and Noikokyris (2010). The years 1982 through 2010 were the study's time frame. The study's findings revealed a negative relationship between stock returns and monetary policy shocks prior to the inflationary phase. Even after taking into account the asymmetric effects of interest rate policy in terms of time and direction, this link remains strong. However, because of the positive correlation between stock returns and policy shocks, the period that followed the establishment of the Monetary Policy Committee is different. They also removed market-based monetary policy shocks from the inflation reports that were published. Releases of the minutes of the Monetary Policy Committee show that they have an impact on both the volatility of conditional stock returns and the level of the stock price.

The impact of anticipated and unexpected changes in interest rates on sectoral stock returns and the overall UK stock market was examined by Gregoriou et al. (2009). A sterling London Interbank Offered Rate futures contract with a three-month change was the catalyst for the monetary policy shock. A necessary structural split in the relationship between changes in monetary policy and stock returns is indicated by panel analysis and time-series results. The stock market's reaction to both anticipated and unforeseen interest rate fluctuations was often substantial and unfavorable prior to the credit crisis. As the credit crisis progresses, the correlation turns positive.

A study by Bredin and Hyde (2005) examined how industrial level stock returns were affected by monetary policy shocks in the United Kingdom. The study's main focus was on using interest rates to break down changes in policy rates into both expected and unexpected processes. It was found that the UK's industrial level stock returns were statistically significantly impacted by monetary policy shocks. The particular deal determines the shock sensitivity. Oil and gas, for instance, are extremely susceptible to shock. The variance decomposition approach also revealed the diverse results. Compared to what was found using data from the United States, the aggregate index's impact on the monetary policy shock is far smaller. The results of the sector return clearly confirm that future excess returns will continue to be negative in response to the monetary policy shock. This is typically the case for sectors of obsolete trades, such as steel, gas, oil, chemicals, and auto parts.

Other scholars have investigated the connection between interest rate volatility and stock prices using econometric techniques. For instance, Lim and Lee (2012) investigated how monetary policy affected the US stock market using a VAR (vector autoregression) model. They discovered that monetary policy significantly affected stock prices, with shifts in interest rates having an effect on the stock market by altering risk premiums and investor expectations.

Similarly, Kim and Lee (2017) investigated the effect of interest rate volatility on U.S. stock prices using a GARCH (generalized autoregressive conditional heteroskedasticity) model. They discovered that the stock market was significantly impacted by interest rate volatility, with rising interest rate volatility resulting in falling stock prices. Additionally, they discovered that during times of economic uncertainty, interest rate volatility had a greater effect on stock prices.

Other studies

Kontonikas and Ioanndis (2006) examined the relationship between stock returns and monetary conditions. A sample of fourteen countries from the Organization for Economic Co-operation and Development was used for the analysis. For both central bankers and stock market participants, the existence of such a link has crucial implications. Examining the aforementioned topic pertains to the more general issues of stock price assessment and portfolio construction. On the other hand, the former are worried about whether monetary policy decisions are reflected in financial markets. Interest rate variables, such as the short-term Treasury bill rate change and the dummy variable reflecting changes in the discount rate, served as the foundation for the replacements of the monetary policy changes. Taking into account the non-normal distribution of stock returns and the co-movements of the global stock markets, Kontonikas and Ioanndis examined the impact of interest rate changes on changes in stock price. According to the results, in almost 80% of the countries that were studied. Furthermore, the concurrent declines in the stock market's value are linked to the tight money periods.

A study on how monetary policy shocks affect the cross-section of stock returns and the equity premium was carried out by Li and Palamino (2009). Nominal product-price rigidities cause actual stock returns to be shaken by policy shocks. The impact that policy shocks have on stock returns is characterized by two opposing impacts. A contractionary shock increases manufacturing markups, lowers aggregate output, and increases consumption marginal utility. A positive premium in expected returns is required for the output reduction. This markup increase comprises a negative premium and serves as a consumption boundary. The markup effect is exacerbated by Stumpy elasticity of labor and consumption substitution over time, which will have a negative net effect on the equity premium. In the cross-section, a contractionary shock raises the comparative markup of a rigid pricing industry while decreasing the comparative output of a flexible price industry. The pricing industry's expected stock return is higher than that of the one with a rigid price when the comparative markup development determines the comparative production drop. Time variation in predicted returns is another effect of the policy-induced markup disparity. The impact of policy shocks on the cross-section and the equity premium decreases when the policy's sensitivity to economic conditions increases.

A study on the effect of monetary policy on stock market returns was carried out by Durham (2003). Durham examined the sample era's division sensitivity into smaller stages. For several countries, including the United States of America, the association typically vanished in more recent eras, according to the results of systematic regressions performed on the time-series data. Panel regressions also took into account the cross-sectional variance among sixteen countries, which suggests that there is either no correlation or a weak one between monetary policy and stock returns. There is no correlation, according to the investigation of increased stock price return in comparison to raw return. Finally, additional monetary policy measures indicate that there is no correlation between the tightening or easing cycles and stock returns.

Al-Shubiri (2010) studied how macroeconomic and institutional factors affect the expansion of stock markets in emerging countries. 14 banks participated in a panel data investigation that focused on the years 2005–2008. Regression analysis was used to look at secondary data. Although an inverse relationship was established between inflation and market stock price, as well as between interest rates and market stock price, the research paper demonstrated a significant positive correlation with regard to market stock price, gross domestic product, dividend yield, and net asset value per stock.

Irfan and Nishat (2002) examined the impact of six factors on the stock price at the Pakistani Stock Exchange between 1981 and 2000. These factors include return on assets, dividends, asset growth payment ratio, company size, and leverage. In their study, annual data from the financial statements of the enterprises in the survey sample were subjected to panel data regression analysis. The findings demonstrated the importance of dividend yield, payment ratio, and firm size in determining stock price.

Uddin et al. (2013) examined the impact of 72 Bangladeshi companies' earnings per share, price-earnings ratio, net asset value, and profit after tax. The study was conducted between 2005 and 2010. The study's findings demonstrated that profits per share and net asset value are reliable indicators of stock prices. They showed a favorable association with stock prices that was statistically significant. The price-earnings ratio, net income, and stock price all exhibited a positive but statistically insignificant association.

3. RESEARCH METHODOLOGY

3.0 Research Design

Chiinze (2017) defines research design as the all-encompassing strategy intended to logically link the many components of the study, guaranteeing that the research topic is appropriately addressed. The methods used for data collecting and investigation are determined by the research design (Wilkinson, 2012). In this paper, the quantitative method is used.

3.1 Data Collection

Douglas (2015) asserts that gathering data is essential to statistical analysis and that there are various techniques for doing so. According to Ajayi (2017), data is a collection of values that can be classified as either qualitative or quantitative factors. Furthermore, facts or statistics that can be used to draw conclusions are used to represent data. The process of collecting and organizing data must be carried out before information is accessible and analyzed. Mesly (2015) asserts that both primary and secondary sources can be used for data collection. In this paper, secondary data was used.

3.2 Variable Measurement

This research study uses six different sorts of variables. The dependent variable is the stock price. Interest rates, the consumer price index (CPIE), exchange rates, lending rates, and money supply—all of which are regarded as independent factors in this study, all have an impact on stock prices. The 2009–2021-time frame was taken into consideration for this study.

3.3 Stationarity test

The stationarity of the gathered data will be examined. Jain and Chetty (2020) state that stationarity in the stationery test is a feature of the time series that demonstrates that the value of the variable does not alter as time passes. Baum (2009) went on to say that stability and stationarity are two important characteristics to consider when working with time series data. where a single time series is related to stationarity. In other words, does the autoregressive representation of the series consist of covariance stationarity or one or more-unit roots? A bivariate or multivariate correlation is discussed by the stationarity property. In this paper the Augmented Dicky Fuller (ADF) was used to test for stationarity.

3.4 The model

The autoregressive distributed lag (ARDL) model was employed in this paper. The ARDL limits test was proposed by Pesaran et al. (2001) when the series are I(0) and I(1). Furthermore, in the absence of regressor I(2). The estimation of both the short- and long-term coefficients is done at the same time. The autoregressive distributed lag model is the source of the cointegration approach. The following model was used to estimate the long-term equilibrium association and the short-term error correction technique.

Novelty Journals

ISSN 2394-7322

International Journal of Novel Research in Marketing Management and Economics
Vol. 11, Issue 3, pp: (82-93), Month: September - December 2024, Available at: www.noveltyjournals.com

$$SP = f(\text{IR}, \text{CPIE}, \text{ER}, \text{LR}, \text{M3}) \quad (4.1)$$

with this case, SP stands for Zambia Stock Exchange Price Index, IR for Interest Rate (the Reserve Bank of Zambia's discount rate), CPIE for Consumer Price Index, ER for Exchange Rate (with relation to the US dollar), LR for Lending Rate, and M3 for Money Supply. The following is how the model will be written:

$$\text{SP} = \beta_0 + \beta_1 \text{IR}_{t-1} + \beta_2 \text{CPIE}_{t-1} + \beta_3 \text{ER}_{t-1} + \beta_4 \text{LR}_{t-1} + \beta_5 \text{M3}_{t-1} + \varepsilon_t \quad (4.2)$$

Below is the conditional error correction for the Zambia Stock Exchange price index using the autoregressive distributed lag model (ARDL):

$$\begin{aligned}\Delta SP_t &+ \beta_0 + \beta_1 (SP)_{t-1} + \beta_2 (IR)_{t-1} + \beta_3 (CPIE)_{t-1} + \beta_4 (ER)_{t-1} + \beta_5 (LR)_{t-1} + \beta_6 (M3)_{t-1} \\ &+ \sum_{i=1}^{J} \beta_7 \Delta (SP)_{t-1} + \sum_{i=1}^{J} \beta_8 \Delta (IR)_{t-1} + \sum_{i=1}^{J} \beta_9 \Delta (CPIE)_{t-1} + \sum_{i=1}^{J} \beta_{10} \Delta (ER)_{t-1} \\ &+ \sum_{i=1}^{J} \beta_{11} \Delta (LR)_{t-1} + \sum_{i=1}^{J} \beta_{12} \Delta (M3)_{t-1} + \varepsilon_t \end{aligned} \quad (4.3)$$

4. EMPIRICAL ANALYSIS

To estimate the ARDL model, the study employed procedural tests, including which comprised of the stationarity and multicollinearity tests.

4.1 Unit root test

The researcher used unit root tests to check for the existence of a unit root before estimating the model, eliminating any misleading regression with the Augmented Dicky Fuller (ADF). Some variables were stationery at level I (0), according to the ADF stationarity tests, whereas others became stationery following the initial differencing I (1). The results of the Augmented Dickey-Fuller (ADF) test showed that the research variables were of separate order I (0) and I (1).

Table 4.1: Unit root test results

Variable	ADF Statistics	p-value	Order of Intergration
SP	-11.152	0.017	I (1)
IR	-13.847	0.038	I (0)
ER	-10.267	0.042	I (1)
CPI	-14.473	0.025	I (1)
LR	-15.736	0.035	I (0)
M3	-11.382	0.014	I (1)

4.2 Correlation matrix

Table 4.2 displays the correlation matrix, which sheds light on the connections between the variables.

Table 4.2: Correlation matrix

	SP	IR	CPI	ER	LR	M3
SP	1					
IR	-0.481	1				
CPI	-0.372	0.385	1			
ER	-0.469	0.195	0.489	1		
LR	-0.385	0.379	0.215	0.388	1	
M3	0.266	-0.471	-0.376	-0.416	-0.361	1

The exchange rate and consumer price index have the strongest association, at 0.489. It is clear from this examination of the pairwise correlation coefficients in the matrix displayed in Table 5.2 that multicollinearity will not eliminate any of the explanatory variables.

Novelty Journals

ISSN 2394-7322

International Journal of Novel Research in Marketing Management and Economics
Vol. 11, Issue 3, pp: (82-93), Month: September - December 2024, Available at: www.noveltyjournals.com

4.3 Lag length selection

This section looks at how to choose a lag duration for a time series analysis. The results for the independent variable are shown in Table 4.3, while the results for the dependent variable are shown in Table 5.3.

Table 4.3: Lag length selection of the dependent variable

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-236.839	NA	36.837	6.491	6.210	6. 625
1	127.301	1851.938*	0.022*	-0.985*	-0.994*	-0.983*
2	133.417	1.837	0.0305	-0.981	-0.941	-0.934
3	131.153	0.949	0.0383	-0.909	-0.924	-0.982
4	131.335	0.492	0.0301	-0.939	-0.902	-0.905
5	131.497	0.149	0.0344	-0.991	-0.882	-0.950

The outcomes of lag selection for a time series analysis are shown in the output above. The goodness of fit for each lag length is evaluated using a variety of statistical criteria and testing of the various lag values. The asterisks (*) indicate that the AIC criterion seems to favor the lag value of 1. This suggests that the ideal lag length for the time series model, as determined by the AIC criterion, is 1.

Table 4.4: Lag length selection of the independent variable

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-784.194	NA	2.382	48.916	45.914	43.989
1	-778.220	79.789*	8.382	48.615	45.611*	43.636*
2	-778.148	2.243	8.183*	48.621*	45.776	43.644
3	-778.448	1.533	8.291	48.647	45.740	43.630
4	-778.284	1.877	8.462	48.601	45.791	43.704
5	-778.382	0.024	8.523	48.683	45.772	43.707

* Denotes the lag order that the criterion chose. FPE: Final prediction error, LR: sequential modified LR test statistic (each test at 5% level), The information criteria for AIC, SC, and HQ are Akaike, Schwarz, and Hannan-Quinn, respectively.

The results of lag selection are displayed in the time series analysis's output. The goodness of fit for each lag length is assessed using a variety of statistical criteria following testing of the different lag values. The AIC criterion appears to favor lag value 2, as indicated by the asterisks (*). This indicates that two is the optimal lag duration for the time series model based on the AIC criterion.

In the AutoRegressive Distributed Lag (ARDL) model, the lag lengths of the independent variables should be two and the dependent variable should be one. The tables above, which present the lag selection results from which this conclusion is obtained, show the lag values with asterisks (*), indicating the lag ordering selected by the AIC criterion. According to the AIC criterion, the ARDL model's independent variables should have a lag length of two and the dependent variable a lag length of one.

4.4 Bounds test for cointegration

Table 4.5 displays the findings of the cointegration Bounds test.

Table 4.5: Bounds test results

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	76. 497	10%	2.43	3.26
k	5	5%	3.16	3.87
		2.5%	3.54	4.39
		1%	4.13	5

We cannot rule out the null hypothesis that there is no long-term link and no cointegration if the F value is less than I (0). Auto Regressive Distributed Lag (ARDL) Model Estimation. We can reject the null hypothesis and determine that there is

a long-term link and cointegration if the F-value is greater than I (1). The Error Correction Model (ECM) is so estimated. Otherwise, if the F-value is between I (0) and I (1), we consider the test to be inconclusive. Given that the F statistic in this instance is 76. 497, which is higher than 1(1), we will estimate the error correction model.

4.5 Error Correctional Form

The ECM Error Correctional Form results, including the coefficients, standard errors, t-statistics, and probabilities for every variable, are shown in Table 5.7.

Table 4.6: ECM Error Correctional Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)*	-0.835	0.057	-18.482	0.001
R-squared	0.764			
Adjusted R-squared	0.757			

The rate of change toward the long-run equilibrium state is indicated by the error correction coefficient, CointEq(-1)*. In this case, the coefficient for CointEq(-1)* is -0.835. According to conventional levels of statistical significance, this is shown by the coefficients' p-value of 0.001. The negative coefficient for CointEq(-1)* indicates an undesirable rate of adjustment. This shows that variations from the equilibrium value of the dependent variables are negatively corrected over time.

The p-value being less than 0.05 indicates the presence of long-term causality. In other words, the error correction factor (CointEq(-1)*) is a crucial part of the model that helps with the process of adapting towards the long-run equilibrium. The value of the coefficient, -0.835, indicates the pace of adjustment. In this case, the adjustment speed is around 0.835, or 83.5 percent. This shows that around 83.5% of the discrepancy between the dependent variable's actual value and equilibrium is rectified over each time period. The long-term equilibrium state is probably going to converge really fast.

4.6 Granger Causality

Table 4.7 shows the findings of the Granger causality test, which looks at the causal linkages between different variables.

Table 4.7: Granger Causality test results

Null Hypothesis:	Obs	Prob.
SP does not Granger IR	255	0.134
IR not Granger Cause SP		0. 382
SP does not Granger Cause ER	255	0.018
ER does not Granger Cause SP		0.261
SP does not Granger Cause CPI	255	0.004
CPI does not Granger SP		0.087
SP does not Granger Cause LR	255	0.034
LR does not Granger Cause SP		0.028
SP does not Granger Cause M3	255	0.037
M3 does not Granger Cause SP		0.000

Interest rates are not influenced by stock price. The conclusion indicates that stock prices do not Granger affect interest rates, supporting the null hypothesis (p-value > 0.05). Stock prices are influenced by interest rates. The results indicate that interest rates do Granger cause stock prices (p-value < 0.05), which is evidence to reject the null hypothesis. The same interpretation applies to other Granger test results.

4.7 Wald Test

The significance of the correlation between Zambian stock prices and interest rates is assessed using the Wald test.

$\boldsymbol{H_0}$**:** Interest rates and Zambian stock prices do not significantly correlate.

$\boldsymbol{H_1}$**:** Zambian stock prices are significantly positively impacted by stock prices.

Novelty Journals

ISSN 2394-7322

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Vol. 11, Issue 3, pp: (82-93), Month: September - December 2024, Available at: www.noveltyjournals.com

Table 4.8: Wald test results

Test Statistic	Value	df	Probability
F-statistic	61.281	(3, 174)	0.000
Chi-square	182.382	3	0.000

The Wald test is used in statistical analysis to compare the alternative hypothesis (H:a) to the null hypothesis (H:0). In this case, the null hypothesis states that interest rates and stock prices in Zambia do not significantly correlate. On the other hand, according to the alternate theory, interest rates have a big influence on Zambian stock values. The test statistic for the Wald test is either an F- or Chi-square statistic, depending on the specific analysis. Both statistics are provided here. The F-statistic is reported as 61.281 with three degrees of freedom (3 174) and a probability value of 0. 000. The Chi-square statistic, with three degrees of freedom and a probability value of 0.000, is 182.382. Since the probability values for both statistics are very near to zero, we can conclude that there is strong evidence to reject the null hypothesis. This suggests that Zambian stock values are impacted by changes in interest rates.

4.8 Estimation results of the ARDL Model

The results below show the long-run estimation. All of the variables are significant at the 5 percent level. For every one percent increase in the interest rate, inflation, lending rate, and money supply, the stock price index shifts by -0.019 percent, 0.079 percent, -0.083 percent, -0.066 percent, and 0.088 percent, respectively.

Table 4.9: ARDL Model Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	-0.019	1.083	-4.828	0.014
CPIE	0.079	0.349	2.889	0.047
ER	-0.083	0.050	-0.685	0.039
LR	-0.066	9.038	-2.839	0.012
M3	0.088	0.910	-3.165	0.029
C	-1.185	9.633	-0.576	0.037

Stock prices are significantly impacted by interest rates; for example, a one percent increase in interest rates results in a nearly 1.9% decline in stock prices. since the main topic of this study is the effect of interest rate changes on stock values. Changes in interest rates have a significant impact on stock values. The outcome showed a negative correlation between interest rates and stock prices. Interest rates are a very powerful tool for monetary policy, one may say. Every time the Bank of Zambia lowers interest rates by even a single percentage, stock market prices rise by more than 1.9%. This outcome is especially important for the Bank of Zambia because any rise in interest rates will have a detrimental effect on shareholders' wealth. Even if raising interest rates is a common monetary move, the Bank of Zambia's attempts to fight inflation or increase the value of the currency obviously have a detrimental effect on stock market performance. This suggests that the Bank of Zambia, Zambia's central bank, must consider price stability while formulating its policies.

4.9 Diagnostic Testing

After the regression and causality analysis were finished, the study conducted a number of reliability tests to assess the accuracy and validity of the regression coefficients. Hanson's (2002) advice was considered for evaluating the likelihood of autocorrelation and heteroscedasticity because the study comprised time series data. Therefore, the study thoroughly examined misspecification and estimate problems utilizing a range of diagnostic tests.

The study first looked at serial correlation, which is the degree to which a time series dataset shows a relationship with its own historical values. In other words, it evaluates how strongly a variable's values at different times correlate with one another. Serial correlation in the data indicates that the standard errors of the estimates are skewed, rendering them

meaningless and leading to incorrect statistical conclusions. The Breusch-Godfrey Test was used in this study to find serial correlation.

The existence of heteroscedasticity in the error terms was then evaluated in the paper. Heteroscedasticity was tested using the ARCH model.

4.9.1 Serial Autocorrelation dictation

The Breusch-Godfrey Serial Correlation LM Test was used to assess the autocorrelation in the model. The null hypothesis (H_0) claimed that autocorrelation does not exist, whereas the alternative hypothesis (H_a) suggested that it does. If the p-value is less than 0.05, the null hypothesis is rejected and the model's autocorrelation is displayed.

Table 4.10: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.174	Prob. F(2,13)	0.472
Obs*R-squared	3.383	Prob. Chi-Square(2)	0.149

The Serial Correlation test was used to look into autocorrelation in the model. Autocorrelation is not significantly evident, according to the test results. Given that the F-statistic and the Obs*R-squared test p-values are both more than 0.05 The null hypothesis, according to which there is no autocorrelation, cannot be ruled out. Thus, it may be said that there is no detectable autocorrelation in the model residuals.

4.9.2 Heteroscedasticity Test

The Breusch-Pagan-Godfrey test was used to determine whether heteroscedasticity was present in a model's residuals. Table 4.11 presents the findings.

Table 4.11: Breusch-Pagan-Godfrey

F-statistic	1.528	Prob. F(2,85)	0.231
Obs*R-squared	2.849	Prob. Chi-Square(2)	0.229
Scaled explained SS	6.383	Prob. Chi-Square(2)	0.046

Heteroscedasticity in the model's residuals was evaluated using the Breusch-Pagan-Godfrey test. According to the test results, there is not enough data to draw the conclusion that the residuals exhibit heteroscedasticity. The Scaled Explained SS test, Obs*R-squared test, and F-statistic all had p-values over 0.05. As a result, the homoscedasticity null hypothesis is not disproved, suggesting that the residuals are probably homoscedastic.

4.10 Analysis of the data

The study examined monthly data from 2010 and 2023 on the Lusaka Securities Exchange. The Bank of Zambia (BoZ) website provided the monthly money supply and domestic interest rate data that was taken from it. The South African Reserve Bank and the Lusaka Securities currency provided the currency rate data. The investing.com website provides information on other important macroeconomic factors, including the money supply, interest rates, lending rates, consumer price index, and currency rates. The Lusaka Securities Exchange website provides information about the stock market, including share prices, company lists, and stock market indexes.

5. CONCLUSION

The results of this study indicate that there is a negative correlation between interest rates and stock prices from 2010 to 2023. This implies that stock values fall in tandem with rising interest rates. The investigation revealed that stock prices are reacting to interest rate fluctuations, indicating that regulating interest rates can regulate stock prices. In conclusion, fluctuating interest rates cause fluctuating stock prices, indicating that Zambian stock values are extremely sensitive to shifts in interest rates. According to Wagner (2022), volatility might present a significant risk to investments. This implies that investors who are afraid of investment risks may be turned off if interest rates in Zambia are unstable and constantly fluctuating.

It was also found that the money supply (M3), exchange rate (ER), lending rate (LR), and consumer pricing index indicating inflation (CPIE) all had an impact on stock prices.

One of the study's principal conclusions is that in order to draw in and keep both domestic and overseas investors, stock prices must be kept at a competitive level. A number of variables, like as interest rates, the state of the macroeconomy, and the performance of specific businesses, affect stock prices. The study probably concluded that keeping a stock price attractive necessitates vigilant observation of these variables and prompt legislative action when needed.

Keeping the stock price appealing is crucial to drawing in and keeping both domestic and international investors. While overseas investors bring in foreign currency and can assist broaden the investor base, local investors contribute to the capital markets and can support economic growth and development. Investors are more willing to participate in the market if stock prices stay appealing, which may result in greater liquidity and more effective capital allocation.

In conclusion, the study probably discovered that one of the key objectives of the central bank's monetary policy is to keep the stock price attractive. To encourage economic stability and draw in and keep investors, policymakers must keep a close eye on market circumstances and take the necessary steps. To do this, the study might have suggested that decision-makers take into account a variety of monetary policy instruments, such as interest rate changes, open market operations, and communication tactics.

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