PATIENCE MONIBAH

VOLATILITY AND CURRENCY FLUCTUATION ON BANK STOCK RETURN (SOUTH AFRICA)

Nicosia
January, 2023

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

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Supervisor

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Approval

We certify that we have read the thesis submitted by **Patience Monibah** titled **"Volatility and Currency Fluctuation on Bank Stock Return (South Africa)"** and that in our combined opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Banking and Finance.

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Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.

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I would first like to thank God Almighty for His guidance, wisdom, and strength to endure through this process.

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PATIENCE MONIBAH

Abstract

VOLATILITY AND CURRENCY FLUCTUATION ON BANK STOCK RETURN

A CASE STUDY ON SOUTH AFRICA

Monibah, Patience

Supervisor, Assoc. Prof. Dr. Turgut Tursoy

MSc, Department of Banking and Finance

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The impact that volatility and changes in currency has had on South African bank stock returns is the focus of this thesis, which looks at the period from 1980 to 2020. Investors have been put in a precarious position as a result of the deregulation that has taken place in the financial markets in recent years. It has recently come to the attention of bank management, regulators, researchers, and investors that rapid movements in interest rates and exchange rates could have a substantial effect on the returns that bank stocks generate. Due to shifting interest and currency rates, a huge number of financial organizations collapsed. Because the vast majority of banks around the globe have not yet completed their internationalization procedures, there is a greater possibility that individual banks' rates of interest and their susceptibility to changes in currency rates will vary. As a re of this, the nationality of the banks as well as the financial activities they engage in will have an effect on the degree to which that variation occurs. The discrepancy between the bank's assets and liabilities in terms of maturity, as well as unforeseen changes considered to be significant determinants, are interest and exchange rates that contribute to the increased likelihood of loss that banks are subject to. Furthermore, the vast majority of financial specialists and economists are of the opinion that unforeseen shifts in interest rates and exchange rates directly affect the revenues, costs, as well as economic viability of financial institutions (Saunders & Yourougou, 1990). For the purpose of integration, this thesis makes use of the ARDL model and ARDL-bound strategy. In this particular study, the consistency in the behavior of the variables was investigated by making use of the ADF unit root. According to other findings, exchange rate and inflation both have an adverse impact on the returns on stocks in South Africa, but there is a significant benefit

brought on by the interest rate. As a result of this, there is a need for involvement by policymakers during periods of abnormally volatile currency rates in order to build confidence among investors. Additionally, there is a need for businesses that trade on stock markets to make greater use of more effective hedging products, which would eliminate any negative consequences. The unstable nature of the currency exchange rate should be stabilized (the return in the context of the stock market diminishes because of fall in the value of the currency). Authorities should exploit stability to encourage foreign portfolio investment.

Keywords*:* Exchange rate, Inflation, Real interest rate, Stock return, and Portfolio

ÖZ

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1980'den 2020'ye kadar olan dönemi inceleyen bu tezin odak noktası, oynaklığın ve para birimindeki değişikliklerin Güney Afrika banka hisse senedi getirileri üzerindeki etkisidir. Son yıllarda finansal piyasalarda meydana gelen deregülasyon sonucunda yatırımcılar güvencesiz bir konuma getirildi. Faiz oranlarındaki ve döviz kurlarındaki hızlı hareketlerin, banka hisse senetlerinin ürettiği getiriler üzerinde önemli bir etkiye sahip olabileceği son zamanlarda banka yönetiminin, düzenleyicilerin, araştırmacıların ve yatırımcıların dikkatini çekmiştir. Değişen faiz ve döviz kurları nedeniyle çok sayıda finansal kuruluş çöktü. Dünya çapındaki bankaların büyük çoğunluğu uluslararasılaşma prosedürlerini henüz tamamlamadığından, bireysel bankaların faiz oranlarının ve döviz kurlarındaki değişikliklere duyarlılıklarının farklılık göstermesi daha büyük bir olasılıktır. Bunun bir sonucu olarak, bankaların uyruğu ve yürüttükleri finansal faaliyetler, bu farklılığın meydana gelme derecesini etkileyecektir. Banka aktif ve pasifleri arasındaki vade farklılıkları ve öngörülemeyen değişimler önemli belirleyici olarak değerlendirilmekte olup, faiz ve döviz kurları bankaların maruz kaldıkları zarar olasılığının artmasına katkıda bulunmaktadır. Ayrıca, finans uzmanlarının ve iktisatçıların büyük çoğunluğu, faiz oranlarında ve döviz kurlarında öngörülemeyen değişimlerin finansal kurumların gelirlerini, maliyetlerini ve ekonomik canlılığını doğrudan etkilediği görüşündedir (Saunders ve Yourougou, 1990). Entegrasyon amacıyla, bu tez ARDL modelini ve ARDL'ye bağlı stratejiyi kullanır. Bu özel çalışmada ADF birim kökü kullanılarak değişkenlerin davranışlarındaki tutarlılık incelenmiştir. Diğer bulgulara göre, Güney Afrika'da hem döviz kuru hem de enflasyonun hisse senedi getirileri üzerinde olumsuz bir etkisi vardır, ancak faiz oranının önemli bir getirisi vardır. Bunun bir sonucu

olarak, yatırımcılar arasında güven oluşturmak için döviz kurlarının anormal derecede dalgalı olduğu dönemlerde politika yapıcıların müdahil olmasına ihtiyaç vardır. Ek olarak, borsada işlem yapan işletmelerin, olumsuz sonuçları ortadan kaldıracak daha etkili riskten korunma ürünlerini daha fazla kullanmalarına ihtiyaç vardır. Döviz kurunun istikrarsız doğası dengelenmelidir (borsa bağlamında getiri, para biriminin değerindeki düşüş nedeniyle azalır). Döviz kurunun istikrarsız doğası dengelenmelidir (borsa bağlamında getiri, para biriminin değerindeki düşüş nedeniyle azalır).

Anahtar kelimeler: Döviz kuru, Enflasyon, Reel faiz oranı, Hisse senedi getirisi ve Portföy

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LIST OF ABBREVIATIONS

ABSA Amalgamated Banks of South Africa Limited

ADF Augmented Dickey-Fuller

APT Arbitrage Pricing Theory

ARCH Autoregressive Conditional Heteroskedasticity

ARDL Autoregressive Distributed Lag

ARIMA Autoregressive Integrated Moving Average

ASE Amman Stock Exchange

BESA Bond Exchange of South Africa

CPI Consumer Price Index

CUSUM Cumulative SUM

CUSUMQ Cumulative SUM of Squares

DF Dickey-Fuller

DOLS Dynamic Ordinary Least Squares

DSI Daily Sentiment Index

ECM Error Correct Model

E-GARCH Exponential General Autoregressive Conditional Heteroskedastic

FDI Foreign Direct Investment

GARCH Generalized AutoRegressive Conditional Heteroskedasticity

GDP Gross Domestic Product

GFC Global Ginancial Crisis

GJR Jagannathan and Runkle Model

GSE Ghana Stock Exchange

H-O Heckscher-Ohlin

ICAMP Intertemporal Capital Asset Pricing Model

ICBC Industrial and Commercial Bank of China

IFE International Fishers Effect

IMF International Monetary Fund

INF Inflation

INR Indian Rupee

IRF Impulse Response Function

IRP Interest Rate Parity

JSE Johannesburg Stock Exchange

LM Lagrange Multiplier

MS Money Supply

N and T Variation across the firms- & Time Series effects

NARDL Nonlinear Autoregressive Distributed Lag

OECD Organization for Economic Cooperation and Development

OLS Ordinary Least Squares Regression

PPP Purchasing Power Parity

R Rand

REER Real Effective Exchange Rate

RIR Real Interest Rates

ST Stock Traded

UNECA United Nations Economic Commission for Africa

USD United States Dollars

VAR Vector Autoregressive

VDC Variance Decomposition

VECM Vector Error Correction Model

CHAPTER I

Introduction

In light of the years of liberalization, money regulatory institutions like the stock market are now more open and competitive exposing investors to a number of potential financial threats. The impact that shifts in interest rates and currency rates have had on the returns of bank stocks has captured the attention of bank managers, regulators, academics, and investors. This is because Banks have been failing for a variety of reasons, and this is partly blamed on the bad effects of factors influencing interest and exchange rates.

Several theories and hypotheses may potentially explain bank stock price movements in relation to variations in interest and exchange rates. Initially, it is possible to include interest rate risk in the model for intertemporal capital asset pricing (ICAPM) denoted by Merton (1973), as an additional market component, since a potential significance of cost of borrowing widely known as interest rates can vary and cause a shift in the investment opportunity set. In light of this, greater compensation is required for investors to shoulder the potential for adverse effects from these modifications. Furthermore, the results of Arbitrage Pricing Theory (APT) perhaps point to the fact regardless of if exchange rate risk or interest rate risk are factors that affect the market equilibrium price level of bank stocks (Sweeney & Warga, 1986). Rates of Exchange and interest rates are suspected to have a big effect on the shares of publicly traded banks and other financial entities, especially banks, because of how sensitive they are (Saunders & Yourougou, 1990). Given the nature of banks' balance sheets, their sensitivity to changes in interest rates has been explained in the theory of nominal contracting by Kessel (1956); Bach and Ando (1957); French et al. (1983).

According to Flannery and James (1984)’s concept, the total amount of a bank's net nominal assets is the key factor in establishing the degree to which the bank's common stock return is capable of being altered in regards bank's interest rate. The holdings of the wealth distribution and results of unexpected inflation have influence on the common stock returns of banks, and these impacts are based on the nominal assets and liabilities of the banks.

It is more probable that rates of interest and the sensitivity of exchange rates will differ between banks because in most banks, the internationalization process is still in progress.

The extent to which this variation occurs, therefore, will depend on the nationality and banking practices of the institutions. The disparity in the average maturities of bank assets and liabilities, as well as unanticipated fluctuation of exchange rates and interest rates, is a crucial consideration that contributes to banks' increased risk exposure. Furthermore, most financial experts and economists believe that unpredictable swings in interest rates and currency values have a significant bearing on bank revenues, expenses, and profitability (Saunders & Yourougou, 1990). As a result of the liberalization of money markets, most banks now operate in other nations, putting them at risk from interest rate swings. So, rates of interest and currency value change may hurt a bank's ability to stay in business since risk management strategies can't get rid of their effects.

It is possible for banks to minimize or possibly avoid exposure to interest and currency rates risk by taking part in a variety of off- the books and making use of solid strategies of risk management. Also, it is difficult to completely separate banks from vulnerabilities in emerging markets especially since most banks lack such tools and approaches. It is hardly surprising that these nations have more severe financial crises. As a result, investigating the Banks' susceptibility to interest and currency rate movements in developing economies is valuable, because the outcome may have far-reaching effects on banking and regulatory policymaking and the overall health of the financial system.

The following is the rationale for investigating volatility spill overs: To begin, starting in the middle of the 1980s, the rate of stock inflows has grown by 34% each year. Substantial change is reflected in this recent trend of growing inflows of foreign equity. Increased demand and supply for the currencies used to price international equities is a direct result of global stock market activity, resulting in stock market performance and currency exchange rate having some correlation fluctuations. Significantly positive spill over effects from Volatility may enhance international investors' non-systematic residual international portfolio risk, lowering the advantages of international portfolio diversification. Third, comprehension of the correlations between stock price swings and currency fluctuations may enhance multinational organizations' capacity to manage their potential losses due to fluctuations in the value of the currency.

The potential for adverse effects from currency exchange rates has a range of effects on banks' capital situations. When banks sign into arrangements that require an overseas

exchange of money at a later time, they expose themselves to the vulnerabilities of foreign exchange owing to the uncertainty involved in making accurate predictions about the spot exchange rate. Currencies swings on international assets and liabilities held by a bank may be significantly impacted by altering the capital ratios of the bank. Alterations in the overall pricing level could potentially neutralize some of the effects of differences in bank capital; nevertheless, study of the short run, discrepancies in PPP can be very important, and they don't always fix themselves. Financial institutions such as other businesses could look for ways to lessen or deal with their vulnerability to the rate of change in currency fluctuations, futures markets for currencies and forward exchange, Instances of this include methods for converting currencies, agreements for swaps, back-to-back loan, as well as a match between the maturity of assets plus the currency in which they are denominated (Dumas & Adler 1980; Roll, 1979). If a bank believes it has an advantageous competitive edge in foreign currency rate forecasting swings, Foreign exchange risk may not be covered by hedging or diversification. Furthermore, the amount of exposure a bank is ready to take will most certainly fluctuate over time, the same as the bank's currency value forecasts (Rutenberg & Shapiro, 1976; Shapiro & Cornell, 1983). Let it be made clear that the essay does not attempt any sort of evaluation of commercial banks' unique hedging or speculative trading activities

The key component of each economic system is the fluctuation of the value of the currency. The argument about the success of the structure of the currency market increased volatility in currency rates after 1973 has exacerbated this problem (Omojimite & Akpokodje, 2010). Policymakers and financial analysts have long been interested in and concerned about the sources of stock market volatility. The main drivers of volatility and their spill over effects on real activity are of interest to policymakers. On the other hand, financial experts are interested in the impact of time-varying volatility. The capital market determines the financial condition of a country's economy, making it vulnerable to foreign exchange volatility (Olweny & Omondi, 2011). Ahmad and Ramzan (2016) annualized standard error of daily stock security price movements may be used to measure volatility, which is the risk or ambiguity associated with stock prices.

The sudden increase in global activities in trade and countries' use of flexible rates of exchange have advanced and those that are still developing signalled the beginning of a

new era of increased currency volatility (Kisaka & Mwasaru, 2012). Its foundation dates back to 1887, and currently, it stands as Africa's biggest stock market, the Johannesburg Stock Exchange (JSE). In addition, financial derivatives and agricultural commodities have emerged as new marketplaces in recent years. Another active bond market is The South African Bonds Trading Platform (BESA), established in 1996 and now performs bond automatization transaction payment. In addition, financial markets were reformed after the financial crisis, resulting in significant changes. Aggarwal (1981) argued that stock prices may be affected by changes in rates of exchange because they affect firm profits, whether multinational or domestic. Interest and inflation rates were four times as unpredictable as currency exchange rates (Jorion, 1990). Therefore, the investor is exposed to foreign exchange risk due to currency fluctuations. The volatility of currency exchange rates may significantly impact an investor's portfolio because of the unpredictability of investment returns. The liberalization agenda includes electronic screen trading on the JSE, corporations, and non-residents. The conversation revolved around members' engagement, commissions' negotiation, and the main broking trade-off. In 1998, Share Transaction Totally Electronic (STRATE) was launched. The JSE has had a strong run, with one of the greatest market capitalizations inside the realm of developing markets, signifying the incorporation of South Africa into the world's most liquid stock exchange indexes. Since the 1970s, exchange rate volatility has caused constant changes in South African policy structures, resulting in the deployment of various exchange rate systems (Muzindutsi, 2011).

Flexible exchange rate regimes have the unwanted side effect of creating excessive exchange rate volatility, which should be addressed carefully. This impact should be avoided at all costs. Quite a few nations, most notably South Africa, have voiced their concern regarding currency fluctuation. The rand has seen the most volatility of any developing currency over five years. Recent attempts made by South Africa to control volatility have been unsuccessful due to the rand's volatility being compounded via means of international economic uncertainty investment flight from the world's wealthiest nations (Davies, 2010). There are Risks factors associated with the use of several currency exchange systems which can modify returns on securities (Aydemir & Demirhan, 2009; Mburu, 2015; Staf & Fathi, 2013).

IMF (2008) report states that South Africa's commercial banks constitute the most powerful section of the financial industry, accounting for nearly 120 percent of GDP in assets. Eighty-five percent of total assets are owned by the Amalgamated Bank of the South African Republic along with other three major central banks (ABSA), Standard Bank, First Rand Bank, and Nedbank. These banks are present in Botswana, Mozambique, Namibia, Zimbabwe, and other countries throughout the globe. S. A.'s banking industry is open to foreign institutions. As of 2005, Barclays Bank was ABSA's biggest shareholder, although a 20% share in Standard Bank was acquired by China's industrial bank (ICBC) in 2007. JSE currency rate changes have impacted the market in recent years (Mlambo et al., 2013). "In the early 2000s, the South African Reserve Bank (SARB) tightened its monetary policy in a bid to keep inflation within the target band of 3-6%. Consequently, the SA rand appreciated significantly. However, the strength of the rand led to a 10% decline in the JSE index in local currency terms and 24% increase in US dollar terms" (UNECA, 2008).

Statement of the Problem

Currency fluctuations with respect to banks' stock returns in South Africa are a major concern since she holds the biggest stock exchange market on the continent. What influenced this research is an examination of volatility in the rate at which the South African rand can be exchanged for world-leading currencies and how it affects banks and returns on stocks in the financial market. Furthermore, any instability in the value of the South African currency could expose the economy and cause vulnerabilities such as distrust in the currency or financial institutions, reduction in the growth of the Gross Domestic Product, and may lead to unemployment.

Purpose of the study

In this day and age, it is difficult to predict the movement of currencies. However, several studies and research have proven that the stronger the economy of a nation, the fluctuation of its currency is reduced and the less volatile it is. Investors around the world are drawn to countries with strong economies that is, there are most often higher returns on investments when the value of the country's currency is higher than their domestic

currency. The same holds true with banks and the financial market. Most Banks around the world now invest in different securities; government bonds and other assets such as real estate and stocks with the expectation of higher returns and profits consequently, the basis for the current study is to ascertain extent to which volatility and fluctuation of one currency can have on Banks' stock returns.

Research Questions

This study aims to examine the below-stated questions:

1. How strong is the South African Currency against other currencies?
2. How often does South African Rand fluctuate?
3. What is the correlation between Stock Return and Volatility?
4. What is the link between interest rate and stock return?
5. Does the exchange rate play any role in the fluctuation of the South African currency?
6. What factors influence currency fluctuation?
7. What strategy of recovery do Banks in South Africa apply to recover losses when there is a devaluation of the currency?
8. How volatile is the South African Rand?
9. What is the relationship between Bank's stock return and currency fluctuation in South Africa?

Research Hypothesis

These assumptions birthed the curiosity to formulate this research paper topic and the outcome of these hypotheses which will be observed and tested through the use of econometric tests and models.

Null Hypothesis

1. Real Exchange rate has no relationship with Banks' stock returns
2. Real interest rates and Banks' stock returns do not have a relationship
3. There is no relationship between inflation and bank stock return

Alternative Theory

1. Both exchange rates rate and bank rates of return are linked
2. Real rate of interest and Banks' stock returns do have a relationship
3. There exists a connection between both inflation and bank returns on stock
4.

Conceptual Framework

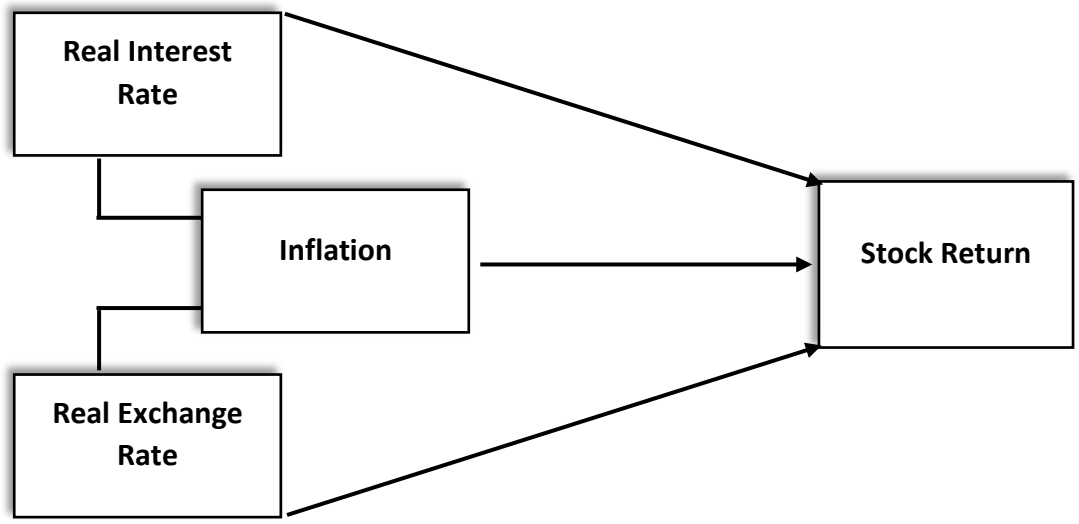


Figure 1.1 Conceptual Framework

Significance of the Study

It is important to note since the great depression, countries all over the world have taken numerous precautions to mitigate financial malpractices and improve financial sectors while ensuring the financial market is safe from another financial crisis. South Africa, holder of the biggest stock exchange market in Africa suffered great losses during the crisis, which led to massive unemployment, a split between political parties, and the death of the securities market. While it is true that other studies have highlighted that which connects currency volatility and the stock market returns for individual shareholders, a full investigation of how Banks' Stocks are affected by currency fluctuation is an important topic of discussion since banks do not identify as individual investors and cannot buy stock as a person but rather use her liabilities (Deposits) to purchase different securities among other investments with the sole purpose of getting higher returns. This study on banks and how their investments are affected in the presence of currency fluctuation, high-interest rate, or high volatility will inform investment banks in South

Africa as to which investment is better to pursue at a time should they choose to invest in the stock market or purchase government securities.

Objective of the Study

This study's goals include the following:

1. Investigate the outcome of volatility and currency fluctuation on banks' stock return in South Africa
2. Examine the degree to which Rand is volatile
3. Explore the linkage of interest, rates of exchange, and the South African Rand

Limitations of the study

In this investigation, the main objective is to explore the impact of market volatility and currency fluctuation on the stock market results of financial organizations within a particular geographical context; more specifically, the findings of this investigation will only be applicable to South Africa during the years 1980–2020. This thesis will only discuss four of the many economic indicators that influence the volatility of currency fluctuation on bank stock returns: the exchange rate, stock return, interest rate, and inflation. Although there are many economic indicators that influence this volatility, this thesis will only discuss these four indicators. This thesis addresses these facets during the duration of the time period for this thesis, with South Africa serving as the focal point. This study used the analysis, testing for ARDL bound strategy for the Johansen co - integration ARDL model for the short-run interactions as well as the long-run among the variables. Although there are a great number of approaches that are used for data analysis, the ARDL Bound Testing Method was selected for this research.

The main idea behind this thesis, which takes this theory into account, is the idea of "purchasing power."

Contribution of the study

When the gold standard was abolished in the 1970s, South Africa maintained a predetermined parity with the US dollar. Efforts on the part of the Reserve Bank of the South African Republic to control the value of the country's currency in the 1990s were

costly. To reduce speculative activity, the bank sold almost $14 billion worth of securities in 1996. By taking these measures, the currency's depreciation was temporarily delayed. Intervention only avoided a depreciation from R3.50 to R4.50 to the dollar due to the action. There were two instances of the bank's intervention in 1997. When it sold minimally more rand than it had purchased, it profited $1 billion. It also raised interest rates to a real-term high of 7%. As a result, the country's currency gained strength due to increased capital inflows prompted by higher interest rates. The South African Reserve Bank required this data. As a result of these actions, the currency depreciation was only modestly contained. Thus, determining whether the changeover to a flexible the exchange rate is of relevance regarding policy, because if it is, such knowledge could help policymakers in determining what government actions would have the most impact in stabilizing the currency.

Going forward, this study will analyze the association between currency fluctuations and banks return in the stock market from 1980 to 2020, following the end of apartheid in the 1970s, events like the 2008 financial crisis and the latest CoV-19 epidemic. South Africa is being used as a case study among the various African countries since it has Africa's largest stock exchange market and one of the continent's major economies.

Conceptual Contributions

1. Definitions of accurate conceptualizations of the stock market and currency exchange rates.
2. New theoretical connections, i.e., research ideas, and the reasoning behind them.
3. Modifications to the linkages of their theoretical foundations.

Empirical Contributions

1. The goal of this research is to establish a previously disproven correlation concerning the difference in the cost of one currency compared to another volatility and returns on banks' stocks.
2. To what extent a variable mediates the correlation between currency value and stock price, this study will attempt to answer.

3. Investigating how changes in currency values affect South African bank stock returns

Definition of Terms

Volatility is variability in financial results as measured statistically for a particular stock index or security. More often than not, the riskier a security is, the more volatile it will be. Most of the time, the standard deviation or variance of returns on the same securities or market index is used to measure volatility. This level of variation means there is a high degree to which the prices of stock swing around the original price. Calculating volatility will require squaring all the differences to ensure all the positives and negatives are placed in a single quantity.

Currency Fluctuation captures the changes in the value of a currency when it is being compared to another currency. When this happens, it is an implication of an irregular change, a problem normally caused by a floating exchange rate.

Stock Market in the stock market, a stake in a publicly listed company can be purchased and traded in equity markets. Stock markets are crucial to a free market economy because of their role in making trading and access to capital exchange more accessible to a wider range of investors. The stock market operates on a network of exchanges, and in most situations, the trading that takes place inside the stock market is conducted between the many exchanges plus the greatest price that buyers are willing to pay is usually less than what sellers are asking for as compensation.

Stocks are investment instruments that represent a fractional share in the ownership of a company. A share, or a small portion of a firm, is what you acquire when you buy its stock.

Interest Rate simply explained is the price of borrowed funds, often known as the interest rate that a bank or other financial institutions charge for using their services levied on you when you borrow money or that they pay you when you maintain money in an account.

Exchange Rate a currency's exchange rate value expressed in terms of another currency or group of currencies. Many countries use different types of exchange rates based on the condition or strength of their economy; The Floating Currency Rate Regime is used by several countries; in this system, the exchange rate is not regulated and is instead set by

market forces. In the pegged exchange rate regime, authorities are more involved. Instead of leaving the determination of exchange rate to driving market forces, they regulate it by buying and selling currencies in the financial market to keep their home currency at a targeted level while maintaining fluctuation at a minimum.

CHAPTER II

Literature Review

Introduction

Before expanding on the main subject of this research, a dive into previous literature will broaden our understanding of the subject and examine major research in light of the topic- evaluating arguments, agreements, and disagreements from different materials from published and unpublished authors on the subject matter. Magazines, journals, books, articles, and various sources of research. Based on the previously conducted research, this chapter explores the impact of volatility and the impact that Interest-rate variations and currency prices had on the share prices of banks. This paper provides a summary of the theoretical and empirical findings from previous and recent research conducted by academics who have devoted their lives and resources to information banks, which are now accessible thanks to the availability of a vast source of information on stocks, the financial market, interest rates, and exchange rates.

Theoretical Framework

There have been numerous investigations on the dynamics of currency swings and a major character of effect which is the exchange rate that has been in play since economies shifted to a floating exchange rate regime. In this study, points will be drawn from the exchange rate and interest rates theories in an attempt to understand how they are linked to volatility, currency fluctuation, and their effect on Banks' stock return.

Exchange Rate Theories

Stockman (1980)'s study on prices and rates of conversion both in recent years displayed significant devaluation, and neither has complied with PPP- hypothesis. Exchange rate fluctuations frequently do not match up with concurrent modifications in relative price in terms of how huge it could be or what turn it could take. Comparative pricing levels alongside inflation rates have been less unpredictable than exchange rates. The characteristics of variations in currency rates have frequently been thought to be out of equilibrium, and many disequilibrium explanations for this unusual behavior have been put forth. Therefore, theoretical models of exchange rate determination aim to achieve this

goal which seems to provide knowledge of financial arrangements that are regulating the flow of currency values in these contemporary economies and; additionally, how the exchange rate influences other microeconomic variables. Hence, it is essential to research the observable pattern in the data-indicative of currency rates and associated factors behavior in economies with freely fluctuating currency rates when investigating the theoretical frameworks for determining the rate of exchange.

Mussa (1984) hypotheses which explains the decision of exchange rates have taken turns since the changeover from a set rate to a free-floating- exchange system. The elasticity approach and the absorption method are two examples of conventional concepts that matured during the era of the set exchange rate and concentrated mainly on the real estate sector. Furthermore, another important factor influencing exchange is the monetary sector, especially during this time of adapting flexible exchange rates. A number of things influence the rate of exchange using these qualities as a baseline, numerous hypotheses and techniques were developed to forecast the rates of exchange between different currencies. We'll go over some of the important theories in this section or chapter.

The purchasing power parity – Swedish economist Gustav Cassel elucidated in a systematic way, that the equal dollar value of two non-convertible notes currencies determines the rate of exchange. It means that the exchange rate between two non-convertible paper currencies is influenced based on the two nations' domestic price levels; the Ricardo and Wheatley concept of Absolute and Relative versions goes way back. The neoclassical theory of international commerce is seen as having two foundations, the first of which is the Purchasing Power Parity doctrine. In his essay he argues that exchange rate fluctuations are preferable to relative price changes because "changes in internal prices and incomes are undesirable due to rigidities in internal pricing, notably wages, and the rise of full employment as a major goal of policy". Instead of relying on changes in the numerous prices that collectively make up the internal pricing structure, it is far simpler to allow one price, notably the cost of currency exchange, to fluctuate (Friedman, 1953). Stockman (1980) theory of PPP declares there is a proportionate correlation between both the exchange rate and ratio of domestic and foreign cost indices, which might be interpreted as claiming other things are roughly similar. Any specific theory of exchange rate determination has no bearing on how accurate this idea is.

The comparative costs trade theory, which Ohlin devised as an interpretation of Ricardo's idea of relative advantages, is what underlies the H-O theorem, which made Ohlin famous but is "independent of the standard labor theory of value" (Ohlin, 1933).

Nominal exchange Rates normally move in the right direction to equalize the relative price levels of two countries, PPP is rather a concept of how exchange rates are calculated. According to proponents of the PPP hypothesis, price level changes are thus dominated by monetary forces in the sense that if the money supply rises, so will the price level in the same proportion, even though it is frequently unclear the question of what strategy must be in place to establish a uniform price level (Dornbusch & Frankel, 1988; Froot & Rogoff 1995; Rogoff, et al., 2002).

It is sometimes claimed that the potential of international goods arbitrage ensures that the PPP theory of currency rates will hold, at least roughly. There are two ways that the PPP hypothesis could be true; that is, the Absolute or the Relative

i. **Absolute Version** - For proponents of this view of PPP, the value of any currency should represent the underlying relationship between the buying powers of several national currencies. This indicates that the currency rate equals the price disparity between buying the same goods at home and abroad for a fixed basket. The purchasing power parity occurs when a unit of money, after being exchanged into another currency at the market exchange rate, has precisely the same purchasing power in both the home and foreign economies. However, it is frequently challenging to evaluate whether a literal same basket of commodities is offered in two separate countries. Simply put, if you choose to purchase at least three commodities using Rand, a commodity I, X, and Y with 458.38 South African Rand, these same commodities should cost approximately or be equivalent to US 25, with this, the price to acquire one US dollar to Rand can be determined. The concept of the PPP is undoubtedly simple and beautiful despite being undoubtedly simple and elegant, the buying power parity theory's absolute form has certain issues. First off, since it aims to determine the absolute value of money, this method of estimating exchange rates is ineffective. In actuality, relative worth is how purchasing power is determined. Additionally, there may be differences between the two countries in the kinds and caliber of products that are offered. The globalization of product pricing is seriously hindered by these discrepancies, which require rapid attention. Demand patterns and

transportation costs are influenced by three factors in addition to changes in quality and kind of commodities. These elements include taxation regimes, tariff structures, the degree of governmental interference and regulation, as well as a number of other elements. Due to these disparities, it is challenging to define the absolute value of two or more currencies in relation to one another with precision.

ii. **The Relative Version** - to account for variations in a state of equilibration of two currencies' exchange rates, an approximate form is provided by Cassel's buying power parity theory that changes in the prices of currencies are related to the purchasing power parities and changes to the equilibrium exchange rate. To put it more simply, the relative exchange rates between the two eras are greatly impacted by the relative changes in price levels across two countries between a base period and the current time. This version states that the equilibrium rate of exchange, that is e = OP/P, where e is a constant reflecting the specified trade barriers, is the theory's representation of changes in relative price levels and the exchange rate. Given these barriers, a rise in domestic prices relative to those elsewhere implies a corresponding decline in domestic currency. The current period (R1) is determined by the equilibrium rate of exchange in the base period (R1) and the ratio of the price indices for the current and base periods in one country to the other country.

Interest Rate Parity – The connection between spot rates, interest rates, and exchange rates for foreign currencies is referred to as interest rate parity. How interest rates and exchange rates relate to one another is determined by the basic equation known as IRP. The underlying idea of IRP is that profits on hedged assets in multiple currencies should be identical whether interest rates are high or low of those currencies. The foreign exchange markets are significantly impacted by it. The IRP assumption may be used if you're interested in researching the relationship between a currency's spot rate and its applicable future rate. In accordance with this theory, there would never be an unequal distribution of interest rates between two different currencies, and the difference would be evident in the markdown or high price of the forward exchange rate of the foreign currency in which it is present; In other words, a difference in the two nations' respective interest rates involved in the transaction corresponds to the magnitude of a substantial international currency discount.

International Fisher Effect – This concept, the "Fisher effect," is named after American economist Irving Fisher. One of the most understandable economics writers in American history, Irving Fisher was a master of mathematics and a great economist. He had the foresight to incorporate mathematics in almost all of his ideas, but only after he had correctly articulated the fundamental principles in language. Whenever there is a change in the interest rates of two currencies, the Fisher Effect theory predicts that the value of each currency will change, and so too does the difference in their exchange rates. Researchers into the International Fisher Effect (IFE) argue that differences in national nominal interest rates can be utilized to foretell movements in the value of national currencies.

When it comes to stock exchanges, the International Federation of Exchanges (IFE), it's a well-known fact that countries with higher nominal interest rates also experience higher inflation rates which causes a decline in the value of their currencies relative to other currencies. Variations in supporting evidence for the IFE exist in practice, and in recent years, direct prediction of currency exchange movements based on forecasted inflation has gained attention. This strategy adopts a hybrid approach that correlates growing inflation rates with a rise or reduction in the value of a currency rather than relying just on inflation rates to forecast changes in exchange rates. Understanding how interest rates are impacted by other financial factors, such as changes in interest rate policy, is crucial for determining a currency's strength in the global market. The International Federation of Exchanges (IFE) claims that economies in lower-interest-rate nations grow more slowly. This could result in increases in an associated currency's actual value relative to that of other countries. The effect would be a short-term decline in the value of currencies from nations with higher interest rates.

Empirical Literature

Real Exchange Rate-Stock Traded Nexus

Abimbola and Olusegun (2017) analyzed how fluctuations in the Naira, stock market, and total output in Nigeria are related to one another. The findings revealed that the value of stock and currency rates are both unstable and their swings have a considerable impact on aggregate output using quarterly time series data analyzed with

ARCH and GARCH models for forecasting volatility, also, the BVAR for estimating autoregression, VAR Granger Causality concept centered around causes after effect. Additionally, exchange rate variation, stock price fluctuation and the difference in total output all have a strong positive relationship with one another. Stock market fluctuations, overall economic output, and currency exchange rate fluctuations are all interconnected. Another factor that significantly and positively affects overall output is market and currency volatility and the success of the stock market. Nigeria's aggregate output is ultimately influenced by fluctuations in the country's exchange rate, stock market, and reserve levels. The findings demonstrated a clear causal connection between changes within the naira-stock exchange rate, stock market performance, and Nigeria's overall output. Keeping the exchange rate stable helps the economy grow because it encourages foreign direct investment (FDI) and money to flow into the stock market. However, it was concluded that volatility shocks were present and persistent in naira-US dollar exchange rates between the years 1985 and 2015 in Nigeria. Since the exchange rate of one US dollar to one naira has not been stable over time using conventional monetary management tactics, it is safe to assume that these methods have failed. Because of this, there are many different ways to manage foreign exchange, particularly to accommodate the substantial demand for foreign currencies which has shaped performance in the trade balance and overall economic performance of Nigeria.

According to Zubair (2013), there is no statistical correlation between currency movements and the constant shifts in the prices of stock. Umoru and Asekome (2013), on the other hand, discovered a unidirectional causal association between Naira-US$ fluctuating rates of exchange and stock market reaction. This means that there is not enough evidence to come to a conclusion about the relationship between changes in stock prices, exchange rate fluctuation, and aggregate production.

In contrast to the prevalent approach in the literature, Salisu and Umar (2018) examined how the rates of exchange react to variations in stock prices. As a result, it develops a dynamic non-stationary heterogeneous model set for panel data that takes into account any fragile endogeneity that might be a recent issue caused by reverse causation while simultaneously accounting for the non-stationary and heterogeneity characteristics of sizeable N and T panels. As a result of mounting arguments from academia that the

majority of financial studies demonstrate the effects of leveraging, it also looks at the role played by asymmetries in the nexus. The research separates the entire data into Euro and non-Euro sectors due to the Euro's significance to the OECD. Additionally, extra regressions are conducted both prior to and following the World Financial Crisis of 2008 (GFC) to take into consideration the financial crisis' contribution to the nexus. To achieve a more reliable result, both nominal and real variables are included in the study in addition to numerous data frequencies. Overall, the results are in favor of the OECD's entire Portfolio Balance Theory, including the Eurozone, and the non-Eurozone, though the latter has less evidence. Furthermore, the theory's validity became clearer at the time of the world's biggest financial meltdown, and regardless of the collected data, the nexus displays long and short-run abnormalities. Unexpectedly, various data frequencies, measures, or lag structures have no impact on the outcomes that lead to these conclusions. Raju et al. (2021) integrated the stock market returns, cost of crude oil, as well as currency rate. The research used co-integration, Granger causality, and variance decomposition to examine data per month between April 1, 2003, and March 31, 2019. The study's overall results show that crude oil has a considerable influence on the Exchange rate INR/USD. In theory, a shock to oil prices could happen when a drop in crude prices lowers the prices of non-traded goods in the country and, as a result, the real exchange return on the rate of return on stocks.

The research by a group of developed and developing countries, reexamined the relationship between exchange rates and stock prices. Given the asymmetrical and cross-sectional reliance of the data, the use of bootstrap panel Granger non-causality tests, both symmetric and asymmetric were the most effective means to separate the correlations between the values of currencies and stock prices that are both symmetric and asymmetric. One main conclusion from their investigation is that an essential component for predicting currency rates is the price of stock, the same does not work in the case of the exchange rate. Second, the results only weakly support the idea that stock prices and currency rates are causally linked in one direction only. Third, the empirical results of the tests for non-causality on the symmetric panel conducted by Hatemi-J (2012) show that exchange rates and the price of stock share a causal relationship (Xie, et al., 2020). According to the Emirmahmutoglu and Kose (2011) test, the Hatemi-J findings hypothesis of stock prices

to exchange rates and vice versa is not disproved. Fourth, the causal links mirror, findings obtained when Emirmahmutoglu and Kose (2011) used the log of data for testing raw data. Additionally, after raw data is used, the causal relationships shown by Kose and Emirmahmutoglu share similarities with the panel Granger's non-causality test and the causal links revealed by Hatemi-J (2012).

According to Agyapong (2009), there is a dispute over whether one of the pillars of financial economics is the idea that developments in the currency markets have an effect on the stock markets. Although some empirical studies concluded that there was no connection between these two significant markets. According to the study, the relationship between the two financial markets is shaped by recent financial developments, the use of the two financial markets as alternatives or complementary investments, the effects of the credit crunch, the cross-listing of companies, the movement of investors in stocks and bonds across international borders, and other factors. Co-integration techniques were shown to be the most effective among the numerous options for building financial variable linkages. As a result, the study provides a typology of the various techniques that organizations may employ in managing such relationships, as well as the operational risk that each of these markets poses to the other.

According to Bhattacharya and Mukherjee (2003), Stock market values are not correlated with the currency exchange rate. Using a Box-Jenkins ARIMA model, Gay (2008) found no evidence of a relationship between currency exchange rates and stock market index prices. Granger et al. (2000) found no proof of a cause-and-effect link in most of the countries they looked at. Bhattacharya et al. (2003) discovered no such causal relationship. In a similar vein, Stavarek (2005) looked into how the exchange rate and stock price relate to one another for nine different nations from 1970 to 1992 and found no causal relationship. Mohammad et al. (2009) found that foreign currency rates significantly affect the stock market, based on their analysis of historical data. Dimitrov (2006) discovered unequivocal impacts of stock price depreciation on the use of a short-run, open economy, multivariate model to examine depreciation of the currency rate. The CPI may seem like a benign economic indicator, but Sohail and Hussain (2009) found that it really negatively affects stock returns. However, long-term stock returns are significantly influenced by a measure of output from industries, the real effective exchange rate, and

the supply of money. According to Sohail and Hussain (2009), there is a positive effect on export-oriented businesses in conjunction with an increase in exchange rates or a decline in the domestic currency, which results in an increase in returns and, finally, a rise in stock prices. Ratanapakorn and Sharma (2007) discovered similar results. Mao and Kao (1990) did more than just link these two markets; they also added a crucial factor (the relationship underlying both micro and macro stock price movement) to the investigation of this linkage. They found that companies engaged in exporting had stock values that were vulnerable to shifts in exchange rates. In line with the theory of goods market, Mao and Kao (1990) realized that an upward movement in the value of a nation's currency value has a negative effect on the domestic market of a country whose main economic activity is exportation and the reverse for a nation with an import-dominated economy. At the same time, Khoo (1994) found that stock returns may quickly respond to any kind of movement or changes in the exchange rate, but a small fraction of stock returns is explained by changes in exchange rates. Domely and Sheehy (1996) discovered that the market value of significant exporters was correlated with the value of the foreign exchange rate. According to Solnik and Roulet (2000), there is a common misconception that the value of a currency in a developed economy is lower than it actually is. The rationale behind this is that a weaker currency makes domestic companies more competitive on the global stage, and as a result, the stock market benefits. However, this does not hold true for stock markets in emerging countries.

According to Lu and Inci (2004), stocks react faster to fluctuations in the exchange rate. Their empirical conclusions are limited by the fact that when they use monthly data, the major effects of exchange rate swings disappear. In other words, their research implies only delayed, rather than immediate, market responses to exchange rate swings. In addition, they do not prove that the stock market accurately reflects fluctuations in the value of currencies. Strong relationships underlying stock returns and value of exchange were discovered by utilizing daily data sets for eight different nations (Mougoue & Ajayi, 1996). Murinde and Abdalla (1997) discovered that stock prices tend to lead as a result of the month-to-month exchange rates of a nation, but the same does not hold true in reverse. Ramasamy and Yeung (2002) said that the direction of causality among the exchange rate and stock return varies in different countries and at different times, with

movements in the price of stock either inducing or mitigating exchange rate volatility. Adopting a study similar to and applying the typical Granger causality methodology (Granger, et al., 2000), Yeung and Ramasamy's study of two markets in East Asia's nine economies revealed that the casualty can change depending on the time that is selected. Adjasi and Biekpe (2005) study of correlation between stock market performance and currency fluctuations in seven countries in Africa cointegration analysis showed that a devaluation of a country's domestic currency leads to higher long-term stock market prices, but worse short-term stock market returns in some countries. Additionally, Granger causality analysis found that in certain nations, in certain cases, stock market returns drive exchange rate movement, while in others, exchange rate movement drives stock market returns. Mishra (2004) used the outcome that exchange rate return affects stock return through prediction error variance decomposition.

According to Choi and Fu (2006), if the stock market has a leverage impact, it is necessary to analyze whether the influence of leverage can be seen in the volatility of exchange rates. They discovered a strong leverage impact in the stock market using a GJR model. They saw that when exchange rate volatility is included in the GJR model, its effects on stock market volatility are still present. Similar to Brailsford (1996) and Kanas (2000), Choi and Fu (2006) employed the GARCH modeling technique to evaluate the unstable movement of the stock index market. When exchange rate volatility is larger, stock index volatility is lower, using the most conservative Generalize Autoregressive conditional heteroskedastic model to define the fluctuations in the rate of exchange expressed as its absolute return while maintaining volatility persistence. After including the contemporaneous initial difference in index trading volume, the conclusion is robust (Ekman, 1992; Duffee, 1995).

Wong, (2017), in his study, looked at the connections between both real exchange rates and stock price returns in Malaysia, the Philippines, Singapore, Korea, Japan, the UK, and Germany. According to the constant conditional correlation (CCC) or dynamic conditional correlation (DCC) – multivariate generalized autoregressive conditional heteroskedasticity (MGARCH) model, the real exchange rate return and real stock price return have a negative and significant relationship for Malaysia, Singapore, Korea, and the United Kingdom, but an insignificant relationship for the Philippines, Japan, and

Germany. Exchange rate markets generally have a big impact on stock markets. Lin (2012) examines the co-movements between currency rates and stock prices in India, Indonesia, Korea, the Philippines, Taiwan, and Thailand at the aggregate and industry levels using Pesaran, Shin, and Smith's autoregressive distributed lag technique. Foreign reserves, the performance of an Asian stock index that excludes Japan, and the difference between local and US interest rates are also considered in the evaluation. The evaluation takes into account Asia's portfolios adjustments, policy choices, and capital flow effects by factoring in interest rates and foreign reserves. The investigation was conducted between January 1986 and December 2010. Market liberalization January 1986 to July 1997, the Asian crisis July 1997 to July 1999, peace August 1999 to February 2008, and the global crisis are the four sub-periods that make up the evaluations July 1997 to July 1999. From March 2008 through December 2010 the results show that during times of crisis rather than peaceful times, there exist presence of a stronger association between exchange rate and stock price. Additionally, the spillover from stock price to exchange rate occurs during times of crisis. This suggests that in order to attract capital inflows, it is crucial to encourage economic expansion and stock markets. For enterprises that are focused on exports, such as those in the industrial and technology sectors, the co-movement is not always greater. This may indicate that, rather than commerce, the capital account balance influences the connection between stock prices and exchange rates in developing Asian countries.

Using monthly and daily data from January 2003 to October 2010, the relationships between currency rates and stock markets in Hungary, Poland, the Czech Republic, Turkey, Russia, Ukraine, Romania, and Croatia. Exchange rates, stock market indexes, and worldwide market indices were a few of the factors examined by Ülkü and Demirci (2012). The findings show, among other things, that a strong correlation between the exchange rate and the stock market is caused by stock market returns in developed countries. Cross-country data show that the stock market's size and its status as a source affect how closely the exchange rate relates to the stock price. Katechos (2011) employed a novel technique to investigate the connections between exchange rates and stock markets. One of the conclusions was that exchange rates and the success of the global stock market were correlated. Higher-yielding currencies have a positive correlation with

the success of the global stock market, but lower-yielding currencies do not. The amount of the interest rate spread has a stronger correlation with both the currency and stock markets. Tsai (2012) looked at the correlations between stock prices and currency exchange rates in Taiwan, South Korea, Malaysia, the Philippines, Singapore, and Thailand. Tsai came to this conclusion after looking at monthly data from January 1992 to December 2009.

Real Interest Rate-Stock Traded Nexus

From 1999 to 2008, Khrawish et al. (2010) looked at how interest rates affected the capitalization rate of the Amman Stock Exchange (ASE). Based on the simple regression model and the multiple linear regression model, the time series analysis showed a strong and positive correlation between the current government interest rate (R) and the stock market capitalization rate (S). The analysis demonstrates a considerable and adverse association between the present interest rate (R) and the government's development stock rate (D). The report also highlighted the importance of government action to encourage investment in ASE by lowering personal tax rates, which would provide as an incentive for wealth creation, managing interest rates to boost stock market growth, strengthening the regulatory environment, and reducing red tape. The relationship between the capitalization rate of the Nigerian stock market and the interest rate was examined by Ologunde et al. (2007). They employed an OLS regression model and discovered that the market capitalization rate of stocks is positively impacted by the present interest rate. Additionally, they found that the government development stock rate is negatively impacted by the current interest rate and the opposite is also true. Arango (2002) discovered proof of a nonlinear and adverse relationship between stock prices on the Bogota exchange and the interest rate that was calculated as the interbank lending interest rate, which is controlled by monetary policy to some degree. The model represents the stylized truth of significant reliance on returns in short run in this market. These data do not provide any evidence that the principal stock exchange in Colombia is operating efficiently. Zhou (1996) used regression analysis to examine the connection between interest rates and stock prices. Zhou discovered that interest rates significantly affect stock returns, especially over long time horizons, yet the assumption that predicted stock returns

follow ex ante interest rates exactly is not confirmed by the evidence. The findings of the analysis also suggested that a sizable portion of the nonlinearities of price-to-dividend ratios could be attributed to long-term interest rates. In addition, he asserts that the high level of volatility witnessed in the stock market is also present in the yields on long-term bonds, possibly as a result of changing expectations for discount rates.

Inflation-Stock Traded Nexus

Adusei (2014) noted that theoretical and empirical study have been done on the relationship between inflation and stock market performance despite the absence of a conclusive data set. While other research discovered a negative link, some show a positive correlation between the two factors. This research contributes to the ongoing economic argument by employing data from Ghana Stock Exchange (GSE), one of Africa's emerging markets, during the years January 1992 to December 2010. Inflation and stock returns have a statistically significant negative association in the short run, but a statistically significant positive link in the long run, as determined by unit root tests, the ARDL technique for co-integration, and Granger causality in the error correction model. The research finding is as follow: Stock market returns are driven toward long-term equilibrium by inflation, as evidenced by the single-direction causal relationship between inflation and stock returns that has been found. Dasgupta (2012) discovered that inflation (as measured by the wholesale price index) is inversely related to stock market returns in India over the long term while using data from the Indian stock exchange to examine the connection between the returns of stocks and macroeconomic factors. The facts, however, refute the theory that inflation will be correlated with the Indian stock market in the near future. Sohail and Hussain (2009) examined the connection between Pakistan's macroeconomic variables and the Lahore Stock Exchange using monthly data from December 2002 to June 2008. The study demonstrates the incorrect relationship between inflation (as determined by the consumer price index) and stock returns. The correlation between stock market prices and macroeconomic factors including inflation in Malaysia, Indonesia, the Philippines, Singapore, and Thailand were examined by Wongbampo and Sharma (2002). They discover that there is a negative correlation between inflation and the consumer price index in all five Asian nations. Gunasekarage et al. (2004) analyzed

how macroeconomic factors, such as inflation, affect the value of stock equity in Sri Lanka using the Colombo All-Share Index as a proxy for the stock market and the consumer price index as a proxy for price growth. The 17-year period covered by the study is from January 1985 to December 2001. It makes use of impulse response functions (IRFs), unit roots, co-integration, vector error correction models (VECM), and variance decompositions (VDCs). It reveals, among other things, that Sri Lanka's stock market suffers from inflation. Naik and Padhi (2012) explored the association between the stock market index and five macroeconomic parameters in India from 1994 to 2011. The industrial output index, wholesale price index, money supply, Treasury bill rates, and exchange rates are some examples of these variables. They found a significant and negative correlation between the stock market index and short-term inflation.

According to Hussain et al. (2009), the wholesale price index, which measures inflation, has a long-term, high negative association with stock prices, examination of the Karachi stock market in Pakistan. Akbar et al. (2012) used cointegration and the Vector Error Correction Model to analyze the link between the Karachi Stock Exchange Index and macroeconomic variables between January 1999 and June 2008. They identified, among other things, a weak link between inflation and stock prices.

Al-Khazali (2003) investigated the short and long-term connections among stock prices, inflation, and output in 21 developing economies. Among the various nations involved are Bahrain, Egypt, Hong Kong, Jordan, Kuwait, Kuwait, Australia, India, Indonesia, Malaysia, Oman, Pakistan, Qatar, Morocco, Saudi Arabia, South Korea, Singapore, Taiwan, Thailand, Philippines, Tunisia, and Turkey. With the exception of Malaysia, the statistics shows a short-term negative association between stock gains and inflation. The analysis demonstrate that stock prices, inflation, and real economic activity are all in equilibrium over the long term in the studied countries, providing evidence that the Fisher effect and the proxy hypotheses are only valid over the long run.

Bhattarai and Joshi (2009) looked into the shaky connection between Nepal's stock market and the macroeconomic variables of the nation. They discovered that while consumer price index-measured inflation drives the stock index to grow in the short-run, it generates inflation in the long-run. Inflation, however, boosts the stock index in the short run. Boyd et al. (2001) investigated how inflation affects the financial sector's performance and

discovered a strong, inverse relationship between inflation and the expansion of the banking sector as well as stock market activity. On the other hand, they implied that this link is not linear, as inflation goes up, the marginal effect on bank lending and growth in the stock market goes massively. Khan and Yousuf (2013) used monthly data from the Bangladesh Stock Exchange to examine the association between 1992–2011 stock prices and macroeconomic conditions. The Dhaka Stock Exchange All-Share Price Index (DSI) is used in the study as a proxy for stock prices, along with deposit interest rates, exchange rates, the consumer price index (CPI), crude oil prices, and broad money supply (M2). Among other things, the study finds that currency devaluation has little to no impact on stock prices.

Alqaralleh (2020) examined the hypothesis that verified the asymmetric link between inflation and stock returns and took into account the possibility of dynamic nonlinearity and, consequently, asymmetry, the nonlinear autoregressive distributed lag model (NARDL) was adopted. This research discovered that stock return reactions are often asymmetric. In other words, the findings indicate that contractionary time seems to lower stock returns more than expansionary time. Dilawer et al. (2022) investigated the ad hoc short and long-run correlations in their study. Using time series analysis (1960 to 2020), Pakistan's stock prices were used to compare stock market returns to economic indicators like the exchange rate, the consumer price index (which is a proxy for inflation), gross domestic product, unemployment, gross national spending, and the interest rate. The Augmented Dickey-Fuller Unit Root test revealed that although other macroeconomic variables become stationary at the first difference, inflation and interest rates become stationary at level. With the level and first difference mixtures, the auto-regressive distributed lag model and the co-integration method were used. Diagnosis were made using Breusch-Pagan-Godfrey, the serial correlation LM test, and the Ganger causality test results demonstrate the long-term correlation between Pakistan's stock market returns and major macroeconomic variables such as the exchange rate, interest rate, and unemployment. These variables are significant and have a long-term negative correlation with stock market returns. As far as the Granger causality test is concerned, there is no connection between any variables that may be considered causes. The Consumer Price Index and gross domestic spending have a negative relationship, even though the impacts

are minimal. Only GDP has a long-term, positive correlation with stock market performance. The study's findings will be helpful to policymakers who are interested in the long-term relationship between the exchange rate, inflation, GDP, interest rate, unemployment, and stock market returns. Duca (2020) research investigated the link between inflation and malt stock returns. The study used 139 observations made every month. The researchers found that the stock returns from prior months achieved positive results on the returns of the current month, but inflation variables had a negative effect on the returns of the current month after three and four months. In the short term, negative inflation, stock returns, the amount of money in circulation, and interest rates, will contribute. Mukhtar and Rashid (2020) looked into Fisher's theory to explain the linkage between the stock market and inflation. This content utilizes a panel dataset of 56 nations from 1950 to 2018 for above-average countries and distinct countries for below-average countries and for many other comparable high-income, upper-medium-income, and low-income nations. The findings showed that, with the exception of lower-middle income nations, the Fisher hypothesis holds in global economies, but only in its weakest version. Iwegbu and Adeoye (2020) described Nigerian returns on stock and the influence of inflationary expectations throughout and following the financial meltdown. Fisher's effects were employed in the model explanation research starting with the first quarter of 2007 and ending with the last quarter of 2018. Data were evaluated using the ADF test stationarity, the same model was used to determine the long-run cointegration, and the bound test was used to determine stability. Finally, it was discovered that inflationary expectations were the major element in the stock market's performance in Nigeria. Years after the global financial crisis, the Fisher hypothesis was discredited. Mukolu and Iiugbemi (2020) investigated the stock's relationship with inflation prices in Nigeria using information from the country's central bank from 1987 to 2018. The data was analyzed using ordinary least squares. From the Fisher (1930)’s theory, the link between macroeconomic factors and price shares puts off inflation. The study's conclusions showed that the returns of stocks provided an efficient inflation hedge in Nigeria, which was explained by Fisher (1930)'s hypothesis, which highlighted the association between stock market gains and inflation. That was meant to indicate that investors making sound portfolio selections may consider shares as a long-term holding against the depreciation

of buying power due to inflation. For monetary policy to get people to make stock market investments, prices had to be more realistic.

The relationship between inflation and stock market growth, including threshold effects, was examined by Asab and Tarawneh (2020). Up until a certain point, it was presumed that the inflation rate has a beneficial effect on market growth. Between the periods 1980-2018, a controlled threshold model was calculated with an inflation threshold of 1.6% as indicating that the link between inflation and stock market growth is nonlinear. Before the threshold level, the relationship is found to be positive, but after, it is found to be negative. When inflation exceeds 6%, the link among both inflation and stock market growth becomes dramatically flattened. These results are resistant to various estimating methods.

Yahya and Hafasnuddin (2021) investigated the impact of actual, predicted, and unexpected inflation on Indonesian conventional and Islamic stock markets. To assess predicted and unexpected inflations, an ARIMA (auto-regressive integrated moving average) model is used in the research. The second stage examined the association between stock returns and inflation from 1999 to 2019 using a dynamic ordinary least squares (DOLS) estimator. Following the Fisher hypothesis, the analysis demonstrated that the gains on Islamic stocks are unaffected by price increases. In the meantime, the returns on conventional stock market investments and the rate of inflation are inversely related. The Fama proxy theory, on the other hand, was unable to fully explain the negative traditional stock returns-inflation relationship. However, the data supports the Mundell-Tobin theory. According to the analysis, the Indonesian Islamic stock market offers complete hedging against reality, but the conventional stock market does not. The research is the first in the Islamic finance literature to compare the impact of inflation on the Islamic stock markets from the viewpoint of the rising Indonesian economy.

Omotor (2010) asserts that, particularly during the 1990s, academics, researchers, practitioners, and policymakers around the world have paid close attention to the correlation between inflation and stock prices, it has been a major subject of many studies in recent decades. The issue has been seemingly paradoxical and majority of research in industrialized nations have shown a negative correlation between inflation and stock market returns. The study used monthly and quarterly data from Nigeria from 1985 to

2008 to look at this link. The results of this study seem to indicate that investing in Nigeria's stock market returns could be a viable approach to hedge against inflation.

According to Feldstein (1980), inflation reduces real stock returns because inventories and depreciation are taxed unfairly, which lower actual after-tax profit. Feldstein went on to suggest that the lack of rise in share prices during periods of high inflation was attributable to tax restrictions governing nominal capital gains, specifically the prior depreciation cost (Friend & Hasbrouck, 1981). Inflation and stock market performance are related and according to Fama's money demand theory-based premise is not a cause; instead, it is a misleading association of dual effect

Yeh and Chi (2009) found that although there is a positive relationship between real economic activity and stock returns and a negative relationship between inflation and real economic activity, there is still a negative relationship between real economic activity and stock return in his explanation of stock-inflation neutrality.

Hoguet (2008) draws support from Giammarino (1999)'s two positions that 1) firms can pass on all of their costs to customers one for one, and 2) inflation does not have a long-term negative effect on growth and that the real interest rate that investors use to discount real cash flows does not increase as inflation increases. Using data from 16 OECD countries, Rapach (2002) calculated the movement of correlations between the variables. He made the discovery that long-run inflation neutrality can be found in the stock markets of nations. According to Rapach, the long-run Fisher effects are real if the long-run real stock returns do not react to a persistent inflation shock while constructing time series characteristics using the procedures outlined in King and Watson (1997)’s study. Subair and Salihu (2010) employed an error correction model to examine the effects of exchange rate volatility on the Nigerian stock market. They discovered that while exchange rate volatility significantly hurt the Nigerian stock market, there was no long-term correlation between the rate of inflation and market capitalization. According to Subair and Salihu, the reason for no long-run connection is the government's intrusive engagement in the market. First, the authors failed to mention the cointegration finding that they claimed demonstrated this point. Second, it is not specified whether government involvement in the market (stock exchange or foreign exchange) is excessive. However, government

engagement in either of the two markets has declined over time. As a result, Subair and Salihu's results might not be entirely true.

Daferighe and Aje (2009) examined that real GDP, inflation, and interest rates have an impact on the stock prices of Nigerian listed businesses from 1997 to 2006. The findings revealed, among other things that a low inflation rate resulted in higher stock prices for Nigerian listed companies. The conventional significant tests are skewed when there is a high R-2 and likely highly auto-correlated residuals. The individual test of the series for random walks was not investigated, nor was the integrated process of the variables. Using a multiple regression method with a data span of just 10 points is insufficient.

Eita (2012) looked into the relationship between inflation and investment returns in South Africa and discovered that the two are positively correlated. Stock prices increase as inflation increases. The outcomes also demonstrate that there are both favorable and unfavorable consequences when the all-share index is employed as a proxy for stock market performance. However, the association is one-way when the gold index is used as a proxy for stock market returns, indicating that inflation drives stock market returns. The positive correlation between these two variables demonstrates that stocks are a useful strategy for South Africans to hedge against inflation.

Sokpo et al. (2017) evaluated the impact of inflation on stock market returns in the Nigerian stock exchange using a volatility modeling technique. In order to assess monthly data on stock market returns and consumer price index inflation rates, the research used GARCH and E-GARCH volatility modeling methodologies. According to the study, CPI inflation does not significantly explain the volatility of the Nigerian stock market. According to the E-GARCH model, which found no asymmetry in the stock return series, both good and bad news appeared to have the same effect on stock returns in Nigeria. The GARCH model demonstrates substantial persistence in the stock return series, despite the fact that a shock to stock returns only has a fleeting influence.

CHAPTER III

Data and Methodology

Introduction

This chapter will provide you with a wealth of information on the sources of the data collection, as well as a better understanding of the model specifications for this study and detailed information on the numerous tests that will be conducted for the analysis.

Data collection

Any type of data, regardless of how specialized, could be used as a source as long as another operation is able to access and utilize it. The place where data first appears or the place where physical information is first converted to digital form are both examples of data sources. Data sources include databases, flat files, and real-time measurements from physical objects, scraped web data, and any of the countless static and streaming data services that are available to the public online. For the analysis, this study pulls secondary data from the World Bank database between 1980 and 2020.

Assessment of Variables

Stock Traded – Stocks are certificates that entitle the bearer to a proportional part of a company's ownership. For example, if a firm has 100 shares of stock available and an investor acquires ten of them, the investor owns 10% of the company. In the case of publicly listed corporations, investors own their shares via a brokerage firm rather than real paper certificates.

Companies do not have to be publicly traded to issue stock. Private corporations may also issue shares, but they are significantly less liquid than public shares. Companies often issue shares to generate funds for their operations. Ordinary stocks, on the one hand, and preferred stocks, on the other, are the two main categories. The difference between the two is that the former holder has a say in corporate matters while the latter does not. However, the law specifies a minimum quantity of dividends that prior to paying dividends to common shareholders, preferred shareholders must first receive payment. The term "convertible preferred stock" is used to describe another type of stock. This is a

type of preferred stock that, after a particular date, can be converted into an equal number of common shares.

Real Effective Exchange Rate – The REER measures the average value of a country's currency in relation to a grouping or index of other significant currencies. It is sometimes referred to as the "actual exchange rate". The weights are based on how a country's trade balance compares to those of the other countries in the index. When the REER of a country goes up, it means that the country's exports are getting more costly while the country's imports are going down in price. It is becoming less competitive in international commerce.

Inflation – Over time, rising prices may make it harder for people to afford necessities. The rate at which one's average price increases for a chosen basket of goods and services over a specific time period can be used to determine the extent to which purchasing power has decreased. The value of one currency has decreased relative to its past purchasing power as a result of inflation, which is expressed in percentage terms. Conversely, devaluation leads to falling prices and an increase in purchasing power. You may draw parallels between this and inflation. Though it's straightforward to assess the rise or fall in the price of a few select commodities over time, the needs of humans extend well beyond that. A wide range of goods and services is necessary to live a life devoid of discomfort. Services such as medical treatment, entertainment, and physical labor are covered in this category, along with commodities such as food grains, metals, and fuel. The overall effect of price increases on a wide range of goods and services is evaluated using inflation rates. It is a convenient way to demonstrate, with a single figure, how the cost of living has risen over time in a given economy.

Real Interest Rate – The increase in money that you owe to the lender as a percentage for the use of the money that you borrowed is referred to as the nominal interest rate (also known as the money interest rate). Consider the following scenario: A year ago, you took out a loan from your bank for $100 at an interest rate of 8% on the loan. When you pay back the loan, in addition to the $100 that you borrowed, you will also be required to pay back $8 in interest, for a total payment of $108. However, inflation is not taken into account when calculating the nominal interest rate. In other words, specifically, it ignores inflation and its consequences. To continue with our example, let's say that as you were

walking to the bank, you happened to glance at a newspaper and saw a headline that said, "Inflation at 5% This Year!" A widespread increase in prices is what we mean when we talk about inflation. If inflation is 5%, then the cost of a typical grocery basket will be $5 more this year than it was last year. As a result, economists devised real interest rate, also referred to as inflation-adjusted interest rate. The percentage increase in the lender's purchasing power as a result of receiving loan repayments from the borrower is factored into the real interest rate. The borrower in the prior case earned $8 in interest on the $100 loaned out. However, since inflation was 5% within the same time frame, the lender's true return on investment was 3%, or $3 on the $100 loan.

Descriptive Statistics

A data collection that is perhaps a sampling or a representation of the complete population of data can be described using descriptive statistics, which are brief informative coefficients. The terms "descriptive data" and "descriptive information" are also used to refer to descriptive statistics. Measurements of variation and central tendency are subcategories of the statistical classification known as "descriptive statistics" (spread). Examples include the mean, the median, and the mode, they all are measures of central tendency. In contrast, metrics of variability include the standard deviation, variance, minimum and maximum variables, kurtosis, and skewness.

Table 3.1 Variables Description

#	***Variables***	***Abbreviation***	***Measurement***	***Source***
1	*Real effective exchange rate*	*REER*	*(2010 = 100)*	*World Bank*
2	*Real interest rate*	*RIR*	*(%)*	*World Bank*
3	*Inflation*	*INF*	*(annual %)*	*World Bank*
4	*Stocks traded*	*ST*	*(% of GDP)*	*World Bank*

Model Specification

One of the most significant, yet least understood issues in all of the regression analysis is the subject of the model definition. The choice of independent variables to include or leave out of a regression equation is referred to as the "model definition."

Generally speaking, theoretical rather than methodological or empirical factors should be the primary foundation for the specification of a regression model. This is due to the fact that theoretical concerns are inherently more theoretical than empirical or methodological ones. Theoretical statements on the association between the independent and dependent variables can be categorized as multiple regression models. There are a plethora of potential variables for this claim. Regression analysis involves three distinct phases: defining a model, estimating its parameters, and interpreting the results. The evidence for this claim is visible. The specification phase is the initial and primary phase. We can't hope to correctly estimate model parameters or interpret those estimates without a precise definition of the mod. As a result of this, we run the risk of encountering issues if we incorrectly define a model. There are essentially two types of specifications mistakes. An improper model definition occurs when an irrelevant independent variable is introduced into the regression equation, as in the first case. In the second case, we make a mistake in how we set up the model by leaving out an independent variable that is important from the regression equation.

The following is the equation for analysis:

$$\boldsymbol{ST_t = \beta_0 + \beta_1 REER_t + \beta_2 INF_t + \beta_3 RIR_t + \varepsilon_t}$$

Whereas:

ST represents stock traded

REER acronym for Real Effective Exchange Rate

INF stands for inflation

RIR stands for real interest rate and

Ɛt the coefficients 1, 2, and 3 are the parameters of the corresponding variables, 0 is the constant term, and t stands for time in the equation.

Stationary Test

For the econometric estimation of a model to be helpful, time series data must be stationary. Granger and Newbold (1974) claim that econometric estimates employing non-stationary time series data frequently result in incorrect findings. To determine if variables are stationary or not, a unit root test is used. One approach to addressing the issue of time series data's lack of non-stationary behavior is to use first-differenced time series. In

economic theory, a correlation between two variables is taken as evidence that they will show little to no long-term variation from one another. While these variables may appear to be moving apart in the short run, they are actually tending back toward equilibrium as a result of disequilibrium forces. Co-integration is seen as a statistical manifestation of the nature of such long-run equilibrium connections. But before we can use Engle and Granger (1987) representation theorem to make an error-correction model (ECM), we must first make sure that both variables are integrated sequentially, making them co-integrated.

Time series challenges are distinct from classification and regression problems in predictive modeling. Time series are very reliant on time and have many different characteristics, such as trend, seasonality, and residuality. In other words, stationary time series data are independent of time. If a time series is devoid of any trend or seasonal influences, it is supposedly stationary. The average or variation of the observation, which are summary statistics based on time series, are constant over time. Modeling is simple in stationary time series. To establish if the variables are stationary or non-stationary, a test for unit root is utilized. The augmented Dickey-Fuller (ADF) and Dickey-Fuller (DF) tests were used.

ADF Unit Root Test

One common statistical method for checking is the Augmented Dickey-Fuller test, which determines if a given time series is stationary (ADF Test). It is one of the most used statistical tests in determining if a given series is truly stationary. Stationary is an important component in time series. Since ARIMA time series forecasting is not accurate in predicting non-stationary time series data, it is necessary to determine how many changes there must be to make the series stationary. Let us attempt to comprehend this in more detail.

The time series characteristics of the data were first investigated using the Augmented Dickey-Fuller method (ADF). The stationarity of the data is assessed using the unit root test. The competing theory "there is no unit root" is contrasted with the null hypothesis, "a series has a unit root (non-stationary)," using the analysis of distribution functions.

ARDL Bound for Co-integration

For this study, we employ the cutting-edge ARDL bound testing strategy to calculate the exchange rate's long- and short-term dynamic correlations with stock return. Pesaran et al. (1996) were the first to present this technique. There are many advantages to using the ARDL. To begin, regardless of the stationary properties of the variables included in the samples, the ARDL methodology can be used, which is an advantage over the most used method for assessing co-integration. As opposed to the other co-integration processes, this makes it easy to draw conclusions about long-run estimations. No matter if the series are fractionally integrated, I(0), or I(1) this method can be used (Oskooee & Ng, 2002; Pesaran, 1997). As a result, it prevents issues brought on by time series data that are not stationary. Second, the appropriate number of delays in the ARDL model allows it to demonstrate the creation of data inside an adaptable modeling technique (Chai & Laurenceson, 2003).

ARDL Model

ARDL represents the abbreviation for "Autoregressive-Distributed Lag." This sort of regression model has been used for decades, but only recently has it been shown that for determining whether there are enduring connections between time series of economic activity, it is a very helpful tool. A single-equation time series arrangement's relationship between (economic) variables has been modeled using the autoregressive distributed lag (ARDL) model for many years. The ARDL model has an EC form reparameterization, which adds to its appeal. The process of co-integration of non-stationary variables is comparable to an error-correcting (EC) process (Hassler & Wolters, 2006; Engle & Granger, 1987). A long-run co-integrating relationship can be tested using the EC representation. Incorporating a limit testing strategy allows for a convincing conclusion to be formed regardless of whether the variables are integrated (I(0) or I(1)) in any particular sequence (Pesaran, et al., 2001). Dynamics that are both long and short-term can be predicted and distinguished using the ARDL/EC model. The ARDL test has several advantages, one of which is that it is more robust and works better with small data samples, which is perfect for this study.

$$ST_t = \beta_0 + \beta_1 REER_t + \beta_2 INF_t + \beta_3 RIR_t + \varepsilon_t$$

Short-run

$$\Delta ST_t = \beta_0 + \sum_{i=1}^{p} \gamma_1 \Delta ST_{t-i} + \sum_{i=1}^{q1} \beta_1 \Delta REER_t + \sum_{i=0}^{q2} \beta_2 \Delta INF_t + \sum_{i=0}^{q3} \beta_3 \Delta RIR_t + \varepsilon_t$$

Long-run

$$\Delta ST_t = \beta_0 + \sum_{i=1}^{p} \gamma_1 \Delta ST_{t-i} + \sum_{i=0}^{q1} \beta_1 \Delta REER_{t-i} + \sum_{i=0}^{q2} \beta_2 \Delta INF_{t-1} + \sum_{i=0}^{q3} \beta_3 \Delta RIR_{t-i} + \delta ECT_{t-1} + \varepsilon_t$$

$$\Delta ST_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta ST_{t-1} + \sum_{t=0}^{q} \beta_2 \Delta REER_{t-i} + \sum_{t=0}^{q} \beta_3 \Delta INF_{t-i} + \sum_{t=0}^{q} \beta_4 \Delta RIR_{t-i} + \beta_1 ST_{t-1} + \beta_2 REER_{t-1} + \beta_3 INF_{t-1} + \beta_4 RIR_{t-1} + \varepsilon_{i1}$$

$$\Delta REER_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta ST_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta REER_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta INF_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta RIR_{t-i} + \beta_1 REER_{t-1} + \beta_2 ST_{t-1} + \beta_3 \Delta INF_{t-1} + \beta_4 \Delta RIR_{t-1} + \varepsilon_{i2}$$

$$\Delta INF_t = \beta_0 + \sum_{i=0}^{n} \beta_1 INF_{t-1} + \sum_{i=0}^{n} \beta_2 \Delta ST_{t-i} + \sum_{i-0}^{n} \beta_3 \Delta REER_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta RIR_{t-i} + \beta_1 INF_{t-1} + \beta_2 ST_{t-1} + \beta_3 REER_{t-1} + \beta_4 RIR_{t-1} + \varepsilon_{i3}$$

$$\Delta RIR_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta RIR_{t-1} + \sum_{i=0}^{n} \beta_2 \Delta ST_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta INF_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta REER_{t-i} + \beta_1 RIR_{t-1} + \beta_2 ST_{t-1} + \beta_3 INF_{t-1} + \beta_4 REER_{t-1} + \varepsilon_{i4}$$

Residual Diagnostic

Regression model errors are examined for autocorrelation using the serial correlation LM test by Breusch and Godfrey. Using the residuals from the model as input for regression analysis test statistic can be generated. According to the null hypothesis, there is no serial association up to rank p.

Time-varying financial time series, such as stock prices, are represented using autoregressive conditional heteroskedasticity (ARDL) models. ARDL models believe that, the present error term's variance is proportional to the magnitude of previous mistakes. As a result, volatility clusters.

Normality Test

Normality tests are used to find out if a set of data is well described by a normal distribution or if a random variable that is linked to the set of data is also normally distributed. It is fairly rare for nonlinear models to have parameter instability (Saliminezhad, et al., 2018).

Granger Causality Test

The term "grander causality" denotes a statistical model of cause and effect based on the concept of prediction. If one signal, that is, X1 "Granger-causes" (or "G-causes") another signal, probably X2, then the theory of Granger causality predicts that we may learn more about the future value of X2 by looking at the past values of X1. The reason for this is the theory of Granger causality, which asserts that if a signal then, X1 "granger-causes" (or "G-causes") another signal Y1, therefore, Y1 must have caused (or been caused by) X1.

Wiener (1956) and Granger (1969) definition of causality is a crucial aspect of the scientific method for studying the interrelationships of time series. The emphasis on predictability in the study of Wiener-Granger causation is one reason why the theory is so highly valued by economists and other decision-makers. Granger causality is a method often used in research to examine bivariate systems. When considering more than two factors, however, it is feasible to reach alternative verdicts. The non-causality requirements get more complex when there are more than two variables at play; for

instance, Dufour and Renault (1998) and investigate this problem. A different way to state this is that a variable may be Granger-causal in a bivariate model but be completely excluded from a multivariate model. In this short discussion a causal connection where the third variable (or variables), also known as an auxiliary variable, was used to help construct the first link (s). For example, in a bivariate process, if one variable drives both variables, then including that variable in the model may make a bivariate causal structure unnecessary. Also, a variable that is not the cause of another in a bivariate model may turn out to be the cause if the data set is expanded to include new components. The reason for this is that there will be more factors to consider if more data is collected. Many experts in the area consider the second set of conditions to be a false causality. Ignoring these underlying causes may lead to flawed economic assessments, which in turn might lead to poor policy choices.

Stability Tests

Therefore, the stability of the calculated model must be checked to evaluate the reliability of the results. Brown et al. (1975) CUSUM of Squares Test serves this purpose. Depending on how much reliance you place on the post-estimation test, the model's stability must be maintained at all times throughout the estimating process (Hansen, 2000). As part of multiple linear regression analysis, Cumulative sum tests examine the parameters' stability. Repeated residuals (standardized one-step-ahead prediction errors) are produced periodically because linked data purposive sampling techniques, and sums or sums of squares of recursive residuals are used in inference. Under the null hypothesis that parameters stay the same, numbers outside of the predicted range of the sequence show that the structure of the model has changed over time. The assumption is supported by iteratively generated considering residuals' sums or sums of squares, and the Cumulative sum tests evaluate the consistency of coefficients in a model of multiple linear regression of the type $y = \beta X + Ɛ$. (standardized one-step-ahead prediction errors). The coefficient's null hypothesis stability asserts that the structure of the model has changed over time if values in a series go outside of a predetermined range.

CHAPTER IV

Results and Discussion

Introduction

This chapter will provide you with in-depth information on the various tests that aided in answering the study's research questions. Some examples of these tests include the stationary test, which determines regardless of whether the factors being tested are stationary; the ARDL bound test, which determines whether or not the variables being tested are co-integrated in the long run; the ARDL for the short run tests are also interpreted in this section; residual diagnostic tests are also performed; and finally, conducting stability tests. By using the first and second examples, each and every one of these tests was successful.

Descriptive Statistics

Table 4.1 Descriptive Statistics

	ST	**RIR**	**REER**	**INF**
Mean	36.801	4.175	109.677	8.635
Median	32.746	4.172	104.482	7.215
Maximum	124.368	12.691	181.351	18.654
Minimum	2.259	-11.009	70.441	-0.692
Std. Dev.	32.261	3.996	29.085	4.675
Skewness	0.723	-0.965	0.776	0.363
Kurtosis	2.751	6.935	2.960	2.137
Jarque-Bera	3.678	32.837	4.119	2.172
Probability	0.1589	0.000	0.127	0.337
Sum	1508.857	171.179	4496.781	354.053
Sum. Sq. Dev.	41632.94	638.8946	33837.99	874.318
Observations	41	41	41	41

Source: This study

The table above describes the features and characteristics of the variables undertaken by this research. As evidenced by the data and the time period that was investigated, it is hypothesized that the average exchange rate is 109.677. According to

sources, the highest amount of the exchange rate is as high as 180.351, which is considered a high figure for a country that falls into this category. On the other hand, the mean stock return is calculated to be 36.801. All of the variables have a good kurtosis because their values are greater than 2, which indicates that they have a good distribution. To that end, stock returns, exchange rates, and inflation all have distributions that are less skewed than interest rates, which have distributions that are more skewed.

Stationary Test

It is critical to perform a stationarity test when doing research using a time series. This is because when a series is stationary, both the difference and the covariance remain steady throughout time. If the data in a stationary time series are time-invariant, the sequence is regarded as stationary; otherwise, the series is considered non-stationary. A stable trend in the series is distinguished by the fact that its data is time-invariant. It is possible to refer to data from a non-stationary time series as having a unit root or adopting the random walk model. This is due to the fact that both of these statements adequately reflect the facts. Because it is a non-parametric test, the Philips-Perron test is often regarded as better than both the ADF test and the other standard tests for unit roots. Because of this, unlike Augmented Dickey-Fuller testing, the level of serial correlation does not need to be selected. The estimation procedure is sharing similarities with the DF test, nonetheless, the statistic is modified to take autocorrelations and heteroscedasticity into account.

A common statistical test used to detect if a specific time series does not change over time is the Dickey-Fuller test (ADF Test), one of the most used statistical models employed to determine if a series is stationary. A time series' crucial component is stationary. In ARIMA time series forecasting, the initial stage is to determine the degree of variations required for the series to become stationary because the model is unable to forecast non-stationary series of data over time. Let's make an effort to better understand this the Dickey-Fuller method was used to explore the time series aspect of the data. To assess the data's stationarity, the unit root test is used.

The competing hypothesis, "there is no unit root," is contrasted with the null hypothesis, "a series has a unit root (non-stationary)," using the analysis of distribution functions (stationary).

Table 4.2 ADF Unit Root

ADF Unit Root				PP UNIT ROOT TEST		
Variables	Level	1st difference	order	Level	1st difference	Order
ST	0.726	0.000***	I (1)	0.726	0.000	I(1)
REER	0.4656	0.000***	I (1)	0.465	0.000	I(1)
INF	0.8345	0.000***	I (1)	0.829	0.000	I(1)
RIR	0.000***	-0-	I (0)	0.000	-0-	I(0)

Source: This study

Note: Schwarz info criterion significant level 1 5** 10****

The table above displays the outcomes of the stationary test using the unit root method. According to the table, each and every time series has been integrated to order one, indicating that they are first differenced stationary. This lays the groundwork for the analysis that will determine whether or not co-integrating links exist between stationary series of the same order. After that, the test for co-integration will be carried out. Table 4.2 also shows that three of the variables are stationary at first difference and only one of the variables is stationary at level using the PP unit root.

ARDL Bound Test

The ARDL co-integration approach was introduced by Pesaran and Shin (1999, 2001), respectively. The concept provides three types of advantages over earlier and more traditional co-integration techniques. The ARDL may be employed when the subordinate variable integration takes place in order 1, order 0, or could be fractionally integrated, and the order in which all the variables being considered are taken or integrated need not be the same. When the sample size is small and limited, the ARDL test is also significantly more effective. The third of the three advantages of the ARDL approach allows us to obtain objective estimations regarding the long-run model (Sollis & Harris, 2003).

Table 4.3 ARDL Bound Test Result

Model	*Lag.*	*F-Statistic*	*Decision*
ST, REER, INF, RIR	*(2, 4, 0, 0)*	*4.102****	*Co-Integration Exist*
Bound Critical Value			
		I (0)	*I (1)*
Sign.	*10%*	*2.2*	*3.09*
	5%	*2.56*	*3.49*
	2.5%	*2.88*	*3.87*
	1%	*3.29*	*4.37*

Source: This study

Note: From Pesaran et al., the lower and upper bound critical values were derived (2001), Akaike Information Criterion: Level of significant 15**10* 2.5*******

Within this section, the long-term interaction of the variables that make up The ARDL bounds testing is used to investigate the generic model methodology. Akaike Information Criterion and the Schwartz Bayesian Criterion must be used first to identify the order of lags on the initial differenced variables in equations (1). Following a second step, a limit F-test to equation (1) to verify if all the variables under investigation share long-run relationships. The table above contains the results from the bound test (F-test), which have a value of 4.102. The findings of the F-test point to the possibility that there is a connection between ST, REER, INF, and RIR that persists over time.

Table 4.4 ARDL Long Run

Variables	*Coefficient*	*Std. Error*	*T statistic*	*P value*
REER (-1)	*-3.321*	*0.226*	*-5.786*	*0.000*
RIR (-2)	*2.097*	*0.864*	*2.425*	*0.022*
INF	*-1.824*	*1.055*	*-1.729*	*0.095*
C	*203.903*	*30.408*	*4.251*	*0.000*

Source: This study

Note: Long-Run ARDL* these numbers denote significance at 1%, 5%, and 10%, respectively***

Table 4.5 ARDL Short Run

Variables	*Coef.*	*Std. error*	*t-statistic*	*Prob.*
ST(-1)	*0.262*	*0.146*	*1.793*	*0.084*
D(REER)	*-0.829*	*0.230*	*-3.599*	*0.001*
D(RIR(-1)	*1.916*	*0.712*	*2.688*	*0.012*
D(RIR(-2)	*2.097*	*0.695*	*3.014*	*0.005*
D (RIR (-3)	*1.736*	*0.591*	*2.933*	*0.006*
INF	*-1.157*	*0.700*	*-1.729*	*0.110*
ECM (-1)	*-0.634*	*0.130*	*-4.853*	*0.000*

Source: This study

Note: Short-Run ARDL* these numbers denote significance at 1%, 5%, and 10%, respectively***

The outcomes that presented in Table 4.4 show that there exists an adverse interaction between the currency rate and the stock traded. Indicating that when the exchange rate rises, South African equities traded will fall by a huge number, a measure of the exchange rate's probability is 0.000 with a negative coefficient of -3.3. Contrarily, the chance of the interest rate is 0.02, it has a significance level of 5%, and its coefficient is 2.09. This implies that raising interest rates will have the exact opposite impact. The study of Kutty (2010), which looked at the connection between exchange rates and stock prices in Mexico, supports this result. The study examined the connection in Mexico between stock prices and exchange rates. Granger causality testing demonstrates that, in the short term, the value of the currency is preceded by the price of the stock, but that, foreseeing the long run, these two variables do not relate to one another. This result supports the conclusions of Sohrabian and Oskooee (1992), however, it is in direct opposition to earlier studies' findings, which suggested a long-term relationship between exchange rates and stock prices.

Table 4.5, ECM demonstrates a very high speed of adjustment, which is a speed of 63 percent long-term to short-term transition on the currency fluctuations of bank stock returns in the economy of South Africa. The statistically significant exchange rate has a

p-value of 0.001, yet it has a -0.82 negative coefficient. This suggests that if the rate is permitted to climb further, an increase in the exchange rate would result in a decrease in bank returns on stock in the South African economy.

Nonetheless, the interest rate operates in direct contradiction to the exchange rate on the stock market in the South African economy, with a p-value of 0.006 and a positive coefficient of 1.736. With all of this data, we can draw the conclusion of an existing short-run relationship between the South African stock market's exchange rate and the latter. This outcome is consistent with the argument that a rise in interest rates will also result in an increase in the stock market in South Africa. The results of the multivariate GARCH model, according to Kumar (2013), showed that there is volatility spillover between the stock markets and the foreign exchange markets in the IBSA countries in both directions. This highlights the integration of the stock markets and the foreign exchange markets.

Table 4.6 Residual Diagnostic Test

Test	***Statistic***	***Pro.***	***Decision***
Serial correlation test	*0.637*	*0.690*	*No level of serial correlation up to 2lag*
Normality test	*72.665*	*0.000*	*Residuals are not normally distributed*
Heteroskedasticity	*0.935*	*0.402*	*No Heteroskedasticity*

Source: This study

Note: Breusch-GodfreryLM test, Jarque-Bera

The hypothesis predicts a normal distribution, as seen in Table 4.6 above, as well as no serial correlation or conditional heteroskedasticity. The results of this discovery are consistent with what the theory predicted. Nonetheless, despite the fact that the alternative hypotheses indicate otherwise, the absence of serial correlation in the model is shown by the null hypothesis. To complicate matters further, the probability of this happening is 0.690, which is substantially higher than the 0.05% limit and by a factor of 2. In this case, it is deemed that the null hypothesis is accurate, and any thought that the model may show serial correlation is rejected. The model does not demonstrate heteroskedasticity at a 5% significance level as a result of the null hypothesis. The reason for this is that after being

put through its paces, this model doesn't become stalled at the 5% barrier and stops moving. If the likelihood value of 0.402 is more than the 0.05 percent threshold, it suggests that the situation is more severe than was first thought. We must conclude that the model does not exhibit heteroskedasticity at this level since at a significant level, therefore, the null hypothesis of 5% cannot be ruled out. This is the only logical outcome for these results. The data set should have a normal distribution if the null hypothesis is accepted between the percentages of 5 and 10%, or someplace in that range. Residual frequency distributions are generally 5% of the total. The Jarque-Bera probability cannot be considered significant since the chance of 0.000 is statistically less than the 0.05 percent criterion. As a result, the likelihood will not be described as negligible. At the 5% level, residuals do not exhibit a normal distribution if the co-integration null hypothesis is correct.

Table 4.7 Granger Causality Test

Null Hypothesis	**Obs.**	**F. Statistic**	**Prob.**
RIR does not Granger Cause ST *ST does not Granger Cause RIR*	*39*	*0.584* *0.495*	*0.562* *0.613*
REER does not Granger Cause ST *ST does not Granger Cause REER*	*39*	*1.784* *2.150*	*0.183* *0.132*
INF does not Granger Cause ST *ST does not Granger Cause INF*	*39*	*3.135* *1.346*	*0.0563* *0.273*
REER does not Granger Cause RIR *RIR does not Granger Cause REER*	*39*	*3.886* *1.179*	*0.030*** *0.319*

INF does not Granger Cause RIR *RIR does not Granger Cause INF*	*39*	*0.583* *0.322*	*0.563* *0.726*
INF does not Granger Cause REER *REER does not Granger Cause INF*	*39*	*6.233* *10.200*	*0.004*** *0.0003***

Source: This study

A statistical model of cause and effect that is founded on the concept of prediction is what is meant when using the phrase "grander causality." If one signal, that is, X1, "granger-causes" (or "G-causes") another signal, X2, then the theory of Granger causality predicts that we may be able to learn more about the future value of X2 by looking at the past values of X1 than we could by looking at the history of X2. This is because the Granger-causes relationship is more complex than a simple cause-and-effect relationship. The explanation for this can be found in the Granger causality theory, which posits that if one signal, X1, "granger-causes" (sometimes written as "G-causes") another signal, Y1, then Y1 must have caused (or been caused by) X1. The rationale for this can be found in the theory. The outcomes utilizing the causality test of Granger, which are summarized in Table 4.7, indicate that there is unidirectional as well as bidirectional causation between the variables. The findings point to the existence of a connection between price increases and the underlying value of the South African currency conversion rate which works in both directions. The findings also suggest that the rate of interest and currency exchange rate correlation is driven in a single direction. Although the currency rate affects the interest rate, it does not affect the exchange rate itself. Additionally, there is proof that there is a single direction of causality connecting inflation and stock gains. Inflation is a leading indication of stock returns, but inflation is not a long-term leading indicator of stock returns.

Stability Test

Figure 4.1 CUSUM Test

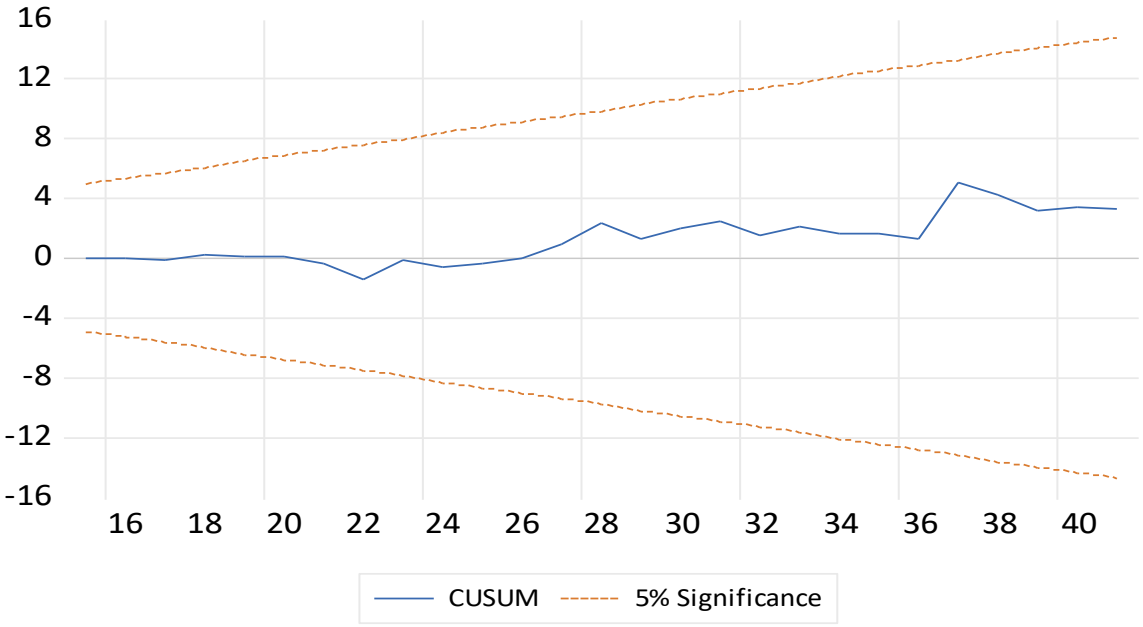
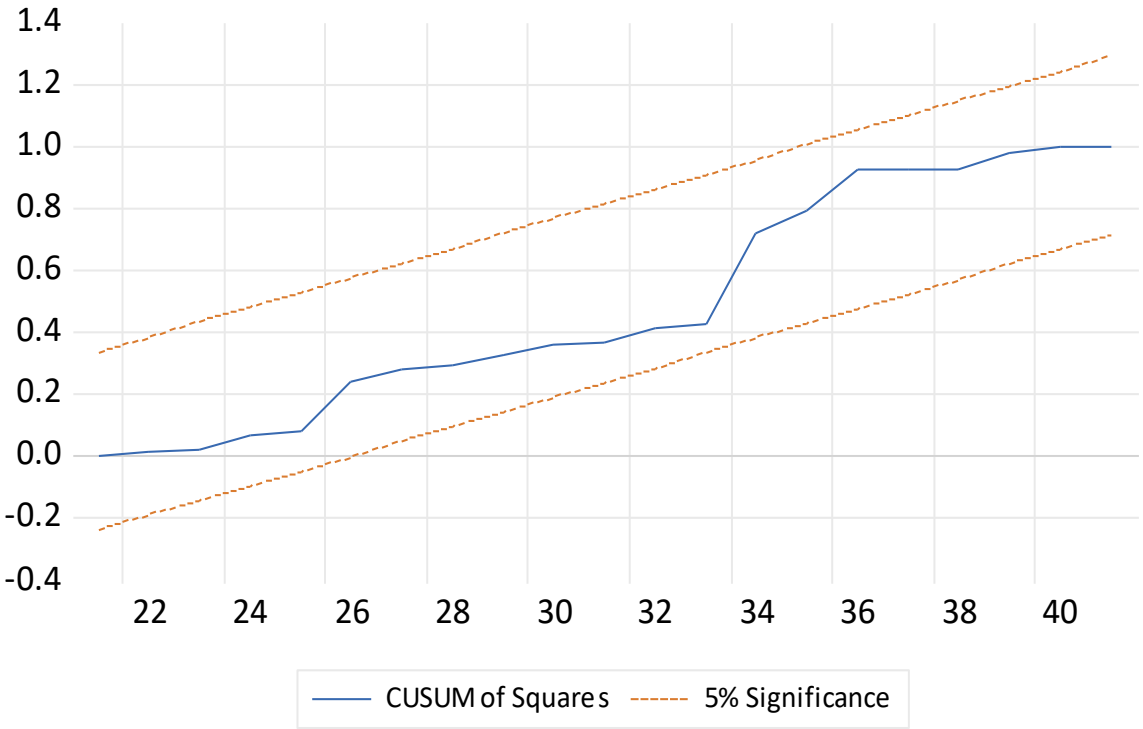


Figure 4.2 CUSUM of Square Test



There is no evidence to support the alternative hypothesis, despite the null hypothesis being a theory that exists, which claims that the parameters are constant. The test results reveal that the blue line cannot expand beyond the red line's limits. There is no other option but to accept the null hypothesis while rejecting the alternative hypothesis because there is an existing thought that residual variances are stable rather than unstable. This will only aggravate the matter further. Furthermore, the determined residual variance is stable rather than unstable. Finally, the evaluation of the long-term consistency of the ARDL model's long-term coefficient in connection to the short-run dynamics of the economic growth indicators and foreign direct investment, the total of all recursive residuals (CUSUM) and CUSUMQ) were used. Both of these techniques are known as cumulative sums. The null hypothesis claims that none of the error correction coefficients present have any deviance in the error correction model within a 5% confidence interval. At a level of significance of 5%, the null hypothesis of consistent coefficients may not be accepted at a significant level of 5% if any of the lines are shown to be crossed. The plot of CUSUM and CUSUMQ data must adhere to the key limits shown in the diagram above. This will guarantee that the coefficient of foreign direct investment stays stable throughout time.

CHAPTER V

Overview, Conclusion, and Recommendation

Overview

This thesis investigates the impact of volatility and currency fluctuations on South African bank stock returns from 1980 to 2020. Financial market liberalization in recent years has exposed investors to a number of risk concerns. Bank executives, regulators, academics, and investors are all interested in the combined effect of interest rate and currency volatility on stock performances in the banking sector. This is because many banks' demise may be traced back to the negative effect of fluctuating both interest currency rates.

Several ideas and hypotheses might explain reasons why the return value of bank shares is greatly affected by interest rate movements and currency rates. It is clear that any movement in the rate may indicate a change in the group of investing possibilities, interest rate risk may first be incorporated as one potential additional market factor utilizing the Intertemporal capital asset pricing model proposed by (Merton, (1973) (ICAPM). As a consequence, to cover the risk of such changes, stakeholders must receive greater compensation. Furthermore, if interest rate or currency rate risk are priced component of banks' stock equilibrium prices, the conclusions of the Arbitrage Pricing Theory (APT) may give evidence for this (Sweeney & Warga, 1986). Interest rates and shifting currency rates have a big impact on the common stocks of financial institutions, especially bans because they are sensitive (Saunders & Yourougou, 1990). Because of the structure of banks' balance sheets, their interest rate sensitivity has been explained by the nominal contraction theory (French et al. 1983; Kessel, 1956). Flannery and James (1984)'s theory states that a bank's common interest rate for stock returns sensitivity depends on how many net nominal assets it has. A bank's holdings of national assets and liabilities have an impact on the returns on its common stock because of how unexpected inflation changes the way wealth is shared.

Because a majority of financial institutions' internationalization processes have not been concluded, interest rates and currency rate sensitivity are more likely to vary among financial institutions; especially banks. As a result, banks' nationalities and how they handle their finances will have a role in the amount of variation that happens.

Unanticipated fluctuations in interest and currency rates, as well as a maturity mismatch between bank assets and commitments, are seen as important factors contributing to banks' increasing risk exposure. Furthermore, the majority of financial specialists and economists feel that sudden shifts in interest rates and currency values have a direct influence on bank revenues, costs, and profitability (Saunders & Yourougou, 1990). Because of the liberalization of the financial market, since the majority of banks are operating abroad, the current upheaval in the financial markets has exposed them to interest rate risk. Now, even the most sophisticated data could be used as a source so that another entity can access and use it. A source of data could be the site where data first appears or the point at which physical information is translated to digital form. This analysis is conducted using secondary data information from the World Bank database between 1980 and 2020. The Dickey-Fuller test (ADF) is a popular data analysis technique for assessing stationary time-series data. It ranks among the most used statistical tests to analyze the stationary behavior of a series. In time series, stationarity is a crucial factor. Since the model cannot foresee non-stationary data in a time series, identifying the quantity of data is the initial step in ARIMA time series forecasting to make sure the series is stationary. Let us attempt to comprehend this in further detail. First, the Dickey-Fuller technique was used to explore the time series characteristics of the data (ADF). Unit root testing is applied to establish whether or not there is a trend in the data.

ADF compares assumption of the null hypothesis, that a given time-series is non-stationary, as well as a unit root, in contrast with the alternative hypothesis- there is no unit root problem. ARDL is an abbreviation for "Autoregressive-Distributed Lag." This type of regression model has been utilized for decades, but only recently has it been demonstrated that it is a highly successful method for evaluating the possibility of long-term correlations among time series data.

Johansen co - integration between non-stationarity variables resembles a procedure for correcting errors (EC), and the method for autoregression incorporates an EC re-parameterization, which makes it more attractive (Engle & Granger, 1987; Hassler & Wolters, 2006). The presence of a long-run or co-integrating link may be determined using the error correction representation. Without being aware of the variables' order of integration—I(0) or I(1), or zero or one— (1), a strong conclusion may be formed using a

limit testing strategy (Pesaran, et al., 2001). Breusch and Godfrey serial correlation the LM test examines regression model errors for autocorrelation. Using the residuals from the model under consideration, a test statistic is computed in a regression analysis. According to the null hypothesis, no serial link exists up to rank p. Autoregressive conditional heteroskedasticity (ARCH) models are utilized to describe time-varying financial data series, including stock price. According to ARCH models, variation of the current error component is proportional to the size of past errors.

Normality tests are used to find out if a set of normally distributed data or if a random variable connected to the data is also normally distributed.

Parameter instability is quite uncommon in nonlinear models (Saliminezhad et al., 2018). As a result, in order to test the accuracy of the data, the consistency of the estimated model that was utilized must be assessed. We utilize Brown et al. (1975) CUSUM of Squares Test to do this. The model's stability must be maintained at all times throughout the estimating process, depending on how much trust you put in the post-estimation test (Hansen, 2000).

A multiple linear regression analysis's coefficient stability is examined using Cusum tests. Based on the periodic generation of one-step-ahead prediction where the forecasted value is subtracted from errors of nested subsamples of data, the recursive residual sums or sums of squares are used to base the inference. Under the null hypothesis that the parameters remain constant, numbers outside the projected range of the series show that the model's structure has changed over time. The assumption is supported by iteratively created RSS, and the Cusum evaluations of the coefficient stability in a multiple linear regression model of the type y = X + (Standardized one-step-ahead prediction errors). If values in a series move outside of a specific range, the null hypothesis of coefficient stability claims that the model's structure has changed over time.

In this section, the variables' long-run association with one another is investigated using the ARDL model that makes up the general limits testing technique. It starts by determining the Akaike information criteria and the Schwartz Bayesian criterion to determine the order of lags on the initial differenced variables in equations (1). The next step is to do F-test on equation (1) to see whether the variables being investigated have a long-run relationship. The outcome of the bound F-test is displayed in the table above

with a result of 4.102. The F-test results point to a potential long-term link between ST, REER, INF, and RIR. The data in Table 4.3 above shows that the rate of exchange and the traded stock have a negative correlation. With a probability value of 0.000 and a negative coefficient of -3.3, the exchange rate suggests that an increase in the price will lead to a decline in the volume of stocks traded in South Africa. The probability value of the interest rate, on the other hand, is 0.02 and the coefficient is 2.09, both of which are statistically significant at 5%. Inferred from this is that increasing interest rates will have the opposite effect. This outcome is consistent with research results that show connection between stock prices and currency rates in Mexico (Kutty, 2010). In the short run, results from the causality test indicate that exchange rates arrive before stock prices, however, in the long run, there is no correlation involving these two variables. Although it contradicts earlier research results that suggested a long-term association between exchange rates and stock prices. This study backs up the conclusions of Sohrabian and Oskooee (1992)'s study with a speed of 63 percent from short to long-term transition on currency fluctuations of bank stock returns in the South African economy, Table 4's ECM demonstrates an extremely high rate of adjustment. This rate of adaptation is remarkable. Despite having a negative coefficient of -0.82, the exchange rate is statistically significant with a p-value of 0.001. This means that if the exchange rate is allowed to increase further, bank stock profits will decrease for the South African economy.

In contrast, the interest rate in the South African economy swings in the opposite direction of the exchange rate, with a p-value of 0.006 and a positive coefficient of 1.736.Outcomes from testing all of data, a simple explanation is that there is an existence of a short-term correlation when comparing the exchange rate with the South African stock market. This result is in line with the evidence, which demonstrates that rising interest rates will boost the South African stock market. According to Kumar (2013), the results from the GARCH multivariate model demonstrate that stock markets and foreign exchange markets in the IBSA countries experience volatility spillover in both directions. This demonstrates how interconnected the stock market and currency markets are. As seen in Table 4.5, the hypothesis predicts a normal distribution with no serial correlation or conditional heteroskedasticity. These findings are consistent with what the theory expected. Nonetheless, despite the fact that the alternative hypotheses suggest otherwise,

the null hypothesis shows that the model lacks serial correlation. To make things even more complicated, the likelihood of this occurring is 0.690, which is far more than the 0.05% restriction. In this situation, the null hypothesis is considered correct, and any notion that the model may exhibit serial correlation is disregarded. When this happens, the model does not exhibit heteroskedasticity at the 5% significance level. This is because the significance level is set to 5. After being put through its paces, this model does not get stuck around the 5% level and stagnate. If the probability value of 0.4025 exceeds the 0.05 percent barrier, it indicates that the issue is more serious than previously assumed. At a significance level of 5%, we cannot rule out the null hypothesis, hence we can safely conclude that the model does not exhibit heteroskedasticity at this level. This is the only logical explanation. If the null hypothesis is accepted, the data set should have a normal distribution with a percentage range of between 5 and 10%, or something similar. Residual frequency distributions account for around 5% of the total. The Jarque-Bera probability is not statistically significant since the chance of 0.000 is less than the 0.05 percent requirement. As a result, the possibility cannot be defined as insignificant. If the null hypothesis concerning co-integration is correct, residuals do not have a normal distribution at the 5% level. There is no evidence to support the alternative hypothesis, despite the presence of the null hypothesis, there is a theory that contends that the parameters are constant. The test results demonstrate that the blue line cannot cross the red line's boundaries. Because we want to believe that residual variances are stable rather than unstable, we will accept the null hypothesis while rejecting the alternative hypothesis.. In addition, it was discovered that the residual variance is stable rather than unstable. Finally, the ARDL's long-run stability coefficient was analyzed in relation to the short-term dynamics of FDI and economic growth variables using the cumulative sum of recursive residuals (CUSUM) and cumulative sums of squares (CUSUMQ). Both of these methods are referred to as "cumulative sums." The null hypothesis says that, within a 5% confidence range, there is no variation in any of the error correction coefficients provided in the error correction model. The option to rule out the null hypothesis of consistent coefficients would exist if it is shown that any of the lines have been crossed with a 5% level of significance. The CUSUM and CUSUMQ data displays must comply with the essential restrictions shown in the picture above. This ensures that the coefficient of

foreign direct investment remains consistent throughout time. The debate about the effectiveness of exchange rate regimes centers on the volatility of exchange rates. Currency rate fluctuation has compounded this problem since 1973 (Omojimite & Akpokodje, 2010). Stock market volatility has always piqued the curiosity and concerns of policymakers and financial professionals. Policymakers are curious about the major sources of volatility and how they affect actual activity. Financial professionals, on the other hand, are interested in the effect of time-varying volatility. The country's capital market influences its financial situation, making it sensitive to foreign currency volatility (Olweny & Omondi, 2011).

Conclusion

From 1980 to 2020, this thesis examines the influence of volatility and currency changes on South African bank stock returns. Exchange rate variations may significantly affect the market value of a bank's foreign assets or liabilities, producing volatility in the bank's capital positions. Adler and Dumas (1980) and Roll (1979) studies show that short-term departures from purchasing power parity are significant and are not always self-correcting, although certain disparities in bank capital may be countered by changes in the aggregate price level. Banks may look for ways to lessen or completely remove their exposure to exchange rate volatility, just like other businesses. Examples include currency futures, forward exchange, options, and swaps, including parallel loans, matching of asset and obligation denomination length and currency (Shapiro & Rutenberg, 1976; Cornell & Shapiro, 1983). If a bank believes it can predict exchange rate swings with a competitive advantage, it may avoid hedging or diversifying away exchange rate risk. Furthermore, the amount of risk a bank is willing to assume will almost definitely shift over time, as will the bank’s forecasted exchange rate. It is important to note that this essay does not seek to evaluate the unique hedging or speculative trading operations of commercial banks.

The debate about the effectiveness of exchange rate regimes centers on the instability of exchange rates. Currency rate fluctuation has compounded this problem since 1973. Omojimite and Akpokodje (2010) Stock market volatility has always piqued the curiosity and concerns of policymakers and financial professionals. Policymakers are

curious about the major sources of volatility and how they affect actual activity. Financial professionals, on the other hand, are interested in the effect of time-varying volatility. The country's capital market influences its financial situation, making it sensitive to foreign currency volatility (Olweny & Omondi, 2011). Annualized standard errors of daily stock and security price fluctuations may be used to quantify volatility, which is the risk or uncertainty connected with stock prices, according to Ahmad and Ramzan (2016).

The fast development of international commerce, as well as the adoption of floating exchange rates by both rich and developing nations, heralded the start of a new age of heightened currency volatility Kisaka and Mwasaru (2015). Finally, this thesis is discovered in Table 4.1. In this section, the long-term relationship between the variables that make up the general model is investigated using the ARDL limits testing technique. Akaike information criteria and the Schwartz Bayesian criterion are used to determine the order of lags on the first non - stationary variables in equations (1). The next step is to do a limit F-test on equation (1) to see whether the variables being investigated have a long-term relationship. The outcome from the F-test, which had a value of 4.102, is displayed in the table above. Evidence from the F-test indicates a possible association between ST, REER, INF, and RIR. Moreover, as seen in the data presented in Table 4.3 concludes, the volume of stock transactions and the currency exchange rate are inversely related. A rise in the exchange rate will reduce the volume of stock trading in South Africa, as indicated by the negative coefficient of -3.3 and the likelihood value of 0.000. On the other hand, the probability value of the interest rate is 0.02 and the coefficient is 2.09, both of which are statistically significant at 5%. According to this, increasing interest rates will have the exact opposite effect. This outcome is consistent with research by Kutty (2010), who looked into the connection between stock prices and exchange rates in Mexico. The Granger causality test proves that in the short run, stock prices are considered before exchange rates, but in the long run, the two do not seem to show any link. This study backs up Oskooee and Sohrabian (1992) conclusion, but it goes against earlier studies that showed a long-term link between exchange rates and stock prices (Oskooee & Sohrabian, 1992). Also, the ECM in Table 4.5 shows that the South African economy adjusts very quickly, with a speed of 63 percent from the short run to the long run on currency fluctuations of bank stock returns. This rate of adaptation is remarkable.

Despite having a negative coefficient of -0.82, the exchange rate is statistically significant with a p-value of 0.001. This means that if the exchange rate is allowed to increase further, bank stock profits will decrease for the South African economy.

In contrast, the interest rate in the South African economy swings in the opposite direction of the exchange rate, with a p-value of 0.006 and a positive coefficient of 1.736. The conclusion from all of this data is that there is a short-run correlation between the exchange rate and the South African stock market. The evidence supports this claim, which states that rising interest rates will raise the value of the South African stock market. According to Kumar (2013), the results of the multivariate GARCH model reveal that there is volatility spillover between the stock markets and the foreign currency markets in the IBSA countries. This volatility spillover occurs in both directions. This exemplifies the intertwined nature of the stock market and currency markets around the world. The unexpected effect of adopting flexible exchange rate regimes is an increase in the level of exchange rate volatility, which must be managed in an appropriate manner. This effect must be avoided at all costs. Several countries, most notably South Africa, have expressed worry over currency fluctuations.

Recommendations

Businesses dealing in stock markets could make greater use of more effective hedging products, which would avoid any negative implications, and authorities should get involved during periods of exceptionally volatile currency rates to build trust among investors. Currency depreciation reduces stock market returns, thus governments should work to stabilize the exchange rate as a tool to entice foreign portfolio investment. Building a robust stock market that can survive economic ups and downs over the long haul is a top priority for government regulators. The findings suggest that in order to evaluate their investments, investors should focus more on monetary policies. This is because the return and volatility of bank shares may be predicted using interest and currency rates. Investors should adapt the composition of their portfolios anytime interest and exchange rates fluctuate since the risk-return trade-off can change quickly. When developing risk management strategies, bank executives must also consider monetary policies. The condition of the nation's financial sector should be taken into account while

designing monetary policies. This is crucial because the banking system contributes significantly to economic growth, and monetary policies may have an impact on the establishment of a strong and stable banking system. Additionally, it is crucial that decision-makers consider how changes in exchange rates affect the overall performance of the stock market. This is because, despite their best efforts to ameliorate the ailing state of the economy, their policies may have an effect on performance. The Monetary Committee division of the Central Bank of South Africa must maintain a stable exchange rate for foreign currencies if stock market trading is to be promoted. Large exchange rate swings have this effect because they skew stock market performance trends, making it impossible for investors to forecast the future status of the economy with any degree of certainty. Investors must therefore make educated guesses about the market's likely course of action going forward. The study goes on to recommend that, in order to minimize the influence of exchange rate fluctuations on the profits made by foreign investors, the management of the security should design equities with foreign currency as their unit of account. This is done in an effort to reduce the impact of currency rate changes on the profits made by foreign investors. This would encourage additional investment from foreign investors, which would boost the market's vitality.

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Appendix X

UNIT ROOT TEST

ST

Null Hypothesis: ST has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.048742	0.7263
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Null Hypothesis: D(ST) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.419082	0.0001
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

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

REER

Null Hypothesis: REER has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.614817	0.4659
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Null Hypothesis: D(REER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.564444	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

INF

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.698660	0.8345
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

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

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.468614	0.0001
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

RIR

Null Hypothesis: RIR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.427683	0.0001
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

ST

Null Hypothesis: ST has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.048742	0.7263
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Null Hypothesis: D(ST) has a unit root
Exogenous: Constant
Lag length: 5 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-29.42723	0.0001
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

INF

Null Hypothesis: INF has a unit root
Exogenous: Constant
Lag length: 4 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.721440	0.8297
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant
Lag length: 3 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.864190	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

REER

Null Hypothesis: REER has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.614817	0.4659
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Null Hypothesis: D(REER) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.564444	0.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

RIR

Null Hypothesis: RIR has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=9)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.427683	0.0001
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

ARDL Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.102697	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

ARDL Long Run Test

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR	-3.217781	1.676863	-1.918929	0.0656
REER	-1.307819	0.226030	-5.786045	0.0000
INF	-1.824996	1.055318	-1.729332	0.0952
C	203.9031	21.42012	9.519232	0.0000

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	129.2909	30.40868	4.251774	0.0002
ST(-1)*	-0.634080	0.146573	-4.326030	0.0002
RIR(-1)	-2.040330	1.116691	-1.827121	0.0788
REER**	-0.829262	0.230353	-3.599960	0.0013
INF**	-1.157193	0.700898	-1.651015	0.1103
D(ST(-1))	0.262459	0.162561	1.614522	0.1180
D(RIR)	-0.700273	0.905406	-0.773435	0.4460
D(RIR(-1))	1.916564	0.953141	2.010788	0.0544
D(RIR(-2))	2.097213	0.864612	2.425610	0.0222
D(RIR(-3))	1.736705	0.708993	2.449536	0.0211

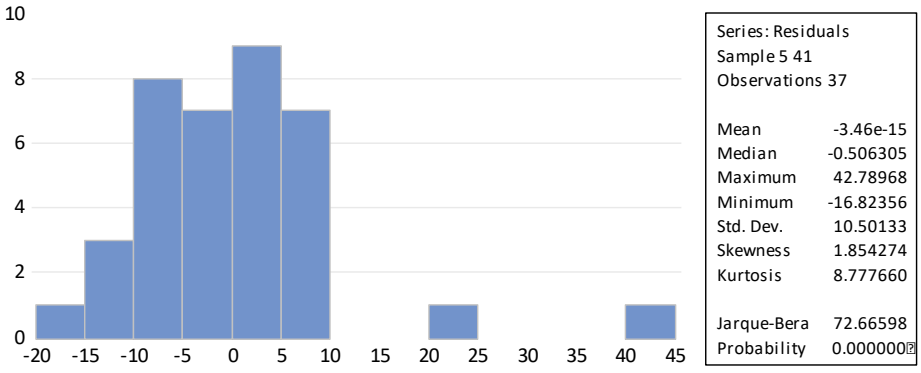
ARDL Short Run Test

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ST(-1))	0.262459	0.146363	1.793207	0.0841
D(RIR)	-0.700273	0.640729	-1.092931	0.2841
D(RIR(-1))	1.916564	0.712933	2.688280	0.0122
D(RIR(-2))	2.097213	0.695745	3.014339	0.0055
D(RIR(-3))	1.736705	0.591929	2.933975	0.0068
CointEq(-1)*	-0.634080	0.130655	-4.853094	0.0000

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ST(-1)	0.628379	0.170302	3.689782	0.0010
ST(-2)	-0.262459	0.162561	-1.614522	0.1180
RIR	-0.700273	0.905406	-0.773435	0.4460
RIR(-1)	0.576507	0.894601	0.644429	0.5247
RIR(-2)	0.180648	0.833776	0.216663	0.8301
RIR(-3)	-0.360508	0.821040	-0.439087	0.6641
RIR(-4)	-1.736705	0.708993	-2.449536	0.0211
REER	-0.829262	0.230353	-3.599960	0.0013
INF	-1.157193	0.700898	-1.651015	0.1103
C	129.2909	30.40868	4.251774	0.0002

Residual Diagnostic Test



Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.637289	Prob. F(9,27)	0.7554
Obs*R-squared	6.482768	Prob. Chi-Square(9)	0.6908
Scaled explained SS	13.42467	Prob. Chi-Square(9)	0.1443

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

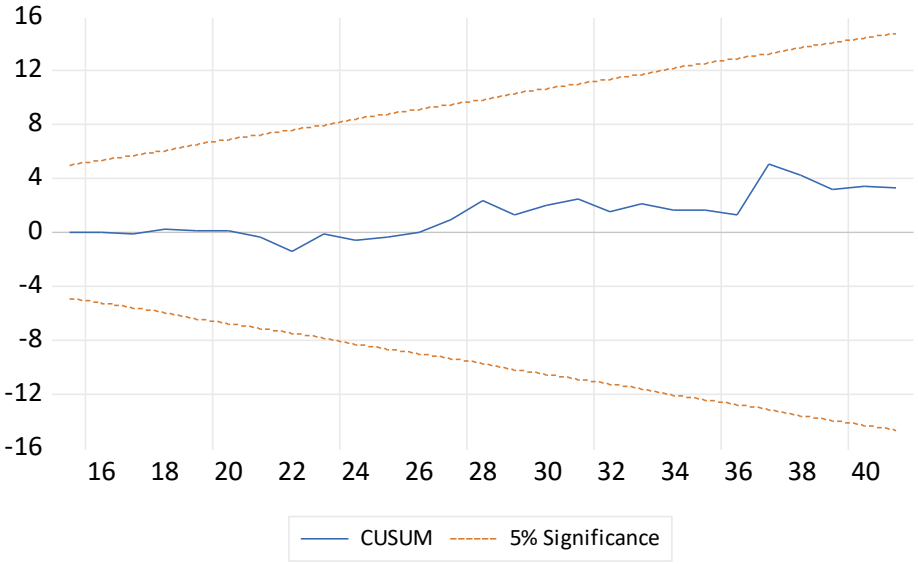
F-statistic	0.935590	Prob. F(2,33)	0.4025
Obs*R-squared	2.146391	Prob. Chi-Square(2)	0.3419

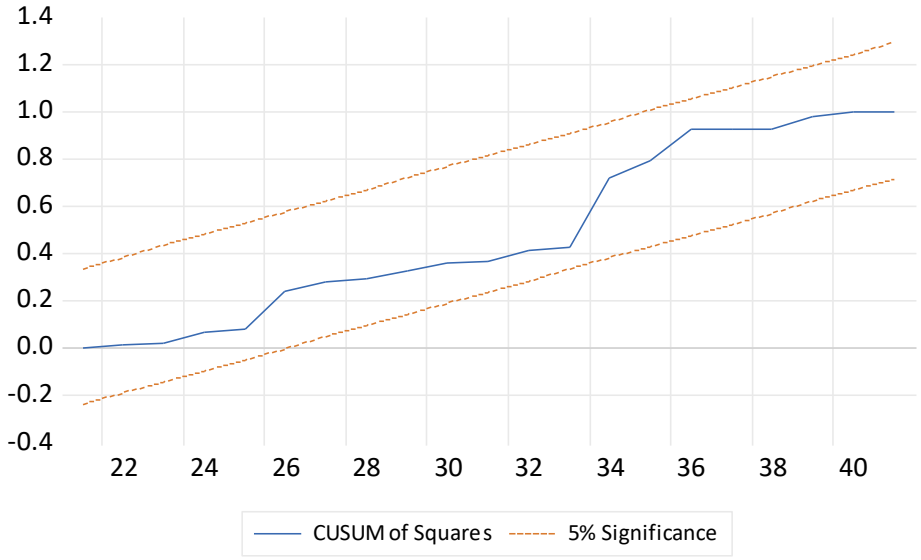
Granger Causality

Pairwise Granger Causality Tests
Date: 12/20/22 Time: 15:45
Sample: 1 41
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
RIR does not Granger Cause ST	39	0.58458	0.5628
ST does not Granger Cause RIR		0.49564	0.6135
REER does not Granger Cause ST	39	1.78447	0.1833
ST does not Granger Cause REER		2.15071	0.1320
INF does not Granger Cause ST	39	3.13531	0.0563
ST does not Granger Cause INF		1.34678	0.2736
REER does not Granger Cause RIR	39	3.88627	0.0302
RIR does not Granger Cause REER		1.17995	0.3196
INF does not Granger Cause RIR	39	0.58392	0.5632
RIR does not Granger Cause INF		0.32228	0.7267
INF does not Granger Cause REER	39	6.23352	0.0049
REER does not Granger Cause INF		10.2009	0.0003

Stability Test




1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
22
24
26
28
30
32
34
36
38
40
CUSUM of Squares
5% Significance

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