



**NEAR EAST UNIVERSITY
INSTITUTE GRADUATE STUDIES
DEPARTMENT OF BANKING AND FINANCE**

**The relationship between inflation on money supply in
South Africa (1980-2021)**

MSc. THESIS

OTIS YALLA KPANAHA

**Nicosia
JUNE, 2023**

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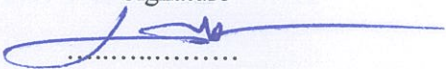

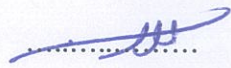

OTIS YALLA KPANA

**Supervisor
Assoc. Prof. Dr. Turgut Tursoy
Chairmen Banking and Finance Department.**

**Nicosia
JUNE, 2023**

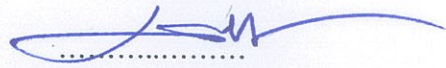
Approval

After a careful scrutiny of the thesis titled “**The relationship between inflation on money supply in South Africa (1980-2021)**” submitted by **OTIS YALLA KPANAH**. It has met the unanimous consensus and in our combined opinion, it is fully adequate, in scope and in quality, as a thesis for the degree of Master Educational Sciences, and hereby recommended for approval and acceptance.

| Examining Committee | Name-Surname | Signature |
|------------------------|--------------------------------|--|
| Head of the Committee: | Prof. Dr. Turgut Tursoy |  |
| Committee Member*: | Assoc. Prof. Dr. Mehdi Seraj |  |
| Committee Member*: | Asst. Prof. Dr. Ala Fathi Assi |  |
| Supervisor: | Prof. Dr. Turgut Tursoy |  |

Approved by the Head of the Department

25.04/20.23



Assoc. Prof. Dr. Turgut Tursoy
Head of Department

Approved by the Institute of Graduate Studies



Prof. Dr. Kemal Hüsnü Can Başer

Head of the Institute

Declaration

I hereby declare that all information presented in this thesis titled “**The relationship between inflation on money supply in South Africa (1980-2021)**” was gathered, analyzed, and tailored in accordance with all academic rules and ethical guidelines established by the Institute of Graduate School, Near East University. I further declare that, to the best of my abilities, any supplementary resources utilized in the creation of this thesis are adequately credited, acknowledged, and referenced.

OTIS YALLA KPANA

...../06/2023

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OTIS YALLA KPANAH

Abstracts

THE RELATIONSHIP BETWEEN INFLATION ON MONEY SUPPLY IN SOUTH AFRICA (1980-2021)

OTIS YALLA KPANAH

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This thesis explores the 1980–2021 South African periods' link between inflation and money supply. An economy is said to be suffering from inflation when there is a long-term overall trend toward increasing prices. If prices keep going up, fewer goods and services will eventually be available for purchase with a single denomination of the country's money. There are several causes of inflation. This is a risk when too much money is injected into the market, whether by the federal government via the purchase of bonds or by financial institutions through the issuance of loans to the general populace. When inflation is high, both businesses and consumers are more anxious because they think it will affect their ability to make future purchases. The World Bank data site is the source for this research data. The link between inflation and the money supply is examined using both the ARDL and Granger causality. The results demonstrate that although foreign direct investment and interest rates have a beneficial influence on the money supply, inflation and exchange rates have a negative impact on it. Therefore, it could be advantageous to use additional measures like fiscal policy and supply-side economics to control inflationary tendencies in South Africa. A supply-side strategy may be able to handle macroeconomic problems like unemployment and inflation while also raising output in South Africa. In conclusion, the supply-side economics strategy may result in low rates of unemployment and inflation while simultaneously fostering long-term economic development.

Keywords: Inflation, Money supply, Foreign Direct Investment, Exchange rate, Interest rate

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Abbreviations

FMF: Ministry of Finance

CBSA: Central Bank of South Africa

TR: Total Reserve

PP: Phillips Perron

IFE: International Fisher Effect

RIR: Real Interest Rate

REER: Real Exchange Rate

MC: Market Capitalization

ARDL: Auto Regressive Distributed Lag

GCT: Granger Causality Test

LDCs: Least Developed Countries

WBDC: World Bank Data Center

IRP: Interest Rate Parity Theory

GDP: Gross Domestic Product

OLS: Ordinary Least Squares

ADF: Augmented Dickey-Fuller

IMF: International Monetary Fund

REER: Real effective exchange rate

EXP: Export

ECM: Error correction model

INF: Inflation

CPI: Consumer Price Index

CHAPTER I

1.1 Introduction

If prices consistently increase over a prolonged period, an economy is undergoing inflation. As a result, a single unit of the country's currency will eventually be able to purchase fewer goods and services. There are several causes for inflation. When too much money is brought into the market, whether by the federal government in the manner of the acquisition of bonds or by financial institutions in the shape of the issuing of loans to the people as a whole, this is a possibility. Businesses as well as customers are more concerned when inflation is high because they believe it will reduce their future purchasing power. This is due to the fact that an elevated inflation rate will be produced by the economy's overexpansion of the money supply in relation to its growth. A low rate of hyperinflation is useful since it helps firms and consumers plan for the long term since they are conscious of the monetary value of their cash and that it won't be constantly diminished. This is due to the decreased likelihood of price increases over time caused by low inflation. Economists determine the inflation rate in prices by analyzing the annualized shift in the average consumer inflation rate (CPI) percentage during a designated timeframe. The CPI, or Consumer Price Index, serves as a metric for tracking the price fluctuation rate over time for a representative selection of goods and services consumed by the general public. Meanwhile, exchange rate pertains to the valuation of a particular currency about another currency or economic region. What number of South African rands (ZAR), for instance, must be purchased to equal one US dollar? As of January 1st, 2009, the exchange rate was 6.79 ZAR, meaning that it cost 6.79 ZAR to buy one dollar. The purchasing and selling of commodities with a foreign currency value is included in foreign currency trading. These foreign assets can be utilized in the same manner as foreign currency, such as way to postpone paying for overseas operations or a way to send money abroad. They can perform the same functions as foreign currency. The spread of internationalization, which has increased the volume of trade between nations, particularly since the introduction of the digital payment system, may be blamed for the steady expansion of the foreign exchange market over the past several years. One of the world's most important financial marketplaces is the foreign exchange market. In this market, investment and commercial banking institutions stand to gain the most since they play the most important roles in it. According to Stephen et al. (1998), demand and supply are the variables that affect each currency's value in the

marketplace for foreign currencies. These forces are in charge of keeping the market in balance. Chiira (2009) asserts that a wide range of various currencies are utilized in global trade. Since it affects how banks carry out monetary intermediation, exchange rate volatility acts as a controlling factor for bank profitability levels. No country can exist without being surrounded by other countries; hence, every nation trades with each other, which leads to the development of an industry for exchange rates for currencies. Periods of the South African rand's depreciation, which are characterized by volatility in the exchange rate, are bad for the country's economy. The value of one South African Rand (ZAR) to one United States dollar (USD) reached a high of 16.76 as a consequence, making it difficult for the financial industry to predict the exchange rate in the future with any level of precision. Commercial banks' overall financial performance was significantly impacted because they were attempting to finance enough global trade at the time. The Reserve Bank of South Africa's (Central Bank) monetary control aims to preserve price stability by using an inflation-targeting method. This may be accomplished by altering the repossession rate, which effectively manipulates the prime rate by two percentage points. Additionally, this action alters the overall amount of cash supply, which has an impact on how much consumers and investors can spend. Variations in economic output, productivity, and production can affect consumer prices index and costs, potentially increasing or decreasing. Nonetheless, it's essential to recognize that inflation cannot be solely ascribed to the Reserve Bank's monetary policy. According to Le Blanc and Chinn (2004), the cost of crude oil significantly contributes to overall inflation. Additionally, it's crucial to acknowledge that external factors can undermine any progress achieved through the Central Bank's monetary policy decisions beyond the Reserve Bank's authority. Since Brent crude's spot market low of \$11.10 per barrel in January 1999, the price of gasoline has more than quadrupled, hitting \$100 per barrel in January 2011. Over this period, South Africa's inflation index considerably climbed, going from 59.0 to 113.5. This would imply a link between oil prices and inflation, which would indicate that investors and policymakers should consider this information when making investment choices.

Research has indicated that inflation can be impacted by various factors, including expanding the money supply. Numerous experts and writers concur that boosting the quantity of money may trigger hyperinflation or exacerbate other inflationary pressures. Monetarism theory asserts that inflation is mainly triggered by

an upsurge in the money supply, culminating in a surge in prices of goods and services. This, in turn, can create a scenario where consumers compete for scarce goods due to the surplus of money, further driving up inflation rates. Should domestic credit or money supply surpass projections, it has the potential to create market instability. Inflation will rise as a result of this. This situation evolves over time as a consequence of price increases and suppliers boosting output to make up for market shortages (Lim and Papi, 1997). As a result, the market becomes more competitive, which in turn fuels price competition between rival companies. It is anticipated that this will cause the overall rate of inflation to decrease. Another point of view contends that growing inflation is primarily due to the methods administrations use to collect taxes, especially when taxing policies are unsuccessful. This technique investigates the significant fiscal imbalances that come from ignorance of or improper use of the local or global financial markets' collection mechanisms. Governments are consequently compelled to rely increasingly heavily on the procedures for collecting local revenue as their main source of income to fill the budget gap. When the revenue base is very narrow, a larger percentage of public spending must be financed by borrowing. A greater inflation rate may arise from this increase in government borrowing since it causes the deficit to grow, which in turn increases inflationary pressure. The 2001 Catao and Terrones research examines how other variables, such as exchange rate regimes, impact inflation in addition to how incomes affect it.

Researchers have come to the opinion that wage increases immediately cause a rise in manufacturing expenses and a subsequent rise in inflation after studying how pay inflation and wage increases have changed over time. This is because growing salaries increase the cost of inputs (Catao and Terrones, 2001). Romer (1993) discovered an antagonistic relationship between inflation and exchange rate openness. The phrase "exchange rate openness" is used to characterize an economy with an open currency and few import and export restrictions. The journal *Economics Research* reported Romer's findings.

According to a study that was conducted by Terra in 1998, open-market economies of smaller sizes are more susceptible to the effects of pressure that is exerted on their exchange rates. This was shown to be the case. In spite of the fact that open economies often have lower rates of inflation, this statement is nonetheless accurate. This paper is based on a study that was intended to include wages. It was decided not to include salaries in this analysis since earlier research by Brada and

Kutan (1999), Barbakadze (2008), and Grigorian et al. (2004) showed that pay increases had a negligible effect on inflation. However, Coorey et al. (1996), Hernandez-Cata (1999), and Kim (2001) found that nominal wages are a strong Real wages continue to have a strong correlation with the money supply as a predictor of inflation. Despite these results, Perovic (2009) found that pay growth can only have an influence on inflation if it is greater than wage expansion in productivity, which only happens when wages grow more quickly than output. It is important to note that inflation will inevitably arise in every economy at some point in the future (Aurangseb, 2012). Hyperinflation has been an explosive subject since the beginning of the 1970s, when the cost of oil reached previously unheard-of heights, according to research by Greenidge and Dacosta (2009). Since that time, many nations have realized how crucial it is to control inflation, particularly those with developing or fragile economies (Greenidge & Dacosta, 2009). With average inflation rates of 3.6% for affluent nations, 7.3% for expanding Asian economies, and 10.2% for African countries in 2008, there was a return to high inflation (Economic Survey, 2009). In the 1970s and 1980s, Kenya experienced an annual inflation rate ranging from 10 to 20 per cent. This peaked at 47.7 per cent in 1993, as Gichuki and Moyi (2013) noted. Such inflationary trends are not exclusive to Kenya, as highlighted by research conducted by the African Development Bank (AfDB) in 2011, as reported by Durell & Sjo (2012). Our investigation into this phenomenon was based on the monetarist concept of inflation, championed by the renowned economist Milton Friedman. In a book published in 1970, Friedman and Schwartz argued that inflation is pervasive in economic activity (Tafti, 2012). Inflation is characterized by a continuous increase in the overall level of prices in an economy, which poses a significant challenge to the stability of the global macroeconomic system (Bashir et al., 2011).

The Consumer Price Index (CPI), which is the official inflation indicator in Kenya, changes annually by a percentage. The CPI is a statistical indicator that determines the average cost of a certain category of goods and services, such as food, housing, healthcare, and transportation, that consumers buy during a specified time period. The CPI is a price index used to gauge inflation by keeping track of changes in the cost of a preset selection of consumer goods and services. Price stability should be a priority for any nation, as it is widely accepted to be necessary for long-term, ongoing development and economic growth (Odusanya & Atanda, 2010). According to Odusanya and Atanda (2010), an elevated and volatile inflation rate can exert

detrimental financial and social effects on an economy by undermining price stability, savings, and investment. Odusanya and Atanda (2010) suggest that monetary regulation should prioritize low inflation over reducing production or addressing unemployment. According to Chicheke (2009), monetary policy refers to the actions the central bank takes to regulate the money supply in order to achieve price stability, full employment, and economic growth. "Money supply" refers to the total amount of money available for spending on goods and services by the West African Monetary Agencies in 2009. The term "money" will be used broadly throughout this essay. As per the World Bank's report in 2013, the comprehensive delineation of money encompasses various components. There exist various forms of currency that remain outside of the realm of financial institutions and government control. They may also include other financial instruments like certificates of deposit and commercial paper as well as demand deposits, time deposits, deposits made in foreign currency by non-governmental residents, bank and traveler's checks, and so forth. The notion that fluctuations in the value of currency are linked to changes in quantity has been a widely accepted concept in economics for quite some time, according to Gerald et al. (1999). This hypothesis has been a foundational principle of monetarism, with the quantity theory of money serving as its fundamental tenet (WEMA, 2009). According to the monetarism school of economic thought, the expansion of the money system is largely to blame for inflation, and there is a clear connection between inflationary pressures and a significant increase in the currency supply. According to economists, maintaining the amount of money within a reasonable range is necessary to bring inflation rates under control (WEMA, 2009). Despite having a lengthy history and a wealth of evidence to support it, the hypothesized connection between money and inflation is still up for question, as stated by Gerald and others (1999). Given that policymakers and practitioners tend to be more concerned with short-term price changes than longer time horizons, the link between inflation and money growth may only be important over very long-time horizons. Gerald et al. (1999) proposed one explanation for this disparity. Furthermore, there has yet to be a consensus among scholars on the connection between inflation and the money supply. While Dlamini et al. (2001) observed minimal impact, Bashir et al. (2011) discovered a significant and positive correlation. The Republic of Cote d'Ivoire, Burkina Faso, Niger, Senegal, Togo, Nigeria, and Sierra Leone were among the countries where WEMA (2009) discovered a negative connection. It is crucial to thoroughly investigate the correlation

between the amount of money and hyperinflation rates in South Africa. Inflation and the money supply are essential economic indicators demonstrating a nation's strength and prosperity. Ensuring stable pricing levels is a top priority among economists. According to monetarists, the money supply and inflation are related. The quantity of money and how it affects the economy are hotly debated in the financial industry since a rise in the money supply may have both favorable and unfavorable consequences for economic expansion. The process of inflation is ongoing and is always present in the economy. Contrary to the prevailing wisdom among economists that price inflation can be eliminated. Because of this, the main focus of policymakers is on reducing inflation, which is impacted by fiscal and monetary policies. Inflation in Pakistan is rising, which raises concerns about the economy's future and the volatility of the financial system (Hossain and Akhtar, 1986). Pressure to inflate prevents businesses from investing and hiring new workers. Growing national debt and a steadily rising budget deficit are Pakistan's main monetary policy concerns, according to Bilquees (1988). The continual price increase, in accordance with Chaudhry, Ismail, and associates (2015), is Pakistan's economy's fundamental unresolved problem. South Africa has made great economic strides lately, but the nation's core economic issues have not been fixed.

The most pressing of these problems continues to be inflation. To control inflation, we need to understand what generates it. The inflation rate for December was 7.2%, a little slower than the 7.4% figure for November. The inflation rate for December was the smallest until May of this year. The cost of utilities and housing increased more slowly in December, per the data detailed in the publication. In addition, compared to the information from the previous month, the rate of appreciation for the price of non-alcoholic beverages and food was a little lower. Between November and December, the average annual inflation rate climbed slightly, from 6.8% to 6.9%. The core inflation rate did, however, drop from 5.0% in November to 4.9% in December, which is important to note. At the very least, consumer prices rose faster in December than they did in November, rising by 0.37% from the month before. The index of consumer prices (CPI) dropped from December's 7.2% reading to 6.9% in January. The rate of inflation in January was the smallest since May 2022. It is clear from a close examination of the release that the reduction was principally brought on by a slowing in the rise in transportation costs. Meanwhile, throughout the month of January, the amount of change for dwellings as well as utility expenses was

essentially constant. However, compared to other prices, the price of non-alcoholic beverages and food increased more quickly. Despite this, the increasing trend persisted, and annual average inflation hit 7.0% in January (compared to 6.9% in December). This was slightly higher than the 6.9% reading from the previous month. Underlying inflation, which was measured in January at the same 4.9% rate as in December, remained steady. In conclusion, relative to the month before, consumer prices fell by 0.09% in January, as opposed to December's 0.37% increase. In May of last year, the statistic for January was at its lowest level. There was a rise from the 13.4% rise in prices that was published in January to a 13.6% yearly price increase for non-alcoholic beverages and food. Since April 2009, when the equivalent rate was likewise 13.6%, the number reported in February marks the highest point attained. The average annual rate of inflation for bread and cereals was 20.5% in February, as opposed to 21.8% in January. A crucial basic ingredient, maize meal, has not seen a decline in inflation rates in recent years. In February, the company's price index rose by 2.2 percent, bringing the entire rise to 34.7 percent. Rusks, macaroni, and savory biscuit prices all had significant month-to-month price hikes of 6.8%, 4.4%, and 4%, respectively.

The rate of inflation for meat has exhibited an upward trend, with an increase from 11.2% in January to 11.4% in February. The current yearly increase in beef consumption represents the most significant growth observed since February 2018, when the annual rise in consumption was also recorded at 11.4%. On the other hand, the annual percentage rate decreased from 2.6 percent in January to 0.2 percent. The lowest monthly gain occurred in February 2022 because there was no increase in the cost of meat. In the year leading up to February, the annual percentage increase in the price of dairy products, eggs, and cheese was 12.3%, which was higher than the 10.9% observed in January. Cheddar cheese's price has gone up by 15.2% in the last year, while other food items including feta cheese, custard, fresh low-fat milk, and long-life full-cream milk have all witnessed price increases between 14.3% and 14.9%.

The annual inflation rate for oils and fats, on the other hand, has been falling for six months in a row, hitting 16.7%, the lowest level since April 2021. On the other hand, "other food" has seen a large increase in inflation, going from 7.7% in June 2022 to 15.0% in February 2023, with just a rate of 2.3% for February. Additionally, in only one month, the cost of infant formula has gone up by 7.2%, the cost of baby cereal by 4.6%, baking powder by 2.8%, and tomato sauce by 2.5%. Cold drinks experienced a

yearly rise in prices of 8.5% and an average monthly cost increase of 2.7%. Fruit juices (up 4.0%), fizzy drinks in cans (up 3.3%), and flavored beverages in bottles (up 3.1%) all saw increases in monthly sales. An annual survey is carried out in February to gather information on hospital ward fees, doctor and dentist visits, and other medical service costs. The price rise that occurred in February 2023 was 5.3% larger than the 5% increase that was observed in February 2022. The health insurance index increased 4.4% month over month in February as a result of numerous businesses implementing yearly premium increases. The price of fuel increased just 0.9% in the months of January and February. The annual rate measurement is currently at its lowest level until March 2021 (2, 4%), when it was at that value. The onshore 95-octane gasoline price witnessed a significant decrease from R21.40 to R19.14 per liter, between December and January. This drop was due to the fuel price index plummeting by 10.5% from 22.8% to 13.1%. The price was lower than the previous month's R23.46 amount. The cost of fuel right now is very similar to what it was in March 2022. (R21, 60). Food and non-alcoholic beverage (NAB) inflation has been accelerating recently. In January, the annual rate had an increase, reaching 13.4%, which is its highest rate since it reached 13.6% in April 2009. Since the start of 2009, this reading has been at its highest level.

Comparing all of the other categories of goods that make up the CPI basket, cereal and bread products had the highest rate of price change in January (21.8%). This is the highest number for this group of items since 23.6% in February 2009 (23.8%). Compared to December, this was a rise of 20.6%. Pastry products (pizzas and pies) increased by 3.6% month over month in January, adding maize (up 3.1% m/m) as well as brown bread (up 1.3% m/m), leading bread and cereal items that experienced notable monthly price increases. From a level of 9.7% in December, the price hike for beef increased to 11.2% in January. The cost of independently quick-frozen (IQF) chicken components, which have the most weight among all the different kinds of meat products, increased by 2.7% in December and January. There were also significant monthly price increases for a number of animal goods, including stewing beef (up 3.6%), fresh chicken parts (up 5.3%), and beef offal (up 5.2%). The annual growth rate of bacon was 19.4%. Fish prices increased by 13.0% annually in January, up from 10.4% in December. It represents the highest yearly rate of inflation for fish since it was first reported in May 2009, when it hit 14.2%. The categories of items with the highest percentage month-over-month rises in prices in January are shown in the charts

below. In terms of food, vegetables experienced the largest monthly shift in January (5.1%), and in 2022, consumer inflation will reach its highest rate in 13 years. Vegetables made up five of the ten products with the biggest monthly price increases. The 6.9% annualized inflation rate hides variations in the timing and intensity of price increases for different product categories. The costs of transportation, food, and nonalcoholic drinks (NAB) had the biggest impact on overall inflation. When the year is broken down, the price of transportation primarily affected the headline rate in July, but other categories of goods had a greater impact towards the end of the year. Both in January and February, the headline inflation rate was 5.7% to start the year. After that, in July, it rose to 7.8%, the highest level it had experienced in the preceding 13 years, before dropping to 7.2% in December. Certain products experienced their best sales levels several times throughout the year. For instance, in the case of wine, the annual rate peaked in May and fell to its minimum point in August. On the other hand, the price increase for hot beverages started the year in the negative and didn't turn around until December, when it reached 14.6%. While the cost of oils and fats increased the most in August, inflation, as assessed by the overall rate, peaked in July. The cost of 95-octane petroleum sold domestically in July reached a record-high level of R26.74 a liter. A complete fill-up for a car with a 45-liter tank would have cost you R1, 203. This is a big rise from the \$783 you could have spent a year ago at R17.39 per liter. Gasoline prices started to drop in July, and before the final day of the year, 95-octane was going for R23.46 a liter. On the other hand, in November, the average cost of a gallon of petroleum rose to an unprecedented level of R27.29. The fundamental cause of the general increase in the price of oils and fats was the skyrocketing cost of sunflower oil. Poor harvests in 2021 led to a decrease in the global supply, which was further worsened by Russia's invasion of Ukraine, one of the globe's two main producers of oil from sunflowers. Famous stores like Woolworths and Pick & Pay were forced to restrict client purchases as a result of the crippling shortage in April 2022. In August 2021, the average price of a 750-ml container of sunflower oil was R28.20, but by August 2022, the cost had risen to a startling R44.51. In August 2022, the cost of fats and oils significantly increased, setting a record high of 376% in the consumer price index (CPI), which was first calculated in 2008. Costs for used cars rose rapidly in the same year, reaching a record of 16.0% in December. To cope with limited funds, many consumers retained their vehicles for extended periods, leading to a shortage of used cars in the market. The year's second quarter was particularly

challenging due to intense inflationary pressure. However, the prices of new cars only saw a slight increase, with a peak of 6.0% in April. The ongoing war in Ukraine disrupted global grain supplies, causing inflation to persist in grain products throughout the year. The annual rate peaked at 20.6% at the end of the year, with numerous items, such as grain meal, brown bread, and white bread, including cereals, experiencing double-digit price rises. Although it will be colder at year's end, the pressure won't change. After peaking in July, the overall inflation rate decreased to 7.2% in December. The percentages of appreciation for both of the product groups that had the greatest effect during the year, mobility (especially fuel) and food and alcohol-free drinks, continue to be relatively high in relation to the other items in the basket.

1.2 Statement of the Problem

Inflation in South Africa reached a seven-month low in December, but rising cost pressures, such as a steep rise in energy prices, may push the central bank to maintain higher mortgage rates for longer. The headline index of consumer prices climbed by 7.2% during the same period last year, compared to the prior reading of 7.4%. According to a statement posted on Data South Africa's website on Wednesday, the relevant month was November. The median estimate, obtained from research by Reuters with 15 different economists, was 7.3%. Price changes actually happen at a range of different speeds. While some things, like the pricing of sold goods, change every day, others, like salaries spelled out in contracts, take longer to adjust and change less frequently. This is known as being "sticky" in economic terms. The biggest cost associated with inflation is the reduction in real income that it causes. Uneven price increases that eventually reduce certain customers' purchasing power define inflationary conditions. Additionally, inflation over time may reduce the purchasing power of both fixed-interest rate payers and recipients.

1.3 Purpose of the study

Individuals are in a worse financial situation because they can purchase fewer products and services to the extent that households' nominal earnings, which they receive in actual money, do not increase at the exact same rate as prices. In other words, whether their income is real or adjusted for inflation, they see a reduction in their purchasing power. Actual revenue is frequently used as a stand-in for living quality. The standard of living is rising in tandem with actual incomes, and vice versa. Prices

fluctuate in real life at different rates. Other things, such as salaries that are established by agreements, take longer to adjust (or are "sticky" in economic parlance), while some, like the pricing of traded commodities, are subject to daily variations. The decrease in actual revenue, which happens when prices grow unevenly for all products and services, is inflation's most major adverse effect. Inflation can impose a significant financial strain as it gradually diminishes purchasing power. This can adversely impact individuals dependent on fixed payments or those who pay fixed interest rates. For instance, retirees relying on pensions that increase by 5% each year may encounter difficulties coping with escalating expenses. The purchasing power of senior individuals will decline in the event that the rate of inflation surpasses 5%. Individuals who make mortgage payments at a fixed interest rate of 5% would experience a financial advantage in the event of a 5% inflation rate. According to the justification, the real interest rate is zero when the inflation rate is subtracted from the nominal interest rate. Assuming that the borrower's discretionary income rises proportionally with inflation, managing debt would be more manageable if prices escalate. The inflation rate is determined by contrasting the nominal and actual interest rates. Nevertheless, the lender's actual earnings would be impacted, and the degree to which hyperinflation is excluded from the nominal interest rate would determine whether specific individuals' purchasing power would increase or decrease. Undoubtedly, many countries have experienced significant and, in some cases, excessive inflation that may reach annual rates of 1,000 percent or higher. In one of the worst instances of hyperinflation ever documented, Zimbabwe's annual inflation rate in 2008 is estimated to have been a mere 500 billion percent. Highly elevated rates of hyperinflation have been devastating, and countries have been compelled to implement painful and tough economic measures in order to reduce inflation. This has occasionally necessitated nations giving up their native currencies, as was recently the case with Zimbabwe. The goal of this dissertation is to look into the relationship between hyperinflation and the quantity of cash that is accessible in South Africa in light of the information that has been provided thus far.

1.4 Research questions

1. What connection does broad money have on inflation in South Africa?
2. What connection exists between broad money and foreign direct investment in South Africa?

3. What relationship does South Africa's general money have to the exchange rate?

1.5 Research Hypothesis

The connections between several economic elements and South Africa's economic development are described in the sentences that follow:

Hypothesis 1: H1 contends that there is no connection between broad money and South Africa's economic development, whereas H2 maintains that there is.

Statement 2: H1 contends that there is no connection between South Africa's inflation and economic growth, whereas H2 contends that there is.

Hypothesis 3: While H2 contends that there is a link, H1 says there is none between FDI and economic development in South Africa.

Statement 4: H1 claims that there is a connection between REER and South Africa's economic development, whereas H2 claims that there is no connection.

1.6 Significant of the study

Numerous aspects of the economy are susceptible to inflation, including consumer spending, business investment, and labor force participation. Interest rates, tax regulations, and government initiatives may also be impacted. Understanding inflation well is crucial when it pertains to investing because it has the ability to reduce the worth of investment returns. Since inflation has lately climbed after a period of comparatively calm inflation to its most recent peak in four decades, investors could profit from learning about the variables driving price increases, their effect on their investment accounts, and strategies to think about as the investing environment transforms. After several years of comparatively tranquil conditions, it rose to its greatest height in forty years. The results of this investigation will be useful to people who decide on policy.

1.7 Limitation of the Study

This research investigates the relationship between the money supply and inflation in the South African economy. We pay particular attention to the FBI, broad money, inflation, real effective exchange rates, and general economic expansion. Our study is limited explicitly from 1980 to 2021 in South Africa. This investigation will only focus on two of the numerous ideas that have been proposed about currency exchange rates: the theories of money supply and inflation, which are both instances

of economic models. This study will only focus on the ARDL for Regression Analysis since there are many other models that may be used for regression analysis. However, this research will only focus on the ARDL for Regression Analysis.

1.8 Definition of terms

Inflation: When an economy grows, both consumers and businesses expend more money on goods and services since they have more money to spend. When an economy is in its boom phase, there is frequently greater demand than supply, allowing businesses to boost prices. This has the immediate effect of accelerating inflation. Inflation is the continuous and widespread increase in prices. This research investigates the relationship between the money supply and inflation in the South African economy. We pay particular attention to the FBI, broad money, inflation, real effective exchange rates, and general economic expansion.

While moderate inflation is linked to economic progress, high inflation may be an indication that the market is running too hot. Demand will rise considerably more swiftly as economic growth picks up speed, forcing manufacturers to keep boosting prices. Supply constraints have the ability to raise prices even in the absence of a noticeable change in demand. Price inflation that spirals out of control is a possibility and is frequently referred to as "runaway hyperinflation" or "hyperinflation." In the US, the phrase "an excess of cash chasing too few goods" is widely used to describe the inflation condition. This phenomenon happens when an economy has more money available than is needed for carrying out financial transactions, which happens when a nation's economy has more spending than it produces in terms of products and services. Therefore, it may be inferred that the value of the dollar will persistently diminish. When attempting to determine overall inflation rates, numerous economists and central banks place their emphasis on core inflation, which is alternatively known as "core CPI" or "core PCE. In contrast to general inflation, core inflation disregards swings in the prices of food and energy, which are susceptible to significant short-term price volatility and may potentially distort the accurate representation of long-term inflation patterns. Investors can monitor inflation using a variety of regularly disclosed inflation indices that are available to them. The statistic that receives the greatest attention in the US is the index of consumer prices (CPI). It tracks changes in the costs consumers pay at the point of sale for goods and services like those related to living expenses,

transportation, and healthcare. Consumer expenditure on personal items is something that the Federal Reserve desires to emphasize more.

Broad money- The concept of "broad money" is used in economics to describe an indicator of the overall amount of money, also referred to as the supply of cash. Either extremely fluid "narrow currency" or less liquid forms of cash are included in this calculation. Depending on the organization utilizing it, such as the European Central Bank, the Organization for Economic Cooperation and Development (OECD), and the Bank of England, "broad money" may have different meanings. According to the OECD, "broad money" includes physical currency, short-term bank deposits with a fixed maturity period of two years or less, short-term bank deposits that can be redeemed with a notification period of up to three months, shares or units of money-market funds, and debt instruments with a recognized maturity period of up to two years. The OECD uses the symbol M3 to refer to "wide money." However, financial measurements may differ between countries, and terms will often be explained in detail before discussion to ensure a shared understanding. The selection of assets included in "broad money" is somewhat arbitrary and subject to change over time, so there is no single definition. The Bank of England has concluded that "wide money" is typically a word rather than a precise meaning that applies to all situations.

Real exchange rate (RER): You combine the nominal currency exchange rate with the cost of living that varies between the two nations to obtain the actual exchange rate (RER). For instance, you might divide the nominal value of the currency by the price differential to purchase a single euro with one dollar. The basic equation has the notation $RER = eP^*/P$. In this example, P^* stands for the mean cost of the item in the euro region, whereas P stands for the typical price of what is sold in the United States. e denotes the nominal value of the currency from dollars to euros. It is possible to calculate the real rate of exchange between two countries using just one sample product. To make the comparison, one could, for instance, look at the cost of a Big Mac, an entree made by McDonald's that is basically the same as variants offered abroad. If the actual rate of exchange equals 1, the price of a hamburger, for example, would be the same in both Germany and the United States since both countries use the same currency. If a Big Mac cost \$1.36 in the United States and €1 in Germany (or any other euro-using European country), that would be the case.

Foreign direct investment, sometimes known as FDI, is a kind of international investment when a shareholder from one nation tries to build a substantial presence

over the long term in a business from another nation. Foreign direct investment is mostly focused on achieving this goal. The presence of a persistent interest suggests a long-term relationship between the shareholder and the business, as well as the investor's ability to have a significant impact on how the firm is run. The formal recognition of legitimacy for this particular interest is granted when an unorganized enterprise has an actual shareholder who possesses a voting power of 10% or more on the board of members. In the case of an established corporation, this threshold is applicable, while for other organizations, a proportionate amount of casting power is considered. Foreign direct investment (FDI) is a different economic strategy that businesses use to build new offices or manufacturing facilities or, alternatively, to buy the assets of a foreign company that already has them. By producing (and frequently selling) goods and services in nations that differ from the ones in which these businesses were initially founded, these companies seek to either augment or replace existing international trade.

CHAPTER II

2.0 Literature review

2.1 Theory of money supply

According to Hollander and Van Lill (2019), the South African Reserve Bank (SARB) used financial asset requirements to successfully control interest rates and lending between 1960 and 1981. In 1978, the De Kock Council recommended that the South African government establish monetary objective ranges and adopt a comprehensive currency description, specifically M3, to regulate interest rates and lending. According to du Rand et al. (2021), these recommendations were put into practice. The SARB implemented a technique from 1986 to 1998 that included reserve monies and pre-determined financial goals, but at a cost (Du Rand et al., 2021). According to Hollander and Lill (2019), as part of the inflation-targeting framework designed to maintain the 3% to 6% inflation objective by 2002, the SARB used interest rates as the major vehicle for policy execution to maintain price stability in 2000. According to Rand et al. (2021), the capacity to unilaterally alter the repo rate serves as the entity's main tool for implementing policy. The central bank uses the repo rate as a monetary policy instrument to react to current market circumstances. The central bank's critical methods include reducing prices, open market operations, reserve requirements, and resource requirements (Hollander & Lill, 2019). Equation (1) illustrates how the idea of the amount of money postulates an inverse relationship between an economy's money supply and its overall price level.

$$M \times V = P \times T$$

The Cambridge University-developed cash-balance theory offers an alternative viewpoint to the well-known quantity theory of money. The classical quantity theory and the Cambridge quantity theory both seek to explain the relationship between the creation of products, the level of prices, the circulation of money, and the flow of money. However, both hypotheses assume a constant flow of funds. What sets the Cambridge equation apart is its emphasis on the significance of currency demand rather than supply (Cesarani, 2008). The following equation illustrates the Cambridge cash-balance theory:

$$M = kpR$$

To explain the economic development of a nation, we can use the following variables: R for national revenue, P for the median price level, and pR for nominal national

income, where M is the monetary quantity. The R column displays the GDP (gross domestic product) statistic. According to economist Milton Friedman, the availability of financial resources is a key element in a nation's economic expansion. The monetarist hypothesis, which contends that variations in the money supply affect economic growth, is this theory. In contrast, Keynes' liquidity preference paradigm emphasizes the demand for money over its supply. He believed the need for money is closely tied to the quantity of foregone earnings. The cash-balance theory, developed at Cambridge University, presents a different perspective from the quantity theory of money. While both theories aim to explain the relationship between goods production, price level, money circulation, and flow, they assume a constant money stream. The Cambridge equation emphasizes demand for money rather than supply. Maintaining price stability is monetary policy's main goal. By controlling the money supply, which also involves controlling inflation and interest rates, this is achieved.

Additional tactics, such as overseeing money and resource costs, may also be implemented to attain stable prices. (Ingves 2007). Bong-Soo (1992) posits that the rate of return is a widely utilized economic policy instrument and highlights its correlation with inflation velocity and interest rates. Famous academics like Rozeff (1974), Moosa (1998), Fama (1981), Malliaris, and Urruita (1991) produced empirical research that supports the idea that macroeconomic factors have a major impact on inflation rates. Several factors that are of significance include the accessibility of currency, the volatility of short-term currency exchange rates, prevailing interest rates, and fluctuations in oil prices. Oil prices are one of the contributing causes. The analysis conducted reveals a direct correlation between fluctuations in overall expenditure and variations in the market valuation of oil. Furthermore, these results point to a relationship between the US stock market indexes, interest rates, inflation, and the expansion of the GDP. According to Malliaris and Urruita (1991), the increase in additional liquidity, also known as the money supply, is the main cause of the stock market's increased activity and system volumes. Additionally, these findings demonstrate the prompt reactions of changes in the money supply, which arise from alterations in monetary policy, to fluctuations in prime interest rates. The aforementioned elements—which directly affect the level of market activity right now—are covered in further detail in this essay. Gaining a thorough understanding of the index for consumer prices (CPIX) and the way the Bank of Canada manages inflation through the use of a framework for targeting inflation was crucial for this

exam. The purpose of this discussion was to provide a theoretical framework for comprehending the link between macroeconomic conditions and inflation as well as examine how closely related they are. The gathering of this data could aid decision-makers in developing and carrying out monetary and economic policies. Many countries embraced inflation targeting as their main method of implementing monetary policy throughout the 1990s, including New Zealand, Australia, Brazil, Canada, Chile, Mexico, Sweden, and the United Kingdom (van der Merwe, 2004). Despite the fact that South Africa did not officially adopt this policy until February 2000, it had previously been implemented in a formal manner since the 1990s. There were four factors that supported the justification for adopting a formal framework for targeting inflation. In order to enhance the effectiveness of the Reserve Bank, specific aspects must be addressed. Getting a clear understanding of the budget, coordinating monetary policy with other economic policies, increasing transparency, and addressing the inflationary outlook to reduce inflation rates are some of these. The Reserve Bank influences monetary policy in a number of ways, one of which is through alterations to short-term interest rates. In order to maintain inflation within a predetermined range, the Reserve Bank is responsible for determining what it believes to be the appropriate level for interest rates on short-term loans (van der Merwe, 2004). This study's key goals included better understanding South Africa's overall monetary policy framework as well as interest rates and their impact on inflation. South Africa concentrates on the CPIX because it is easy to understand for customers and is sometimes referred to as general inflation in urbanized and other urban areas. Any potential direct effects on prices that variations in the rate at which repurchases are made might have are not taken into account by the CPIX. Regular evaluations of financial instruments are conducted by the Reserve Bank, with input from the government and consideration of the Minister of Finance's remarks on inflation. The Department of Finance's desired inflation level is also considered. Economic expansion is encouraged by lowering interest rates while raising them to combat future inflationary pressures. Understanding the relationship between mortgage rates and stock market indices is essential since changes in interest rates have an influence on inflation and the volatility of the stock market. Increases in short-term interest rates may have a negative effect on stock market returns and indicate rising inflation expectations. Higher interest rates can also increase financing costs and decrease business profitability. It should be noted that importing goods can contribute to inflation in open

economies. Due to a rise in the volume of imported goods, the national currency either changes for the better or worse in comparison to the currencies of trading partners. In comparison to its main commercial partners, like the United States, Europe, and China, South Africa's economy is comparatively open and small.

In order to prevent future inflation, interest rates are frequently increased when a currency's value drops. Egypt's economy is also shown to be small and open in a study by Bahmani and Malixi (1992), which suggests that maintaining a consistent exchange rate is crucial to maintaining price stability and controlling inflation. While the national inflation rate may increase when foreign currency values rise, changes in import costs have little impact on consumer prices in the United States. The Egyptian government has allegedly implemented subsidies to assist low-income residents in coping with inflation.

2.2 Theory of inflation

There are generally three basic categories of inflation theories. No one theory can be regarded as a complete inflation theory since only a few theories is capable of accounting for every important component of the method of price increase. Instead, each theory concentrates on specific aspects of the inflation process. In order to put it into execution, we must determine which factors contribute most significantly to inflation in a given nation and, consequently, which theory—or theories—applies most effectively (Agussalim et al., 2017). 1) The quantity theory, refined by a team of experts at the University of Chicago, is the oldest theory of inflation. Despite its age, it remains helpful in explaining how inflation operates in modern times, particularly in developing countries. In regard to (a) the quantity of currency in existence and (b) the emotional response (hope) of the general public towards the increase in prices, this theory emphasizes the function of the inflation process. 2) the most current theory of inflation is the price level theory, although it relies on expectations. The crux of this thesis can be succinctly stated as follows: Inflation arises when the aggregate money supply expands, be it through tangible cash or demand deposits. Nonetheless, transient price hikes can result from unforeseen crop failures. The inflation rate is contingent upon two principal determinants: the pace at which the money supply burgeons and the psychological outlook of the populace, particularly their anticipations of future price surges. Inflation will end on its own if the sum of cash is not increased, regardless of what caused the price increase in the first place. Raising the quantity of currency is

like pouring "energy" to a flame that is currently burning. The three possible outcomes are listed below. Suppose there needs to be more confidence in the expectation of price hikes shortly. In that case, the primary factor contributing to the surge in the overall money supply will be an expansion of the general public's liquidity. Consequently, the Cash section on the financial records of individuals within society will show an increase. This shows that a sizable portion of the increase in the amount of cash is not going toward buying new stuff. Additionally, this suggests that there won't be a noticeable increase in consumer appetite for goods, which guarantees that there won't be a significant increase in the cost of products (or that prices may only rise little). In such circumstances, the total amount of cash in circulation will increase by 10%, which will be accompanied by price increases of about 1%. This situation frequently occurs before inflation has reached its peak and before society is aware that price inflation is currently at work. The subsequent scenario is a scenario in which humanity begins to recognize that it faces inflation based on the encounters it has had in recent months. People are starting to predict that the cost of expanding the money supply isn't going to be embraced by the public as a means of boosting the flow of money but will instead be utilized to purchase things. This is due to growing public expectations that the value of the list's assets, or the quantity of money in circulation, will rise. People in society do this because they seek to reduce the risk of monetary loss associated with money ownership. Since currency is losing its value as a currency at a steady pace as prices rise, hyperinflation is nothing more but a "tax" on the amount of cash held by the people. By placing their financial savings in physical assets, people try to remain one step ahead of this "tax". By using their money to buy things, people have the power to alter their individual financial statements in this way. This suggests that there would be a general increase in commodity demand, which affects the entire population. The subsequent effect of this is that the prices of such things will go up. If people believe that prices will continue to climb at the same pace that they have seen over the previous several months, an augmentation in the aggregate money supply now in circulation would lead to a corresponding rise the increase in the need for products and services. In the current situation, there will be a corresponding increase in the quantity of commodities with an increase in financial resources. For instance, a 10% rise in quantity will be followed by a concomitant 10% increase in the price of items. This kind of circumstance often arises after inflation has been strong for a significant amount of time and individuals have had sufficient time to adapt their mentalities to

the new circumstances. The third scenario takes place during the hyperinflation stage of the inflationary process, which is the most severe stage. People have lost faith in the value of money as a result of this predicament. The public has a growing aversion to keeping cash on hand and an increasing need to make purchases with it as soon as it is physically available, despite the fact that doing so would be more convenient. Humans have a tendency to anticipate that things will get much worse. According to Assagaf and Ali (2017), the rate of inflation for the next few months is forecast to be even higher than the rate of inflation for the months that came before them. The crucial factor in this scenario is the swift flow of money, commonly referred to as the higher velocity of circulation. It is vital to note that if the total amount of money in circulation increased by twenty per cent, the ensuing price hike would exceed 20%. This type of inflation occurred in Indonesia from 1961 and 1966. Hyperinflation not only destroyed the financial and financial joints of society; it also obliterated the sociocultural joints of society. Over time, the current social structure will disintegrate and be replaced by a new one (Assagaf, A., & Ali, 2017).

2) Keynes' theory of macroeconomics forms the basis of his inflationary theory. This theory provides information on a number of other aspects of inflation. This point of view claims that inflation occurs when a society demands a level of income that is higher than what it can support economically. This viewpoint holds that the inflation process amounts to nothing more than social groups contending for the same quantity of wealth. These social groups want more of the wealth than society can afford to give them. A situation where the community's need for commodities constantly exceeds the amount of items that are delivered to the society (the creation of what is known as the inflationary gap) is the end outcome of this process of conflict. Because some societal segments have been successful in translating their aspirations into actual product demand, the disparity between demand and availability adds to inflation. That means that they were effective in obtaining the money required to turn their objectives into a plan that included buying things that were guaranteed by money. This part of human society might be the federal government itself, which seeks to increase its share of the community's output by running its expenditures on additional money printed by the government. This social class aspires to take home a bigger chunk of the pie. Individual business owners who are seeking to make fresh purchases and need finance from financial institutions to do so may also be included in this group. In order to get a salary increase for its members above what would be justified by an increase in labor productivity; this group may also

assume a type of labor stratification. A gap between the maximum amount of goods that the community can create and the total actual requirement of all those various groups that exist at the current prices is known as an inflationary gap. When demand outstrips supply, the result is higher average prices that you must pay. It is an uncontrollable market fact, and you must be prepared to accept it. It will be impossible to implement some of the tactics that were intended for purchasing things from those organizations due to the increase in price. These organizations will try to raise more money over the coming term (either by issuing new currency, receiving credit from an additional bank, or raising salaries). Obviously, not all of those organizations have been successful in obtaining the necessary additional funds. A larger output share will be more likely to go to organizations that can secure additional funding. The final result will include a smaller percentage of those who are unable to obtain finance. The groups regarded "lost" in the course of struggle are those whose incomes either remain stagnant or do not increase at the same rate as price increases (these groups include older people, civil servants, producers who must sell their crops at the rates imposed for price stabilization of the ankle and workers in companies who do not have unions to represent them or who do not have successful avenues to fight for their enhancement). These are the groups that are regarded as "lost" in the course of conflict. As long as the total functional demands made by all societal segments exceed the entire amount of production that society is capable of producing, inflation will continue to take place. Inflation will terminate if the total effective demand is not greater than the amount of production now offered at the current prices.

Monetarism is a compelling economic theory that highlights the critical role of the money supply in shaping economic outcomes. Proponents, including the esteemed economist Milton Friedman, firmly believe that when it comes to fostering economic stability, monetary policy is more effective than fiscal policy. As per the principles of monetarism, the quantity of money in circulation is a crucial factor, among others, that influences both short-term production and market prices, as well as long-term values. The importance of money's function was heavily emphasized by monetarists. Milton Friedman led the development of the contemporary quantity theory, which states that "the rate of inflation is perpetually and everywhere an economic phenomenon arising from an increasingly rapid increase in the supply of cash than in total output." The basic quantity theory of money provides a tenable explanation for this phenomenon. When discussing structural inflation in economics, the monetarists defended Fisher's

conventional exchange equation. This phrase speaks to the influence of important factors on inflation. Understanding how economic events take place and identifying the underlying causes of persistent problems or unfavorable elements, such as rising prices, are the goals of structural economics. This form of analysis evaluates the phenomenon's connection to the law as well. The increase in supply brought on by structural economic variables is connected to demand-push even when there is a lot of joblessness and manufacturing is unattainable or slow. Less developed nations argue that this is because they have not yet been effective in making structural changes, pushing for rapid self-economic development, or putting up with sometimes very high inflation. Despite the fact that inflation represents a cost associated with rapid economic expansion, it is deemed essential in light of the structural improvements being made. Even among the subset of those who do not advocate for modifying the existing policy framework aimed at eliminating inflation, there is a general acceptance of structuralism. In fact, there is a notable emphasis placed on these structural elements. There is no objection to controlling inflation by government interference in market structure and the adoption of forceful policies for fairly distributing the inflationary burden. It is argued that conventional measures to combat inflation, such as contractionary fiscal and monetary policies, are seen as just addressing the deceleration of economic development in non-developed countries. This objective may also be achieved by the involvement of experts, the implementation of rationing strategies by advanced investing countries and international organizations exerting control, or by understanding the inherent limitations of less developed economies. However, given that this is the case, typical anti-inflation measures amount to little more than a prescription for crippling the economic expansion of non-developing nations. The swifter and quicker rise in the hospitality sector, which is related to people growth and settlement, is another factor contributing to inflation that structuralism emphasizes more. Both of these variables are connected to this growth. In addition to all of these factors, structured thinking from the perspective of inflated social policy structure is unaware of the remainder of the framework of the supply chain, the unique quasi- and structure of some of the advanced sectors, the obstacle structure and the high cost of work, as well as tens of other small and large factors. It is important to acknowledge that the rivalry among different societies for substantial portions of the national revenue is a crucial factor contributing to the occurrence of hidden inflation in advanced investing countries. The structuralism version of this competition has been

shown to be efficacious in engendering instability in underdeveloped nations. Competition becomes more pronounced, especially in the context of fast economic expansion and a rise in the prevalence of social movements. The attempt is made to strengthen power while also changing the wealth distribution through the use of inflation when a new social group obtains access to financial and political activity. This perspective contends that inflation is the manifestation of a shift in social and economic circumstances, and that this shift was made possible by the economy's quick and explosive growth (McCallum, 1987).

2.3 Empirical literature

In order to better understand the connection involving price increases and the amount of money velocity (M1) in the Jordanian economy between 1980 to 2019, Batarseh (2021) has conducted a study. In order to achieve our research objective, we employed a methodology known as macroeconomic retrospective analysis and conducted a series of experiments. Our group evaluated the stability of the variables under consideration using the Augmented Dickey-Fuller (ADF) test. The Johansen co-integration method was used to ascertain the long-term connection between the variables. We also utilized the Granger Causality Test to identify any recent causal connections. More information on these examinations is provided in the following section. Our study findings indicated that although inflation has stabilized, there was initial volatility in the currency supply within M1. However, this was eventually resolved after accounting for the first variation. M1 and inflation do not have any significant long-term causal link. The money supply M1 and the short-term inflation rate are causally related in only one direction, according to our Granger causality analyses. As a result, changes in the money supply, namely M1, may be used to explain oscillations in the Consumer Price Index (CPI) within the Jordanian economy. This observation suggests that changes in the availability of currency influence price levels rather than the reverse causality. Our results highlight the need to keep an eye on the money supply in order to control inflation rates in the Jordanian economy. The paper argues that the Jordanian central bank should have more authority over the currency supply since it significantly influences the equilibrium of the country's aggregate price level. This guidance is offered in an effort to prevent a crisis similar to the one experienced in 1989, which was characterized by a steep decrease in the dinar's value relative compared to other currencies and an increase in prices to 25.6% that year.

Research by Yang and Shafiq (2020) one of the most important issues now affecting emerging nations worldwide has attracted the attention of academics: economic expansion. This research intends to assess the effects of numerous variables, including foreign investment, capital creation, price hikes, cash supply, and trade openness, on the economic growth of Asian nations. The study gathered information from 20 emerging Asian countries between 2007 and 2018 using the Global Development Indicators database. The model used to analyze the data considered long-term effects and robust standard deviation estimation to determine how these predictors affect economic growth rates. According to the data, capital creation, access to cash, trade transparency, and foreign direct investment (FDI) are all directly correlated with economic development. Hyperinflation also hinders the economic growth of Asian countries. For those who are interested in learning more about this subject, such as seasoned entrepreneurs who want to create trade agreements that will strengthen their nation's economy, these insights are important. In related research, Sultana et al. (2018) examined the connection between Bangladesh's money supply and inflation using data from May 2010 to December 2017. Using a mix of co-integration and vertical correction of error modeling (VECM) methodologies, the study revealed no evidence of a short-term causal link between the money supply and inflation. The quantity of money and inflation have a consistent causal relationship, although the money supply has little direct impact on inflation. This suggests that Bangladesh's inflation is under control at the moment. Before making any monetary policy choices, it is crucial to take into account the possible long-term effects of expanding the money supply. The findings recommend that the Bangladesh Monetary Authority carefully weigh the money supply's long-term effects on inflation before making decisions. In the research he conducted, Joshi (2021) investigates the correlation between the monetary supply and inflation within the context of Nepal from both a long-term and short-term perspective. Data have been obtained annually from 1964–1965 to 2018–19 from the National Economic Survey of Nepal in order to establish the connection. The ARDL Limits test is the statistical technique of choice when performing a test of co-integration with inflation as the variable that is dependent and the supply of cash and Indian inflation as the variables that are autonomous for estimating the model. The results indicate that both variables exhibit long-run co-integration, implying the existence of a sustained link over an extended period of time. Furthermore, it was observed that the error correction term exhibited statistical significance ($p = 0.02$) and

had a negative coefficient (0.98). The study's results imply that decision-makers should give priority to managing inflation via the employment of fiscal and monetary policy tools in order to reduce the impact of cash supply on volatility. The rate of inflation should ideally be equal to or higher than the rate of economic growth, and the implementation of an effective anti-inflationary policy will contribute to the sustained prosperity and stability of the nation. For this aim, the Keynesian theory as well as various structural explanations put out by other economists, including Milton Friedman's monetarist concept of inflation, are examined. While doing so, an array of literature related to inflation is reviewed. Inflation occurs after there has been total employment, and when it does, it remains in the semi-inflationary or constriction stage, according to Keynes (1936). The most significant variables that influence the causes of and remedies for prices in rising countries have been politicians, the credibility of policies, and political will. Many countries have tested these inflation control strategies throughout the span of the last few decades. Using a model that combines structural vector autoregression and vector error correction, Moriyama (2008) observed that the real exchange rate and the expansion of the money supply had an 18–24-month lag in their impact on inflation in his research on the state of inflation in Sudan. According to the results of research done in Yemen by Almounsor (2010), that nation's distinct dynamics regarding global pricing, currency rate, and innovation have had an impact on the pattern of inflation there. Found that the nation's prices are significantly under pressure to rise due to the monetary growth caused by borrowing by the government from the banking sector. As a result of their investigation on Pakistani inflation using an econometric model, Khan et al. (2007) came to the result that a variety of factors, including the money supply, have a role in macroeconomics. Similar to this, Vuyyuri and Sethaiah's (2004) study came to the conclusion that India's fiscal shortfalls are the primary driver of inflation. According to 2017 research by Ofori et al., the quantity of currency in circulation and the rate of hyperinflation in Ghana have a long-term relationship. The researchers employed the conventional least squares method to obtain the outcomes of their regression examination. Similar findings were made in Tanzania by Mbongo et al. (2014), who found that studies utilizing ordinary least squares (OLS) and error correction models (ECM) showed a significant impact of currency supply and exchange rate on prices in both the short and long runs. The vector autoregression (VAR) analysis also indicated that previous inflation rates hold significant sway over present inflation in Tanzania. Simwaka et al. (2012) assert that

inflation arises from a combination of finance and supply-side issues, as shown by their later research conducted in Malawi. Another element that significantly more significantly influences the cost-push inflation we observe is the currency rate. The deficit of the government and the monetary supply are co-integrated, according to the research by Narayan et al. (2010). Additionally, the long-term elasticity demonstrates that inflation in Fiji is brought on by both the money supply and the budget supply. Although Nguyen (2015) discovered that having a lot of cash had a significant influence on inflation, the research also pointed to the budget deficit, interest rates, and government expenditure as the key causes of inflation. Yasmin et al.'s (2013) research in Pakistan found that the amount of money in circulation and government borrowing both significantly affect inflation. The completely altered minimum squares method is employed in the study to come to the conclusion, and monthly data are utilized. Researchers have come to the opinion that a number of elements, namely the supply of cash, the rate of exchange, global cost, and deficits in the budget, all have a link to a country's general level of inflation as a result of several studies carried out in a range of countries. The elements that have a significant impact on inflation in Nepal were all considered in account, including the money supply, the index of consumer costs, Indian costs, and real GDP. Chaudhary (2018) conducted a study that identified that the amount of money and pricing in India are the primary determinants of long-term inflation. Based on a study by Acharya (2019), there is a correlation between real wages and M1 and M2. However, it is essential to note that there is no evidence to prove that one causes the other in the short term. The research suggests that there may not be a long-term relationship between LNCPI and LNM2, but a long-term connection exists between limited liquidity and consumer prices. This study seeks to clarify the real nature of the link between the ARDL limits test and the ECM notion after several studies have noted this conundrum. The only subject that will be explored in this phase of the study is how Nepal's money supply affects inflation.

The researchers Cheng and Dewi (2020) look into how money supply, risk rate, and inflation affected the return on investment of equity mutual funds from 2015 to 2017. Purposive sampling is a technique that was used in this study to collect a total of 75 samples, 25 of which were equities obtained from mutual funds annually. The researchers used EViews version 9 to conduct regression analysis in this study. The findings demonstrate a statistically significant positive effect of the risk rate variable, alongside negative impacts of inflation and cash availability, which also carry notable

statistical significance. These results underscore the critical role of macroeconomic factors, including inflation, investment product risk, and the overall money supply, in influencing the performance of stock mutual funds.

Samimi and Jamshidbaygi's (2011) study sought to establish a direct correlation between budget deficits and macroeconomic inflation rates. This research aimed to enhance our comprehension of the correlation between Iran's budget deficit and inflation rate. Quarterly data from 1990 to 2008 were scrutinized in the study, utilizing a concurrent equation model with four structural equations to delve into the relationship between hyperinflation and money supply. The results divulged a noteworthy connection between the budget deficit and monetary variables, culminating in an upsurge in inflation. Our sensitivity analysis provides empirical support for the reliability of the estimated outcomes concerning the definitions of inflation and money supply. The 2012 academic research by Akinbobola examined the relationship in Nigeria between the money supply, the currency rate, and inflation.

The study used secondary data from the International Financial Statistics (IFS) and uncovered a significant inverse relationship between money supply and exchange rate. This correlation ultimately led to inflationary pressures over a prolonged duration. Inflationary pressure can be affected by fluctuations in international prices, disruptions in the supply chain of commodities, and actual production growth, thereby not solely attributed to aggregate demand pressure. Empirical deductions also demonstrate robust feedback mechanisms from long-term disequilibrium to short-term disequilibrium. Nonetheless, a causal relationship can be shown between inflation, the quantity of money in circulation, and the exchange rate in Nigeria. Sola and Peter's (2013) research aimed to determine the connection between the quantity of money in circulation and the inflation rate in Nigeria. The data source used was the CBN Statistical Bulletin, from which secondary data from 1970 to 2008 were extracted. To examine the data, a vector auto-regressive (VAR) model was used. The qualities of the model were investigated via analysis.

The findings showed that the amount of currency in circulation and exchange rates remained steady, while revenue from oil and rate of return remained consistent. The causality test revealed a one-way connection between cash quantity and inflation rate and between interest rate and inflation rate, which applied to both partnership categories. The study specifically looked at the impact of currency circulation and interest rates on inflation and the effect of interest rates on currency circulation. The

current inflation rate is a valuable gauge for assessing the efficacy of government monetary policy

CHAPTER III

3.0 Methodology

3.1 Data

In order to draw meaningful conclusions from the vast majority of research efforts, theoretical comprehension as well as data analysis are required. The researcher who conducted the current study used the exact same methodology as the researcher who conducted the prior study. It was determined that having access to the data center of the World Bank was absolutely necessary in order to get quantitative data relevant to a wide variety of components and parts. The aforementioned endeavor started in 1980 and continued until 2020; it collected data on a yearly basis, ultimately lasting for a total of 41 years before coming to an end. During the allotted time span, the data were collected anywhere between the years 1980 and 2020. It is essential, in order to acquire findings that are more dependable and precise, to conduct an analysis of economic elements such as price rises and the availability of cash over a period of time that is somewhat extended.

3.2 The Factors at Play

When discussing monetary economics, the concept of broad money refers to the whole worth of currency that is not held inside banking institutions. This concept encompasses broad money in its entirety. This consists of demand deposits kept by domestic businesses, with the exception of those connected to the federal government. Deposits for savings held by resident industries other than the central administration, bank deposits, check deposits held by resident industries, and other investments such as documents of deposit and paper for business are examples of these types of investments. The IFS line that's being questioned is one that deals with the idea of wide money. The method by which this indicator is derived underwent a simplification in the month of September of 2012. It is now necessary to multiply the GDP of the current year by the broad money of the current year and then divide the resulting number by the broad money of the current year. It is feasible to estimate the rate of price variations across the whole economy by doing an analysis of the annual growth percentage of the GDP and incorporating the deflator as a gauge of growing prices. In this way, the rate of price fluctuations can be determined. The GDP implicit deflator is the ratio of GDP measured in current local currency to GDP measured in constant local currency. This ratio is calculated using the current local currency. The word "inflation" is used by economists to refer to an increase in the average population's standard of living across an economy. If prices as a whole continue to rise, consumer purchasing power will decrease since each

individual dollar will be worth less. As a consequence, inflation leads to a reduction in consumers' total buying power. The general term for a decrease in the overall level of prices for goods and services is known as deflation. As opposed to inflation, which shows an increase in prices, deflation is defined by a drop in the overall price level. In contrast, inflation implies an increase in prices. Calculating the average percentage change in an all-encompassing price index is normally how inflation is measured, since this is the method that is most often used. This is also the method that is considered to be the most accurate. As a result of the fact that the costs that families have to deal with do not consistently go up, the CPI, which is also referred to as the index of consumer prices, is a statistic that is often employed for the purpose of achieving this aim. The labor cost index is also applied in the process of determining compensation in the United States. There is a lack of consensus in this area as a result of the differing points of view held by economists about the factors that determine inflation. Variations in the existing demand for goods and services, as well as variations in the supply that is available, especially during times of shortage, are the reasons that are stated most commonly for low or reduced levels of inflation. These adjustments in demand come as a result of periods of scarcity. Depending on the level of inflation, the effects of economies may either be beneficial or detrimental to their respective countries. The unfavorable repercussions would include an increase in the potential cost of money holding, uncertainty over incoming inflation that might possibly discourage savings and investments, and scarcity of goods as consumers commence hoarding owing to apprehensions of future price spikes. In the event that there is a quick tendency toward inflation, the prospective cost of maintaining one's financial stability might climb proportionally. The reduction of unemployment, improved flexibility for the Federal Reserve to carry out monetary policy, encouragement of investments and loans over the hoarding of money, and avoidance of the drawbacks associated with deflation are some of the beneficial outcomes that might result from the rigidity of wages for small businesses. The term "foreign direct investment," or "FDI," refers to the aggregate value of investments made with the intention of acquiring a large ownership stake—typically at least 10% of voting shares—in a business that operates inside an economy that is separate from the investor's own. This valuation takes into account many different kinds of capital, including equity capital, capital for long-term investments, capital for short-term investments, and reinvested earnings. This series depicts the net inflows of foreign money into the economy of the country that is reporting them. This

series was created by the Federal Reserve Bank of St. Louis. The difference between fresh investment inflows and disinvestment inflows is what is meant when people talk about "net inflows." In addition to that, the data is organized according to GDP. Statistics on worldwide economies as well as the global balance of payments may be found in the databases that were acquired from the International Monetary Fund. The databases of the World Bank provide detailed information on foreign debt, and both the World Bank and the OECD provide estimates of gross domestic product (GDP). The principal source of statistical data about the balance of payments is the International Monetary Fund, which is more often referred to as the IMF. After that, this data is used as the primary foundation upon which equity flow information is constructed. The data that is already available on foreign direct investment (FDI) is supplemented with staff estimates provided by the World Bank. The projections that are presented in this book were compiled with the use of data obtained from the UNCTAD and other governmental bodies. According to the Balance of Payments Manual published by the International Monetary Fund in 2009, the definition of foreign direct investment (FDI) is comprised of many different components. Some of these components include equity investment, which involves investing in companies that are indirectly influenced or controlled; investments in other businesses; loans (except for certain types of debt); and reverse investment, amongst others. In accordance with the principles of control and influence, the Framework for Direct Investment Relationships lays out the criteria that must be met in order to determine whether or not a direct investment connection may be established as a result of cross-border ownership. A foreign direct investment (FDI) is an investment made in another country with the intention of acquiring significant ownership in or management control over a business located in that country. It is often necessary to construct factories, warehouses, and other long-lasting organizations in a foreign country in order to keep people interested in a particular economic venture. Investors have the option of pursuing a greenfield investment strategy, which entails the construction of new operational infrastructure for a new company to operate in a foreign country; a joint venture investment strategy, which entails working with a foreign partner to create a novel business venture; or a merger and acquisition investment strategy, which entails the purchase of an existing business in a foreign country. According to the standards of the International Monetary Fund, in order for an investment to be designated a foreign direct investment (FDI), it must account for at least 10% of the voting stock.

However, a few countries have even stricter requirements for themselves. The statistical data on direct foreign investment in a country's economy should be able to offer a comprehensive portrayal of the full scope of international investment in that country's economy. Even to this day, a great number of countries are obligated to report their reinvestments, and the classification of long-term loans varies considerably from area to region. The data on foreign direct investment (FDI) includes equity flows for any nation for which there is at least some statistical information available. The use of locally derived funds, which constitute a significant portion of the available investment capital in many developing countries, is not taken into account. It is essential to be aware that non-equity cross-border transactions, such as the transfer of services and goods inside a single company, are not accounted for in the statistical data on foreign direct investment. This is one of the most serious limitations of these statistics. According to the World Bank and other reliable sources, different assessments of global private investment have been produced as a result of differences in the classification of benefits and the procedures used to alter and evaluate data. In addition, variations in debt financing may take place as a consequence of the manner in which certain transaction payments and offshore offers are managed. The real exchange rate is a quantitative tool that may be used to evaluate the relative worth of one currency with respect to the weighted average of numerous other currencies. A second statistic, known as the nominal effective exchange rate, may be arrived at by multiplying the nominal effective exchange rate by either an expenditure deflator or an expenditure index. The result is the nominal effective exchange rate. In order to compute the real, effective exchange rate, the nominal exchange rate index has to be modified to take into account changes in local price or cost signals, in addition to those of specific foreign countries and the Eurozone. This is necessary in order to determine the real, effective exchange rate. The weighted average of exchange rates for a number of nations and the euro zone is used to calculate the nominal effective exchange rate index. This index compares the average exchange rate for one currency during a certain time period to the average exchange rate for all countries combined. After this, the ratio that was just discussed is transformed into a percentage based on the benchmark year of 2010, which is given the value of 100. The majority of a prosperous nation's income comes from its participation in the international trade of manufactured products with other countries that have developed economies. Data collection makes use of the nominal effectiveness rate of the exchange index as well as a cost indicator

that assesses the relative adjusted unit labor costs in the manufacturing industry. In order to calculate the nominal operational exchange rate index, it is important to conduct an analysis of trade volumes, which should include the transfer of manufactured products as well as primary commodities between specific nations. These countries may be involved in cooperative or adversarial interactions with one another. One way to deduce that these countries' domestic currencies have appreciated is by looking at how their real effective exchange rate index has been rising. The nominal index serves as the foundation for this index, and its value is modified so that it accurately reflects changes in consumer prices. In order to reflect the true purchasing power of money that has been borrowed or invested, the nominal interest rate must be adjusted for inflation. The real interest rate is referred to as this in certain circles. When the interest rate on loans is adjusted to take inflation into account as assessed by the GDP deflator, the resulting rate is referred to as the "real interest rate," and it is called the "interest rate" on loans. It is impossible to compare loan rates across countries since the terms and conditions of loans are different in each country. The conditions of loans and deposits, as well as changes in the financial position and standing of lenders and borrowers, are all potential factors that might have a considerable influence on an economy's overall interest rate structure. These several elements, taken together, have an effect on the manner in which interest rates are determined. When it comes to determining interest rates, a number of economies look to governmental or regulatory restrictions. It may be difficult to get reliable information on interest rates that properly represents actual market transactions in countries with unfavorable market conditions or in which reported nominal rates do not line up with real effective rates. This may make it difficult to obtain information on interest rates that accurately reflects actual market transactions. It could be difficult to get your hands on any statistics on current interest rates. Data on interest rates on loans and deposits is gathered by the International Monetary Fund (IMF), which then acts as a proxy for the interest rates that regional banks offer their customers. This approach is used in order to ensure that a diverse sample is accurately represented. It is difficult to compare these rates across nations since they are based on distinct concepts and are influenced by a variety of different conditions. When calculating actual interest rates, the nominal interest rates are first adjusted down in order to resemble the current economic inflation rate. This is done in order to ensure that the rates remain comparable. When the real interest rate falls below zero, it indicates that the value of the principal amount will gradually

decrease over time. In order to determine interest rates, an equation known as $(I \text{ minus } P) / (1 \text{ plus } P)$ is used. In the equation that was just presented, the letters "I" and "P" stand for the current interest rate on loans and the inflation rate, respectively. Both of these rates are determined by the GDP deflator. 2009 marked the beginning of the International Monetary Fund's (IMF) use of a new format for the presentation of monetary statistics. The main audience that this format was intended for consisted of the nations that reported their data in conformity with the Monetary and Financial Statistical Manual 2000. The freshly crafted presentation has been developed specifically for use by multinational organizations as its target audience. When it comes to nations that provide their statistical data in accordance with the Standards for International Financial Statistics (IFS), the structural integrity does not alter.

Variables Description

| <i>#</i> | <i>Variables</i> | <i>Abbreviation</i> | <i>Measurement</i> | <i>Source</i> |
|----------|---|---------------------|--------------------|-------------------|
| 1 | <i>Foreign direct investment, net inflows</i> | <i>FDI</i> | <i>(% of GDP)</i> | <i>World Bank</i> |
| 2 | <i>Inflation</i> | <i>INF</i> | <i>(of GDP%)</i> | <i>World Bank</i> |
| 3 | <i>Real exchange rate</i> | <i>REER</i> | <i>(2010=100)</i> | <i>World Bank</i> |
| 4 | <i>Broad money growth</i> | <i>BM</i> | <i>(annual %)</i> | <i>World Bank</i> |
| 5 | <i>Real interest rate</i> | <i>RIR</i> | <i>(%)</i> | <i>World Bank</i> |

Model specification

According to MacCallum's (1995) definition, model specification involves determining which variables should be included in a model. There must be a balance between preserving statistical power and adding all relevant factors, however. In statistical analysis, choosing the right model is essential since the wrong choice might result in findings that are inaccurate due to specification mistakes. The model used by researchers must mathematically depict the connection between the independent factors and the variable under investigation. Even though there are many variables in

most research investigations, only a few of them are finally included in the model. Only factors that really have an impact on the examined variable are included; analysts work hard to exclude extraneous variables that do not connect with the dependent variable. During the "specification" stage of the project, analysts experiment extensively with different combinations of variables and model types. In order to analyse the influence of inflation on the expansion of broad money, a comprehensive econometric model was developed, as elaborated in the following sections. Numerous independent factors, such as interest rates, inflation rates, foreign direct investment rates, and trade, are often incorporated into economic research. On the other hand, economic growth is seen as a variable that depends on other elements. The model in issue, which is the current thing under investigation, displays the following visual traits:

$$BM_t = \beta_0 + \beta_1 INF_t + \beta_2 FDI_t + \beta_3 REER_t + \beta_4 RIR_t + \varepsilon_t$$

Whereas: BM is broad money

INF is inflation

FDI is foreign direct investment

REER is real effective

RIR is real interest rate

β is the coefficient of the independent variables

t is the time interval

Descriptive statistic

The term "descriptive statistics" refers to statistical techniques that clarify, explain, and summarize the key characteristics of a data collection that may be discovered during a specific research project. The statistics above are presented in a concise summary that effectively encapsulates the sample's information and corresponding measurements. As a consequence, the analysts are capable of more effectively interpreting the data. Descriptive statistics depict the available data sample without incorporating hypotheses, decisions, probabilities, or conclusions. The term "descriptive statistics" refers to brief and illuminating measurements illustrating a specific dataset, which may represent the whole population or only a portion of it. Defining terms for descriptive statistics include "descriptive data" and "descriptive indices. Two key elements make up descriptive statistics: measures of pronounced trends and variation measurements, sometimes known as spread. The markers of the

center of gravity are often known as the mean, median, and mode. But the mean, standard deviation, variance, highest and lowest values, kurtosis, and skewness are often acknowledged as indications of variability.

Unit root tests

The researchers Dickey and Fuller (1979) developed specialized software to evaluate their hypothesis following their research efforts. The program employs a criterion to determine the presence of a unit root or previous random walk in a given variable. A judgment is then rendered based on this criterion. The combination of these two entities is commonly denoted as the unit root in academic literature. Hamilton (1994) proposes four separate programs for the modified Dickey-Fuller test as a means of showcasing its utility and pertinence. These software tools can be utilized to ascertain the significance of a particular variable. In the event that one of the null hypotheses that are presented is accurate, it can be concluded that the variable under consideration will possess a minimum of one unit root, regardless of the validity of the remaining null hypotheses. The veracity of the other assumptions notwithstanding, this assertion remains universally applicable. The two strategies exhibit significant dissimilarities from each other in various crucial aspects. One of the most notable distinctions between the two methodologies pertains to the inclusion or exclusion of a drifting term in the null assumption. Upon implementing the initial technique, the evaluation entails ascertaining the presence of a uniform search and a repetitive structure. In the event of utilizing the subsequent strategy, the statistical examination is accompanied by the regression analysis that was executed. These two issues have a connection to the subsequent method that was discussed. A noteworthy differentiation between the testing approach under consideration and the Dickey-Fuller test, which is fundamentally analogous, pertains to the sequencing of the simulation and data recording stages. Specifically, the Dickey-Fuller test involves a preliminary simulation phase followed by the recording of results, whereas the former test entails the recording of data prior to the simulation phase. Peter C. B. Phillips and Pierre Perron developed the Phillips-Perron test, a statistical method for carrying out unit root testing, and the Dickey-Fuller test employs a comparable assessment approach. Its goal is to look into the null hypothesis, which holds that a certain time series is not sequentially integrated, within the context of time series analysis.

ARDL model

The Pesaran et al. (2001) technique of autoregressive distributed lag (ARDL) has been widely used in academic investigations. The strategy was used throughout the investigation. In econometric modeling, the autoregressive distributed lag (ARDL) model is often cited as being preferable to alternative models, particularly when the variables under study exhibit either stationary behavior at I (0) or linked behavior at I (1). The justification for using the autoregressive distributed lag (ARDL) model lies in its capacity to include the effects of both fixed and integrated variables. Depending on the objectives of the investigation, this particular model shows a higher degree of efficacy in capturing the short- and long-term effects of independent variables on output. In particular, when dealing with a confined sample size, the ARDL approach is suggested as an appropriate tool for evaluating both short-run and long-run demand elasticity. The ordinary least squares (OLS) technique is employed in this study's methodology to check for co-integration among the variables. The flexibility of the autoregressive distributed lag (ARDL) model is improved by its ability to change the order in which variables are integrated at any point during the modeling process. It may be assumed that the model shows the following features if it is established that the independent variable in the model has characteristics of either I (0), I (1), or shared co-integration. Frimpong and Oteng (2006) claim that ARDL performs very well. In situations where any of the elements include I(2), it cannot be used. The resulting model was created to clarify the nature of the relationship between dependent and independent variables.

ARDL Model equation

$$\begin{aligned}
 \Delta \ln BM_t = & \alpha_0 + \beta_1 \ln BM_{t-1} + \beta_2 \ln INF_{t-1} + \beta_3 \ln FDI_{t-1} + \beta_4 \ln REER_{t-1} \\
 & + \beta_5 \ln RIR_{t-1} + \sum_{i=0}^q \Delta \alpha_1 \ln BM_{t-k} + \sum_{i=0}^p \Delta \alpha_2 \ln INF_{t-k} \\
 & + \sum_{i=0}^p \Delta \alpha_3 \ln FDI_{t-k} + \sum_{i=0}^p \Delta \alpha_4 \ln REER_{t-k} + \sum_{i=0}^p \Delta \alpha_5 \ln RIR_{t-k} \\
 & + \varepsilon_t
 \end{aligned}$$

ECT Model equation

$$\Delta BM_t = \alpha_0 + \sum_{i=0}^q \Delta\beta_1 InBM_{t-k} + \sum_{i=0}^p \Delta\beta_2 InINF_{t-k} + \sum_{i=0}^p \Delta\beta_3 InFDI_{t-k} \\ + \sum_{i=0}^p \Delta\beta_4 InREER_{t-k} + \sum_{i=0}^p \Delta\beta_5 InRIR_{t-k} + \lambda ECM_{t-1} S + \varepsilon_t$$

ARDL bound test

The univariate equilibrium correction system employs stationary bound testing, which is a modeling technique similar to autoregressive distributed lag (ARDL), to evaluate the relevance of lagging measurements for system variables. This is done by comparing the initial levels of the variables to the later levels. This is due to the fact that it is not yet understood whether or not the technique of data collection used to generate a time series may be utilized to discover patterns or initial differences. Because of this, one cannot be confident in anything. Haug (2002) suggests that the ARDL limit testing technique yields more favorable outcomes and is better suited for smaller sample sizes compared to bigger ones. In addition, it provides better findings with a smaller sample size. This is possibly the most significant point that he is making in his argument. It is plain to see that an ARDL model is being used in this scenario. To put it another way, the ARDL model does not dynamically adapt to any of the several levels it encompasses. Co-integration can help explain the relationship between different series with varying numbers of unit roots. The ARDL model, developed by Shin, Peseran, and Peseran Smith, considers $I(0)$ in the level values, $I(1)$ in the initial differences, and the level values themselves. The model addresses short-term and long-term connections when dealing with value-first difference scenarios, with short-term links being discussed first, followed by long-term connections. Given the complexity of the model and the numerous variables involved, a formulation of the period conditions derived from the model is computed while operating within the parameters of the error correction mechanism (Esen et al., 2012). This approach ensures that short-term and long-term features are estimated concurrently, resulting in a more precise procedure.

Residual diagnostic tests

The association between Breusch and Godfrey in this thesis was investigated using a residual test. The test statistic for the LM test was developed by examining the residuals generated during a regression analysis, which was used to determine if there was autocorrelation in the errors of the regression model. The present model is being examined, and the null hypothesis presupposes that there is no serial connection up to rank p . Autoregressive conditional heteroscedasticity (ARCH) models and autoregressive distributed lag (ARDL) models are used to show correctly how financial data series change over time, such as economic growth.

However, ARDL models might erroneously assume volatility clustering, in which the variance of the current error term correlates with the magnitude of the preceding error terms. The likelihood that a random variable linked to another variable follows a normal distribution may be estimated using normality tests, which are often used to assess whether a dataset can be represented using a normal distribution. The accuracy with which a random variable may be described by a normal distribution, as well as the relationship between a random variable and another variable, may also be evaluated using normality tests.

Granger causality test

In the framework of G-causality, the consequences resulting from causes can be anticipated. This is predicated on the idea that causes are predictable and occur before their consequences. The value of g-causality rests in its capacity to forecast the results of causal factors. Except when otherwise noted, the causes occur before the related effects. Norbert Wiener first proposed the idea, and econometrician Clive Granger subsequently used it to analyze random time series data using linear vector autoregressive (VAR) models. Since then, this approach has seen significant expansions and improvements thanks to John Geweke and other scholars. The goal of VAR models is to describe the value of a variable at a certain moment.

They use linear weighting to incorporate past data points and historical values of additional variables. To accurately fit a VAR model, it is crucial to ascertain the suitable weights to use to minimize the probability of producing inaccurate estimations. In the given context, "G-caused" describes a relationship between two variables, X and Y. The historical data of variable X contains valuable information for predicting the future outcomes of variable Y. This predictive value is in addition to

any information already available from past occurrences of variable Y and any other relevant conditioning variables Z. Completing this aim in a given environment may be understood as the occurrence of "information flow" between sites X and Y. The direction of this flow should be reversed. According to Barnett et al. (2009), using G-causality to measure transmitted entropy is justifiable. This application uses a modified version of Shannon's similarity measure to assess the comparability level between two data sets. The Shannon similarity measure assesses the degree to which two variables are statistically linked to one another or the amount of information they share.

Stability test

Dealing with nonlinear models can pose challenges, particularly regarding parameter instability. Saliminezhad et al.'s (2018) study emphasizes the importance of examining the coherence of the figure model to ensure accurate conclusions. Brown et al.'s (1975) sum of squares measurement tool is employed to achieve this, with the model's coherence regularly verified during estimation. The researcher is responsible for selecting the significance level for the post-estimation test, per Hansen's (2000) guidelines. Cusum tests are used in multiple linear regression analyses to evaluate the consistency of the outcomes. Cumulative sums of recursive residuals and cumulative sums of squares of recursive residuals are used to do calculations and draw conclusions. It is common practice to build recursive residuals—also known as standardized one-step-ahead prediction errors—from nested data sub-samples. If values are outside of the sequence's predicted range, the null hypothesis, which suggests unaltered parameters, is refuted. The preceding assumption of constant parameters is called into question by this observation, which shows that the model's design has evolved over time. According to Pesaran and Pesaran's (1997) study, the stability of parameters is assessed using the cumulative sum of squares (CUSUMSQ) and the cumulative sum of recursive residuals (CUSUM) tests. While the cumulative sum of squares test suggests quick changes in regression coefficients, the cumulative sum test reveals a predictable pattern of change in regression coefficients.

CHAPTER IV

4.0 Results and interpretation

4.1 Descriptive statistic

Descriptive statistics refer to statistical methods that elucidate, illustrate, and synopsise the fundamental characteristics of a set of data that may be revealed in a particular research undertaking. The term "descriptive characterizations" is commonly used to refer to these statistical measures. The aforementioned statistical data is presented in a concise summary that offers a comprehensive outline of the sample data and the corresponding measures. Consequently, the analysts have enhanced their ability to comprehend the data. Basic descriptive statistics offer an overview of the available data sample. Nevertheless, the aforementioned statistics are devoid of any suppositions, evaluations, likelihoods, or deductions. Descriptive statistics include succinct and pragmatic metrics used to portray a certain dataset, which may comprise either a sample or an illustration of an entire community. Descriptive statistics may function as a means of representing either the overall population or a specific subset of the population.

Table 4.1 Descriptive statistic

| Variables | FDI | INF | REER | RIR | BM |
|--------------------|---------------|---------------|-----------------|---------------|---------------|
| Mean | 1.059 | 8.539 | 108.93 | 4.086 | 13.051 |
| Median | 0.519 | 7.047 | 104.01 | 4.099 | 13.429 |
| Maximum | 9.855 | 18.654 | 181.35 | 12.691 | 27.015 |
| Minimum | -0.702 | -0.692 | 70.679 | -11.00 | 1.761 |
| Std.Dve | 1.764 | 4.659 | 29.12 | 3.988 | 6.379 |
| Skewness | 3.385 | 0.404 | 0.801 | -0.896 | 0.204 |
| Kurtosis | 16.438 | 2.159 | 2.980 | 6.747 | 2.053 |
| | | | | | |
| Jarque-Bera | 396.2 | 2.387 | 4.495 | 30.207 | 1.859 |
| Probability | 0.000 | 0.303 | 0.105 | 0.000 | 0.394 |
| | | | | | |
| Sum | 44.500 | 358.66 | 4575.2 | 171.6 | 548.1 |
| Sum sq. Dev | 127.7 | 890.1 | 34783.02 | 652.2 | 1668.5 |
| Observation | 42 | 42 | 42 | 42 | 42 |

We have analyzed levels of foreign direct investment and broad money through our investigation. The mean foreign natural investment level is 1.059, with a maximum of 9.855. The mean general money level is 13.051, with a maximum of 27.015. Our findings reveal that the actual exchange rate boasts the most impressive mean and maximum values, with figures of 108.93 and 181.35.

As indicated by skewness, data symmetry can be inferred based on values between -0.5 and 0.5. Significant skewness is present if the skewness value falls within -1 to -0.5 or 0.5 to 1. A skewness value less than -1 or more than 1 indicates considerable skewness. Given that the skewness of a normal distribution is zero, a symmetrical distribution should have a skewness value that is quite near zero. Positive skewness suggests right skewness, while negative skewness suggests left skewness. In contrast to a "right skew," which shows that the right seat is proportionally more prominent than the left tail, a "skewed left" distribution has a left tail that is much bigger than the right tail. Whether or not there is multimodality in the data will affect the skewness sign.

4.2 Unit root tests

When conducting null hypothesis testing, deciding whether to include or exclude a drifting term is essential. This choice distinguishes two methods. The first method involves detecting a uniform exploration and a recurrent model, followed by statistical examination through regression analysis. The second method identifies the presence or absence of a coherent search process and a repetitive structure. These concerns are interrelated with the second approach discussed. The Dickey-Fuller test, which uses a technique similar to this testing strategy, differs from it in that it is simulated and recorded. At the same time, the preceding examination records data first and then executes the simulation. Replicating the Dickey-Fuller test before recording outcomes distinguishes it from other testing procedures that use a similar approach. The test is known as the Phillips-Perron test after Peter C. B. Phillips and Pierre Perron, who determine if the null hypothesis is valid. This unit root test is commonly used in statistics and tests whether a time parallel has been incorporated out of order.

Table 4.2 unit root test

| <i>Tests</i> | <i>ADF unit root test</i> | | | <i>PP unit root test</i> | | |
|--------------|---------------------------|--------------------------------------|--------------|--------------------------|--------------------------------------|--------------|
| | <i>Level</i> | <i>1st difference</i> | <i>Order</i> | <i>Level</i> | <i>1st difference</i> | <i>Order</i> |
| <i>BM</i> | <i>0.8208</i> | <i>0.0274</i> | <i>I(1)</i> | <i>0.009</i> | <i>-0-</i> | <i>I(0)</i> |
| <i>FDI</i> | <i>0.848</i> | <i>0.001</i> | <i>I(1)</i> | <i>0.087</i> | <i>0.000</i> | <i>I(1)</i> |
| <i>INF</i> | <i>0.541</i> | <i>0.000</i> | <i>I(1)</i> | <i>0.557</i> | <i>0.000</i> | <i>I(1)</i> |
| <i>REER</i> | <i>0.803</i> | <i>0.000</i> | <i>I(1)</i> | <i>0.382</i> | <i>0.000</i> | <i>I(1)</i> |
| <i>RIR</i> | <i>0.540</i> | <i>0.000</i> | <i>I(1)</i> | <i>0.000</i> | <i>-0-</i> | <i>I(0)</i> |

When the ADF unit root test is performed on the data in Table 4.1, it is clear that all variables exhibit stationarity at the first difference. But the PP unit root test shows that wide money and the actual interest rate are stationary at the level, while foreign direct investment, inflation, and the real effective exchange rate are stationary at the first difference between the five variables.

4.3 ARDL Bound Test

The method employed to ascertain the significance of higher-order variables in a single-variate equilibrium correction system is stationary bound testing, which is a modeling technique akin to ARDL. Initially, the baseline levels of the parameters are contrasted with the afterward values of said variables. The reason for this uncertainty lies in the unknown potential of the data collection method employed in constructing a time series to reveal patterns or initial disparities. The cause of this phenomenon is presently unidentified. Consequently, the absence of a foundation renders any possibility of assurance or trust in any matter implausible. Haug (2002) suggests that utilizing the ARDL restrict testing technique yields superior and dependable results, mainly when using a smaller sample size instead of a larger one. This is because a smaller sample size enhances the likelihood of identifying minute variations within the population while maintaining excellent outcomes despite the reduced sample size.

Table 4.3 ARDL bound test

| <i>Model</i> | <i>Lag.</i> | <i>F-Statistic</i> | <i>Decision</i> |
|--------------------------------|------------------------|--------------------|-----------------------------|
| <i>BM, FDI, INF, REER, RIR</i> | <i>(3, 4, 4, 4, 1)</i> | <i>6.604053***</i> | <i>Co-Integration Exist</i> |
| <i>Bound Value</i> | <i>Critical</i> | | |
| | | <i>I(0)</i> | <i>I(1)</i> |
| <i>Sign.</i> | <i>10%</i> | <i>2.2</i> | <i>3.09</i> |
| | <i>5%</i> | <i>2.56</i> | <i>3.49</i> |
| | <i>2.5%</i> | <i>2.88</i> | <i>3.87</i> |
| | <i>1%</i> | <i>3.29</i> | <i>4.37</i> |

The ARDL bounds test with delayed levels (s) is a variant of the ARDL bounds test used to examine co-integration. The test above entails doing an F-test on the lagged levels of the independent variable within the framework of the autoregressive distributed lag (ARDL) equation. The investigation results did not provide sufficient evidence to support the null hypothesis (namely, the period from 1980 to 2021) when assessed with a significance level of 5%. At the given significance levels, the F-statistics, with a cumulative value of 6.604053, exhibited statistical significance over the critical threshold of 4.37. When the value of the F-statistic exceeds the higher critical point, the null hypothesis, which states that there is no co-integration, is rejected. Conversely, the null hypothesis is accepted if the F-statistic falls below the lower critical threshold. In light of these conditions, a co-integration connection is likely present.

4.4 ARDL LONG RUN

Table 4.4 ARDL long run test

| <i>Variables</i> | <i>ARDL Long run</i> | | | |
|------------------|----------------------|------------------|--------------------|----------------|
| | <i>Coef.</i> | <i>Std.error</i> | <i>t-statistic</i> | <i>P value</i> |
| <i>BM</i> | <i>-0.569</i> | <i>0.214</i> | <i>-2.650</i> | <i>0.016</i> |
| <i>FDI</i> | <i>3.370</i> | <i>1.349</i> | <i>2.498</i> | <i>0.023</i> |
| <i>INF</i> | <i>-1.248</i> | <i>0.398</i> | <i>-3.130</i> | <i>0.006</i> |
| <i>REER</i> | <i>-0.427</i> | <i>0.096</i> | <i>-4.418</i> | <i>0.000</i> |
| <i>RIR</i> | <i>0.050</i> | <i>0.353</i> | <i>0.141</i> | <i>0.889</i> |
| <i>C</i> | <i>7.330</i> | <i>5.846</i> | <i>1.253</i> | <i>0.226</i> |

The findings of the ARDL long-run test are presented in Table 4.4, which shows a significant and inverse relationship between inflation and the quantity of money in South Africa. Amassoma et al. (2018) researched the relationship between money supply and inflation in Nigeria and found results that support this assertion. Their study aimed to examine the factors contributing to the significant increase in inflation in Nigeria, which negatively affects the quality of life of its people. The research was motivated by a desire to satisfy intellectual curiosity. They analyzed the variables using a co-integration test and an error correction approach on annual time series data from 1970 to 2016. The aim was to determine the variables' enduring and immediate dynamic relationships. The research results indicate that the money supply has no significant influence on inflation, regardless of the time frame considered, which may be due to the current economic downturn experienced by the country. The error correction model has a negative sign, indicating its considerable nature and around 21% of errors are corrected annually. The Granger causality analysis results suggest no statistically significant relationship between the quantity of money in circulation and inflation in Nigeria during the examined time frame.

Similarly, inflation did not significantly impact the amount of money in circulation over the same period. The research highlights that Nigeria is influenced by several unique economic variables that substantially affect the determination of inflation levels. Based on the study results, it is recommended that the government take measures to enhance financial variety and reduce dependence on imported commodities by promoting local production and service supply. It is also noteworthy that foreign direct investment has a favorable and substantial influence on the money supply.

4.5 ARDL SHORT RUN

Table 4.5 ARDL short run

| <i>Variables</i> | <i>ARDL Short run</i> | | | |
|------------------|-----------------------|-----------------------|-------------------------|----------------|
| | <i>Coef.</i> | <i>Std.err or</i> | <i>t- statistic</i> | <i>P value</i> |
| <i>BM</i> | 0.308 | 0.131 | 2.344 | 0.028 |
| <i>FDI</i> | 1.828 | 0.777 | 2.351 | 0.028 |
| <i>INF</i> | -0.592 | 0.364 | -1.626 | 0.118 |
| <i>RIR</i> | 0.059 | 0.236 | 0.251 | 0.804 |
| <i>ECM</i> | -0.449 | 0.104 | -4.302 | 0.000 |

The results of the short-run ARDL test are presented in Table 4.5, showing a significant negative impact of inflation on the availability of money in South Africa within a limited time frame. Amassoma et al. (2018) surveyed the effect of money supply on inflation in Nigeria, which supports their claim of a similar outcome. Their main objective was to investigate the factors contributing to the rising inflation rate in Nigeria, which negatively impacts the population's well-being. The study used a cointegration test and error correction methodology to analyze the variables on yearly time series data from 1970 to 2016. The study's objective was to determine the dynamic relationships among the variables studied in the short-term and long-term, using a time series dataset spanning from 1970 to 2016. The results indicate that the quantity of money in circulation does not significantly influence inflation, regardless of the time frame considered. This phenomenon may be attributed to the ongoing economic slump in the country. The error correction model has a negative sign, indicating its significant nature, with about 21% of mistakes being identified annually and corrected. Granger causality analysis shows no statistically significant relationship between the amount of money in circulation in Nigeria over the specified period and the inflation rate. Based on the study's conclusions, several economic variables influence Nigeria's inflation rate, each playing a substantial part in the overall equation. It recommends that the government improve economic diversity and minimize dependency on foreign commodities by strengthening domestic manufacturing and increasing the supply of household services, which should be accomplished through increasing financial variety. On the other hand, foreign direct investment positively and substantially impacts the quantity of money in circulation. The error correction model value in the table shows a transition rate of 44% from the short-term to the long-term.

4.6 Residual diagnostic tests

A diagnostic method for determining if autocorrelation exists in the residuals produced by a regression model is the Lagrange Multiplier (LM) test. Investigating a linear connection between the mistakes is one such way. Regression analysis uses the residuals generated by the current model being studied to gather test data. The present model is still being researched. There is no statistically significant connection within the defined rank according to the commonly accepted null hypothesis. Time-varying financial data series, such as economic growth, are often properly represented using

autoregressive conditional heteroskedasticity (ARCH) models. To do this, ARDL models are used. Accepting the incorrect premise in ARDL models that the size of the current error term's variance is related to the size of preceding error terms may lead to volatility clustering. Results from the models may need to be more precise because of this issue. Testing for normality determines how likely it is that a random variable connected to another variable will follow a normal distribution.

Normality tests are used to assess the appropriateness of a normal distribution for effectively representing a specific dataset. Normality tests serve the purpose of ascertaining the suitability of a normal distribution in accurately representing a given dataset.

Furthermore, normality tests can be employed to evaluate the suitability of a normal distribution in effectively describing a random variable. The process can be accomplished by comparing the test outcomes with a standard distribution. Assessing the potential correlation between a stochastic variable and another may encompass applying normality tests.

Table 4.6 residual tests

| <i>Tests</i> | <i>Statistic</i> | <i>P value</i> | <i>Results interpretation</i> |
|---------------------------|------------------|----------------|-------------------------------|
| <i>Serial correlation</i> | <i>0.710</i> | <i>0.1932</i> | <i>No serial correlation</i> |
| <i>Normality</i> | <i>2.8256</i> | <i>0.2434</i> | <i>Normal distribution</i> |
| <i>Heteroskedasticity</i> | <i>0.2370</i> | <i>0.9898</i> | <i>No Heteroskedasticity</i> |

The LM test is a valuable tool that helps to identify autocorrelation in a regression model's residuals. One way to conduct this test is by examining linear associations among the errors present in the residuals. By analyzing the residuals of the current model, we can determine whether there is a significant association within the designated rank. ARDL and ARCH models are often used to correctly depict time-varying financial data, such as economic development. However, accepting a flawed assumption in ARDL models can result in volatility clustering, leading to imprecise model outcomes. Normality tests evaluate whether a random variable follows a normal distribution and can help determine if a normal distribution accurately represents a specific dataset or variable. Potential correlations between a stochastic variable and another can be evaluated by comparing test outcomes with a standard distribution.

4.7 Granger causality

The idea behind G-causality is that causes precede their effects and can be predicted, allowing us to determine the outcomes that result from various reasons. By anticipating the consequences of causes, G-causality confirms that the factors that precede a phenomenon cause its effects. In order to put this idea into reality, Clive Granger created linear vector autoregressive (VAR) models for stochastic time series data in 1969. Further enhancements were made to these mathematical models by Geweke and others, resulting in regression frameworks or vector autoregressions (VARs) that explain the present value of a parameter as a linear combination of past data observations and additional variable values. The LM test is a valuable tool for detecting autocorrelation in a regression model's residuals by assessing linear associations among the errors present in the residuals. Commonly used to depict time-varying financial data, such as economic development, are the ARDL and ARCH models.

However, accepting a flawed assumption in ARDL models can lead to imprecise model outcomes due to volatility clustering. Normality tests assess whether a random variable follows a normal distribution, helping to determine if a normal distribution accurately represents a specific dataset or variable. Comparing test outcomes with a standard distribution can evaluate potential correlations between a stochastic variable and another.

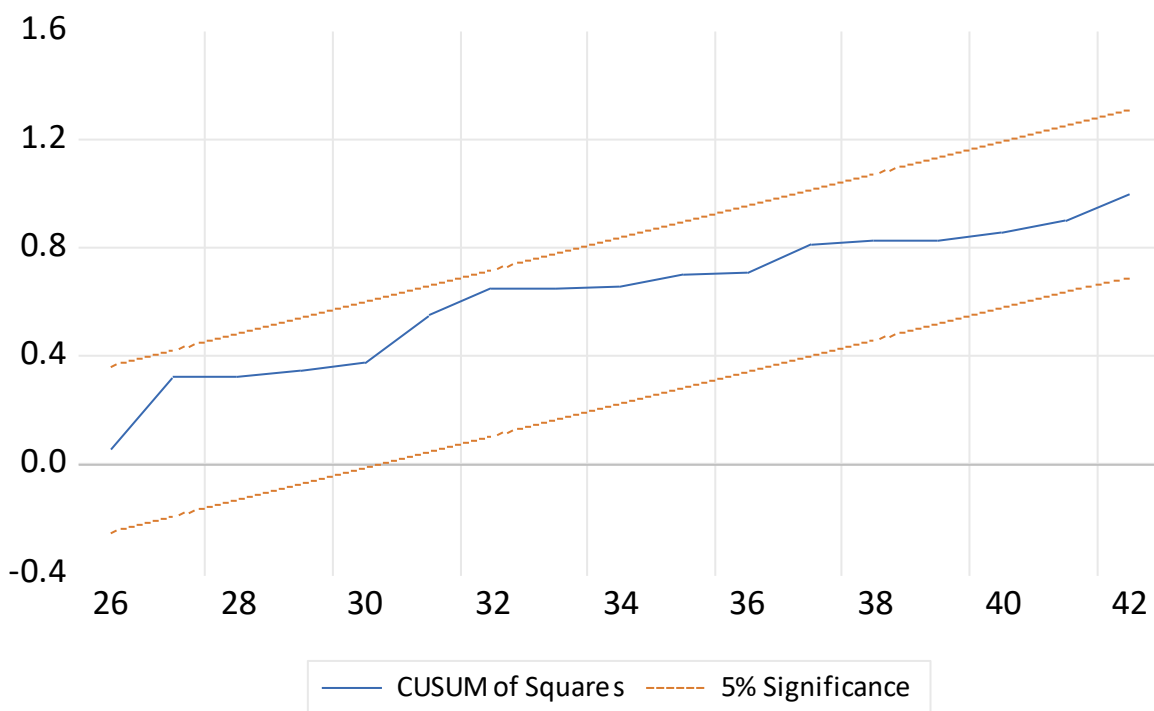
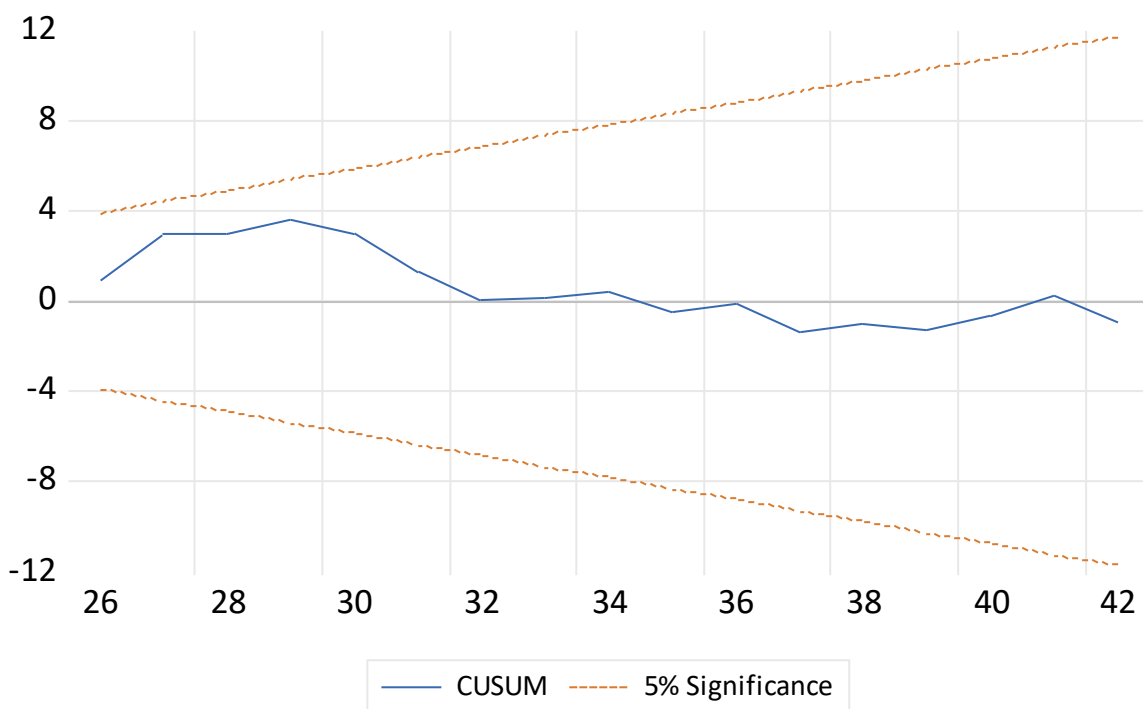
Table 4.7 Granger causality

| <i>Null Hypothesis:</i> | <i>Obs</i> | <i>F-Statistic</i> | <i>Prob.</i> |
|--|------------|--------------------|--------------|
| <i>INF does not Granger Cause FDI</i> | 40 | 4.18286 | 0.0235* |
| <i>FDI does not Granger Cause INF</i> | | 3.81345 | 0.0317* |
| <i>REER does not Granger Cause FDI</i> | 40 | 2.50175 | 0.0965 |
| <i>FDI does not Granger Cause REER</i> | | 1.90611 | 0.1638 |
| <i>RIR does not Granger Cause FDI</i> | 40 | 1.16861 | 0.3226 |
| <i>FDI does not Granger Cause RIR</i> | | 0.38657 | 0.6822 |

| | | | |
|--|----|---------|---------|
| <i>BM does not Granger Cause FDI</i> | 40 | 0.57862 | 0.5031 |
| <i>FDI does not Granger Cause BM</i> | | 1.33349 | 0.9867 |
| <i>REER does not Granger Cause INF</i> | 40 | 10.4665 | 0.0003* |
| <i>INF does not Granger Cause REER</i> | | 6.19858 | 0.0050* |
| <i>RIR does not Granger Cause INF</i> | 40 | 0.31015 | 0.7353 |
| <i>INF does not Granger Cause RIR</i> | | 0.39399 | 0.6773 |
| <i>BM does not Granger Cause INF</i> | 40 | 5.12482 | 0.0112* |
| <i>INF does not Granger Cause BM</i> | | 2.91028 | 0.0677 |
| <i>RIR does not Granger Cause REER</i> | 40 | 1.29320 | 0.2876 |
| <i>REER does not Granger Cause RIR</i> | | 4.23881 | 0.0225* |
| <i>BM does not Granger Cause REER</i> | 40 | 3.92905 | 0.0289* |
| <i>REER does not Granger Cause BM</i> | | 2.18767 | 0.1273 |
| <i>BM does not Granger Cause RIR</i> | 40 | 0.57361 | 0.1138 |
| <i>RIR does not Granger Cause BM</i> | | 1.75957 | 0.1870 |

As per the findings in Table 4.7, the Granger causality test indicates a strong link between foreign direct investment and inflation. These factors are significant causes of one another at a 5% level of importance. The study further reveals that the real effective exchange rate and inflation are also major Granger causes of each other. Furthermore, the research shows that broad money grangers cause inflation, while inflation causes broad money grangers. The interest rate is primarily influenced by the real exchange rate, with interest playing a secondary role in driving it. Lastly, a general money market can result in a genuine exchange rate, whereas a real exchange rate can have the opposite effect.

4.8 Stability tests



It is essential to demonstrate the stability of parameters through empirical evidence, which the null hypothesis assumes, to prove the alternative hypothesis. The exercise emphasizes the significance of the blue line remaining within the boundaries established by the red line consistently. However, this can be problematic as we assume that residual variances remain constant instead of fluctuating, leading us to

accept the null hypothesis while rejecting the alternative idea mistakenly. This bias may be due to our preference for the accuracy of the null hypothesis

To address this issue, Bahmani and Chomsisengphet (2002) conducted a study to evaluate the residual variance's stability about the ARDL model's long-term coefficient and the short-term dynamics of variables such as foreign direct investment, the stock market, and economic growth. They used the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares (CUSUMQ) techniques, which refer to two measurements. The purpose was to compare the long-term coefficient's enduring stability with the variables' transient dynamics.

According to the null hypothesis of the error correction model, all error correction coefficients will be assumed to remain unchanged within a confidence interval of 5%. However, some coefficients may change. If any lines cross at a significance level of 5%, it can be inferred that the null hypothesis of consistent coefficients has no support. This phenomenon is denoted as 5%. To ensure the validity of the CUSUM and CUSUMQ data plots, it is essential to adhere to the significant constraints shown in the figure above. This will ensure no changes in the inflation coefficient over an extended period.

CHAPTER V

5.0 SUMMARY AND CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This dissertation intends to investigate the connection between South Africa's inflation and money supply from 1980 to 2021.

Inflation occurs when prices gradually increase and can result in a decline in the capacity of a nation's money to purchase. Consequently, the quantity of goods and services that can be acquired decreases. Multiple factors can trigger inflation. The infusion of excessive funds into the market, either through government bond purchases or commercial bank loans extended to the public, may result in the aforementioned outcome. Both businesses and customers are more worried once inflation is high since they think it will impact their potential buying power. This is caused by the fact that an elevated rate of inflation will be generated by the economy's excessive growth of the supply of currency when compared to its development. A modest level of inflation can be beneficial since it helps businesses and customers' budget for future generations considering they are aware of the purchasing power of their cash and the fact that it won't be continually reduced. This phenomenon can be attributed to the reduced probability of upward price adjustments over a period of time, which is a consequence of low inflation. By calculating the annual percentage rise in the average household price index (CPI) for a certain time period, economists may determine the rate of price inflation. The Consumer Price Index, or CPI, is a statistic that measures how prices change over time for a typical range of consumer goods and services. The idea of an exchange rate refers to the relative value of one currency in comparison to another or to another economic location. The majority of research projects depend on data analysis and theoretical knowledge as their two main sources of information to arrive at their conclusions.

The current investigator approached the tasks as identical to the prior investigator who conducted the study. Utilizing the World Bank's Data Center was essential in acquiring quantitative data about various components and constituents. The research study collected data every year for 41 years, commencing in 1980 and continuing until 2020. The data was collected over four decades, from 1980 to 2020, encompassing this temporal span. Examining financial factors over a prolonged period, such as price fluctuations and currency supply, is crucial for more accurate and reliable outcomes. The autoregressive distributed lag (ARDL) model is used in this

thesis to conduct regression analysis. The autoregressive distributed lag (ARDL) technique was initially put forward by Pesaran et al. (2001), and it is now frequently used. The aforementioned method was used consistently throughout the inquiry. In comparison to other econometric models, the autoregressive distributed lag (ARDL) model is more appropriate when the relevant variables are either stationary at order I (0) or integrated at order I (1). Due to its capacity to thoroughly evaluate both the short- and long-term consequences of autonomous variables on production, the framework under examination stands out as superior to other frameworks. This capacity depends on the precise goals of the research being done. Daura (2007) claims that the ARDL technique may be utilized to estimate both the short-run and long-run elasticity of demand when dealing with a small sample size. The ARDL method is an ordinary least squares (OLS) version used to examine the cointegration of variables. By changing the order of the variables' integration throughout the modeling process, the ARDL model provides additional flexibility. After it has been shown that the independent variable in the model displays either I (0), I (1), or joint cointegration, the following characteristics of the framework may be taken into consideration as being present: Empirical data backs up Frimpong and Oteng's (2006) assertion that the autoregressive distributed lag (ARDL) model performs well. The use of ARDL is, however, constrained when any variables are integrated into order 2 (I (2)), as should be emphasized. The results of this study reveal that Table 4.1 shows that all variables in the initial variance for the ADF unit root test are stable. Three out of the five variables, including foreign investment, inflation, and the real exchange rate, exhibit stationarity at the first difference, according to the results of the PP unit root test. The real interest rate and the broad currency, the two remaining variables, however, exhibit stationarity at the level. An ARDL limits test with delayed levels (s) is one of the main techniques for doing a cointegration analysis. This particular test requires running an additional F-test on the exogenous variable's historical data in the context of the autoregressive distributed lag (ARDL) model. The study's results, at a significance level of 5%, did not provide sufficient evidence to support the null hypothesis about the time frame spanning from 1980 to 2021. The F-statistics, which amounted to 6.604053 at these thresholds of importance, were significantly different at a level greater than the 4.37 needed criteria. The null assumption of not having cointegration is dismissed whenever the F-statistic surpasses the upper essential border significance; however, it is embraced as long as it is less compared to the lower essential boundary value.

Therefore, it can be asserted that a cointegration relationship exists given these circumstances. The results of the ARDL long-run test are shown in Table 4.4, which demonstrates a statistically significant and negative relationship between inflation and the money supply in South Africa. According to Amassoma et al.'s (2018) research on the impact of money availability on price hikes in Nigeria, their data do indeed corroborate this claim. The goal of this research was to identify the current causes of Nigeria's rising inflation rate, which has a negative effect on the quality of life for its people. The investigation was motivated by the desire to satisfy one's curiosity. A test for cointegration and an error correction were employed in the study to evaluate the variables in the problem using time series data that were gathered annually from 1970 to 2016. The goal of the research was to identify the dynamic relationships between the important components, including both short-term and long-term ones. The findings indicate there is no meaningful connection between the money supply and inflation, either in the short- or long-term, or at all. The following might be due to the economic downturn that the nation is going through. The significance of the error modification model is evidenced by the appropriate negative sign it exhibits. This implies that approximately 21% of errors are rectified annually. The findings from the Granger causality investigation suggest no statistically significant association between the quantity of money in circulation and inflation in Nigeria for the time under investigation. The outcome of this means that various economic factors greatly impact Nigeria's inflation rate. The study's findings suggest that it would benefit the government to implement measures to foster domestic manufacturing and service provision to diversify the economy and reduce its reliance on imported goods and services. The importance of foreign direct investment in boosting the availability and accessibility of financial resources should not be underestimated, however. The outcomes of the ARDL short-term analysis are shown in Table 4.5. According to the findings, inflation will soon have a significant detrimental effect on South Africa's capacity to access liquid assets. The relationship between Nigeria's money supply and inflation is the subject of a study by Amassoma et al. (2018). The importance of foreign direct investment in boosting the availability and accessibility of financial resources should not be underestimated, however. The outcomes of the ARDL short-term analysis are shown in Table 4.5. According to the findings, inflation will soon have a significant detrimental effect on South Africa's capacity to access liquid assets. The relationship between Nigeria's money supply and inflation is the subject of a study by

Amassoma et al. (2018). The study's findings support the claim that this outcome is consistent with the authors' research findings. The major objective of this study was to identify the underlying causes of Nigeria's rising inflation rate, which has a detrimental impact on the population's general well-being. Inherent human curiosity served as the driving force for this inquiry. The study employed an error correction method and a cointegration test to investigate the relevant variables using annual time series data from 1970 to 2016. The temporal dataset covered the years 1970 through 2016. This study assessed the long- and short-term changes in the relationships between the variables it was looking at. The results show that, regardless of the time period taken into account, the amount of actual cash in circulation has no discernible impact on the inflation rate. The current economic downturn the country is going through may be to blame for the observed phenomenon. According to the model for error correction's suitable negative sign, the results are statistically significant. This indicates that the error is being fixed. According to this, around 21% of the observed problems are fixed or rectified each year. The results of the Granger causality study lead to the conclusion that neither the amount of money in circulation in Nigeria throughout the research period nor the inflation rate are significantly correlated with one another. It can be inferred that the pace of prices in Nigeria is influenced by many discrete economic variables, each of which plays a substantial role in the overall equation. The research outcomes indicate that it would be advisable for the government to implement measures aimed at enhancing indigenous manufacturing and broadening the provision of domestic services to augment economic diversity and mitigate dependence on imported commodities. To attain these goals, it is recommended to incorporate greater economic diversity. On the other side, FDI has been shown to substantially and positively affect monetary base expansion. In the tabular presentation, the ECM is given a quantitative value corresponding to the transition rate between the initial period and the extended length; this number is 44%. The findings of a Granger causality test, which shows a statistically significant association between inflation and FDI, are shown in Table 4.7. The statistical significance between the causes of each variable is set at 5%. Both the actual exchange rate and inflation may be regarded as important Granger causal variables at a significance level of 5%. According to the results, vast money-makers cause inflation rather than the opposite. While interest may be seen as a minor factor, the current exchange rate is the main factor that determines interest rates. A sizable money market will finally enable a precise assessment of currency

exchange rates, while a real exchange would provide the opposite result. The alternative hypothesis does not provide any evidence to support the idea that the parameters will change, while the null hypothesis argues that they won't. The experiment shows that the blue line is forced to stay inside the boundaries defined by the red line. Furthermore, it is interesting that there is a propensity to accept the null hypothesis and reject the alternative, aggravating the problem, and to see residual variations as consistent rather than inconsistent. The propensity it gives people to view residual variances as stable rather than unstable may help to explain this phenomenon. The strong tendency to accept the validity of the null hypothesis justifies this. The stability or instability of the remaining variance may also be determined. The conclusion was correct. The study looked at the long-term stability of the long-term coefficient of the autoregressive distributed lag (ARDL) model by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares (CUSUMQ). The cumulative sum of squares was calculated using both of these methods. The model took into consideration the short-term dynamics of variables including outside investment, stock market performance, and economic growth. The abbreviations CUSUM and CUSUMQ stand for the two numbers above, respectively. In order to compare the consistency over a long period of time with the long-term coefficient and the changes that occur over a short period of time with the parameters, this study was undertaken. The flawed correction model puts forward the null hypothesis that, within a 5% confidence range, the error modification coefficients will remain constant. This claim is made due to the model's flaws. Reference is made to the 2002 research by Bahmani, Oskooee, and Ng. The coefficients may change in very uncommon circumstances. It is conceivable to conclude that the null assumption positing consistent values cannot be supported at a 5% significance level if any of the dotted lines overlap. The 5% significance threshold is used to define the circumstances. The graphical depiction of the CUSUM and CUSUMQ data must comply with the essential limitations shown in the figure above in order to be taken seriously. By putting this measure in place, the inflation coefficient's long-term balance will be ensured.

5.2 Conclusion

This study investigates whether or not there is a link between the growing money supply in South Africa and the rising cost of goods. By directing its monetary policy

toward reducing inflation to achieve this purpose, the South African Reserve Bank's principal goal is to ensure that prices remain stable. It is possible to impact the prime interest rate by raising or reducing it by adjusting the repo rate by two percentage points, which would ultimately result in a change in the quantity of the monetary base. This may have an effect on the amount of spending done by consumers and investors, which in turn can have an effect on economic growth, productivity, and production, which can lead to changes in costs or the consumer price index. During the course of the study, the ADF unit root test was used in order to ascertain which variables, if any, exhibited stationarity after the application of a single change. After one differencing, stationarity was shown by three of the five variables in the PP unit root test. These variables were the real effective exchange rate, inflation, and foreign direct investment. On the other hand, broad currency and real interest rates showed no change from their previous levels. The ARDL limits test with delayed amounts (s) was used in order to investigate cointegration. During the investigation, the lagged values of the independent variable were examined using an F-test to see how well they fit the autoregressive distributed lag (ARDL) equation. Following a statistical analysis performed at a significance level of 5%, it was determined that the outcomes of the study did not offer evidence to support the null hypothesis, particularly with regard to the years 1980 to 2021. With a cumulative value of 6.604053, the F-statistics provided evidence of statistical significance that was in excess of the crucial value of 4.37. When doing research on cointegration, it is common practice to reject the null hypothesis that there is no cointegration if the F-statistic is greater than the upper critical value. On the other hand, one must acknowledge the existence of the null hypothesis if the F-statistic is lower than the lower critical value. The existence of a cointegration relationship may be deduced from the current state of affairs. According to the results of the ARDL long-run test, which are shown in Table 4.4, there is a significant and unfavorable correlation between inflation and the availability of liquid money in South Africa. This argument is bolstered further by the findings of research conducted by Amassoma et al. (2018), which investigated the impact of Nigeria's currency supply on the rate of inflation. The purpose of the study was to identify the factors that contribute to Nigeria's high inflation rate, which has a detrimental effect on the standard of living enjoyed by the country's population. The research looked at crucial variables using yearly time series data from 1970 to 2016 and utilized cointegration analysis and an error correction model to uncover short-term and long-term dynamic interactions

between essential elements. The data used for the study were from 1970 to 2016. According to the findings of the study, there is no clear connection between the amount of money in circulation and inflation, which may be attributable to Nigeria's current economic downturn. The mistake modification model is essential due to the fact that it demonstrates that only 21% of issues are supposedly dealt with on a yearly basis. According to the Granger causality analysis, there was never a statistically significant association between the total quantity of money in circulation and the rate of inflation in Nigeria for the whole of the research period. According to the conclusions of the research, it is vital to encourage government measures to promote local manufacturing and service delivery in order to stimulate economic development and reduce dependency on products and services that are imported. Table 4.5 displays the findings obtained from the research conducted over a short period of time using the autoregressive distributed lag (ARDL) approach. They demonstrate that South Africa's capability of obtaining money will soon suffer a significant and unfavorable impact due to inflation. According to the research carried out by Amassoma and colleagues (2018), there is a correlation between the rate of inflation in Nigeria and the amount of money that is readily available. An investigation into the factors that lie at the heart of Nigeria's persistently high inflation rate—which has a direct bearing on the living conditions of the country's citizens—was carried out recently. The study looked at a variety of different factors by utilizing yearly time series data from 1970 to 2016. This dataset, which began in 1970 and continues through 2016, has been made available for use in analytical endeavors. The purpose of this study was to investigate the possibility of short-term and long-term correlations between the variables that were being looked at. The fact that the quantity of money in circulation had no influence on inflation in either the short term or the long term was shown by the findings, and this finding may be attributed to the protracted nature of the economic crisis. The error correction model resolves around 21 percent of the issues on an annual basis. According to the findings of the Granger causality analysis, no correlation was found between the total quantity of money in circulation and Nigeria's inflation rate during the period under investigation. According to the findings of the study, the rate of inflation in Nigeria is influenced by a variety of economic factors that have a significant bearing on the equation. In order to find a solution to this issue, the government has to expand access to domestic services, promote home manufacturing as a means of diversifying the economy, and reduce the country's reliance on imported goods. The research suggests

making use of a wide range of economic activities to achieve these objectives, with international direct investment being one of the activities that will have a positive impact on the overall money supply. The value of the ECM, which is 44%, also provides insight into the magnitude of the shift from the short to the long term. Utilizing the Granger causality test, it was discovered that there is a link that is statistically significant between inflation and foreign direct investment. Accurate effective exchange rates and inflation were the primary factors that contributed to Granger's causation. The fact that the cointegration test and a problematic modification technique were used to examine the data in this research has the potential to spark the interest of those who are already knowledgeable about the topic.

5.3 Recommendations

According to the findings of the study, the government of South Africa needs to reduce its benchmark interest rate in order to encourage both domestic and foreign investment. This recommendation is based on monetary policy as a potential role that the government may play. One possible explanation for this occurrence is that it has the potential to raise levels of productivity and advance general economic growth. In addition, the government has to exercise prudent fiscal management by addressing the issues of excessive spending and the persistent budget deficit that are prevalent across South Africa. In addition, the nation's central bank should stop the practice of printing currency at low interest rates, which is already being done as a method of lowering the excessive amount of money that is now available in the economy. To alleviate Nigeria's high inflation rate, it is advised that the government relax export rules, encourage economic diversification, and give fuel subsidies. These actions would all be taken in conjunction with one another. It is considered that these elements have a negative influence on a variety of economic subsectors, including the transportation industry, the food industry, and vital commodity markets. As a result, the research recommends giving priority to elements other than the availability of money that contribute to inflation inside the nation in order to lessen the negative effect that inflation has on the country's economic well-being. The results of this research activity may give useful insights to lawmakers as well as the Reserve Bank of South Africa on the limits of contractionary monetary policy as a way of reducing inflation. This research endeavor was undertaken with the purpose of According to the findings of the study, the rise in prices that has been seen in South Africa cannot be completely

linked to the monetary policy that has been implemented. There is a possibility that the adoption of M2 as a mechanism for maintaining price stability in South Africa may have a negative impact on the country's overall economic development. As a result, it could be helpful to include additional measures in the control of inflationary tendencies in South Africa, such as fiscal and supply-side economics. This is because inflationary tendencies have been seen there. Inflation and unemployment are two examples of macroeconomic problems that may be alleviated by adopting a supply-side strategy, which would also lead to an increase in South Africa's overall level of output. In conclusion, the supply-side economics method has the ability to produce low levels of inflation and unemployment while simultaneously fostering sustainable economic development. This is all down to the supply-side economics approach's focus on increasing aggregate supply.

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Appendix

Similarity Report

OTIS YALLA KPANAH

ORIGINALITY REPORT



PRIMARY SOURCES

| | | |
|---|---|-----|
| 1 | docs.neu.edu.tr Internet Source | 4% |
| 2 | www.researchgate.net Internet Source | 1% |
| 3 | www.virtusinterpress.org Internet Source | 1% |
| 4 | data.worldbank.org Internet Source | <1% |

Ethical Letter



04.09.2023

Dear Otis Yalla Kpanah

Your project "**The relationship between inflation on money supply in South Africa (1980-2021)**" has been evaluated. Since only secondary data will be used the project it does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

A handwritten signature in blue ink, appearing to read "A. KIRAZ".

Prof. Dr. Aşkın KİRAZ

The Coordinator of the Scientific Research Ethics Committee

Descriptive statistic

| | FDI | INF | REER | RIR | BM |
|--------------|-----------|-----------|----------|-----------|----------|
| Mean | 1.059532 | 8.539642 | 108.9353 | 4.086264 | 13.05192 |
| Median | 0.519900 | 7.047930 | 104.0181 | 4.099963 | 13.42988 |
| Maximum | 9.855527 | 18.65492 | 181.3517 | 12.69103 | 27.01572 |
| Minimum | -0.702215 | -0.692030 | 70.67473 | -11.00901 | 1.761086 |
| Std. Dev. | 1.764971 | 4.659434 | 29.12673 | 3.988617 | 6.379347 |
| Skewness | 3.385502 | 0.404677 | 0.801324 | -0.896744 | 0.204626 |
| Kurtosis | 16.43832 | 2.157936 | 2.980985 | 6.747624 | 2.053956 |
| Jarque-Bera | 396.2612 | 2.387220 | 4.495471 | 30.20725 | 1.859351 |
| Probability | 0.000000 | 0.303125 | 0.105638 | 0.000000 | 0.394682 |
| Sum | 44.50033 | 358.6650 | 4575.282 | 171.6231 | 548.1805 |
| Sum Sq. Dev. | 127.7200 | 890.1234 | 34783.02 | 652.2717 | 1668.539 |
| Observations | 42 | 42 | 42 | 42 | 42 |

Unit root tests

Null Hypothesis: FDI has a unit root

Exogenous: Constant

Lag Length: 6 (Automatic - based on t-statistic, lagpval=0.5, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -0.641687 | 0.8483 |
| Test critical values: | | |
| 1% level | -3.632900 | |
| 5% level | -2.948404 | |
| 10% level | -2.612874 | |

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

Null Hypothesis: D(FDI) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -4.378545 | 0.0013 |
| Test critical values: | | |
| 1% level | -3.615588 | |
| 5% level | -2.941145 | |
| 10% level | -2.609066 | |

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

Null Hypothesis: INF has a unit root
 Exogenous: Constant
 Lag Length: 5 (Automatic - based on t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -1.460771 | 0.5417 |
| 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 t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -5.627923 | 0.0000 |
| Test critical values: | | |
| 1% level | -3.621023 | |
| 5% level | -2.943427 | |
| 10% level | -2.610263 | |

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

Null Hypothesis: BM has a unit root
 Exogenous: Constant
 Lag Length: 10 (Automatic - based on t-statistic, lagpval=0.5, maxlag=12)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -0.743580 | 0.8208 |
| Test critical values: | | |
| 1% level | -3.661661 | |
| 5% level | -2.960411 | |
| 10% level | -2.619160 | |

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

Null Hypothesis: D(BM) has a unit root
 Exogenous: Constant
 Lag Length: 7 (Automatic - based on t-statistic, lagpval=0.5, maxlag=12)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -3.224474 | 0.0274 |
| Test critical values: | | |
| 1% level | -3.646342 | |
| 5% level | -2.954021 | |
| 10% level | -2.615817 | |

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

Null Hypothesis: REER has a unit root
 Exogenous: Constant
 Lag Length: 9 (Automatic - based on t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -0.806847 | 0.8036 |
| Test critical values: | | |
| 1% level | -3.653730 | |
| 5% level | -2.957110 | |
| 10% level | -2.617434 | |

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

Null Hypothesis: D(REER) has a unit root
 Exogenous: Constant
 Lag Length: 4 (Automatic - based on t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -5.070206 | 0.0002 |
| Test critical values: | | |
| 1% level | -3.626784 | |
| 5% level | -2.945842 | |
| 10% level | -2.611531 | |

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

Null Hypothesis: RIR has a unit root
 Exogenous: Constant
 Lag Length: 4 (Automatic - based on t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -1.463777 | 0.5405 |
| Test critical values: | | |
| 1% level | -3.621023 | |
| 5% level | -2.943427 | |
| 10% level | -2.610263 | |

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

Null Hypothesis: D(RIR) has a unit root
 Exogenous: Constant
 Lag Length: 3 (Automatic - based on t-statistic, lagpval=0.1, maxlag=9)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -5.922794 | 0.0000 |
| Test critical values: | | |
| 1% level | -3.621023 | |
| 5% level | -2.943427 | |
| 10% level | -2.610263 | |

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

PP UNIT ROOT TEST

Null Hypothesis: FDI has a unit root
 Exogenous: Constant
 Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

| | Adj. t-Stat | Prob.* |
|--------------------------------|-------------|--------|
| Phillips-Perron test statistic | -2.672842 | 0.0874 |
| Test critical values: | | |
| 1% level | -3.600987 | |
| 5% level | -2.935001 | |
| 10% level | -2.605836 | |

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

Null Hypothesis: D(FDI) has a unit root
 Exogenous: Constant
 Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

| | Adj. t-Stat | Prob.* |
|--------------------------------|-------------|--------|
| Phillips-Perron test statistic | -6.551519 | 0.0000 |
| Test critical values: | | |
| 1% level | -3.605593 | |
| 5% level | -2.936942 | |
| 10% level | -2.606857 | |

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

INF

Null Hypothesis: INF has a unit root
 Exogenous: Constant
 Bandwidth: 18 (Newey-West automatic) using Bartlett kernel

| | Adj. t-Stat | Prob.* |
|--------------------------------|-------------|--------|
| Phillips-Perron test statistic | -1.431326 | 0.5577 |
| Test critical values: | | |
| 1% level | -3.600987 | |
| 5% level | -2.935001 | |
| 10% level | -2.605836 | |

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

Null Hypothesis: D(INF) has a unit root
 Exogenous: Constant
 Bandwidth: 33 (Newey-West automatic) using Bartlett kernel

| | Adj. t-Stat | Prob.* |
|--------------------------------|-------------|--------|
| Phillips-Perron test statistic | -9.349391 | 0.0000 |
| Test critical values: | | |
| 1% level | -3.605593 | |
| 5% level | -2.936942 | |
| 10% level | -2.606857 | |

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

ARDL LONG RUN

ARDL Long Run Form and Bounds Test
 Dependent Variable: D(BM)
 Selected Model: ARDL(3, 4, 4, 1)
 Case 2: Restricted Constant and No Trend
 Date: 03/17/23 Time: 13:34
 Sample: 1 42
 Included observations: 38

| Conditional Error Correction Regression | | | | |
|---|-------------|------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 7.330714 | 5.846004 | 1.253970 | 0.2268 |
| BM(-1)* | -0.031248 | 0.221037 | -0.141368 | 0.8892 |
| FDI(-1) | -4.306678 | 1.758698 | -2.448787 | 0.0255 |
| INF(-1) | -1.952512 | 0.519508 | -3.758388 | 0.0016 |
| REER(-1) | 0.151177 | 0.089236 | 1.694137 | 0.1085 |
| RIR(-1) | -1.377922 | 0.319344 | -4.314855 | 0.0005 |
| D(BM(-1)) | -0.515542 | 0.196718 | -2.620714 | 0.0179 |
| D(BM(-2)) | -0.569220 | 0.214751 | -2.650604 | 0.0168 |
| D(FDI) | -0.442172 | 0.389374 | -1.135597 | 0.2719 |
| D(FDI(-1)) | 3.370259 | 1.349182 | 2.498002 | 0.0230 |
| D(FDI(-2)) | 2.823786 | 1.158445 | 2.437565 | 0.0261 |
| D(FDI(-3)) | 1.526248 | 0.826881 | 1.845790 | 0.0824 |
| D(INF) | -1.088400 | 0.585144 | -1.860054 | 0.0803 |
| D(INF(-1)) | -0.210198 | 0.591545 | -0.355337 | 0.7267 |
| D(INF(-2)) | -0.854151 | 0.473333 | -1.804544 | 0.0889 |
| D(INF(-3)) | -1.248932 | 0.398969 | -3.130398 | 0.0061 |
| D(REER) | -0.034255 | 0.128056 | -0.267502 | 0.7923 |
| D(REER(-1)) | -0.279674 | 0.131476 | -2.127187 | 0.0483 |
| D(REER(-2)) | -0.133535 | 0.097785 | -1.365608 | 0.1899 |
| D(REER(-3)) | -0.427910 | 0.096837 | -4.418880 | 0.0004 |
| D(RIR) | 0.050052 | 0.353634 | 0.141535 | 0.8891 |

ARDL SHORT RUN

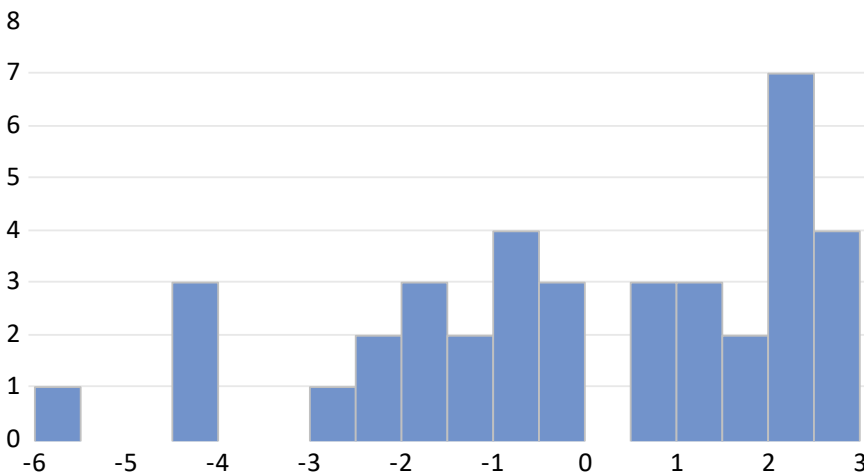
ARDL Error Correction Regression
 Dependent Variable: D(BM)
 Selected Model: ARDL(4, 3, 2, 0, 3)
 Case 2: Restricted Constant and No Trend
 Date: 03/17/23 Time: 13:40
 Sample: 1 42
 Included observations: 38

| ECM Regression Case 2: Restricted Constant and No Trend | | | | |
|--|-------------|------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(BM(-1)) | 0.017078 | 0.163413 | 0.104511 | 0.9178 |
| D(BM(-2)) | 0.053387 | 0.140200 | 0.380795 | 0.7072 |
| D(BM(-3)) | 0.308093 | 0.131394 | 2.344803 | 0.0289 |
| D(FDI) | -0.698417 | 0.398613 | -1.752120 | 0.0943 |
| D(FDI(-1)) | 1.828802 | 0.777589 | 2.351889 | 0.0285 |
| D(FDI(-2)) | 1.801553 | 0.665351 | 2.707673 | 0.0132 |
| D(INF) | 0.315846 | 0.338793 | 0.932271 | 0.3618 |
| D(INF(-1)) | -0.592275 | 0.364128 | -1.626558 | 0.1187 |
| D(RIR) | 0.059387 | 0.236408 | 0.251206 | 0.8041 |
| D(RIR(-1)) | -1.037085 | 0.259016 | -4.003944 | 0.0006 |
| D(RIR(-2)) | -1.130384 | 0.248094 | -4.556276 | 0.0002 |
| CointEq(-1)* | -0.449939 | 0.104583 | -4.302212 | 0.0003 |

Residual Diagnostics

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

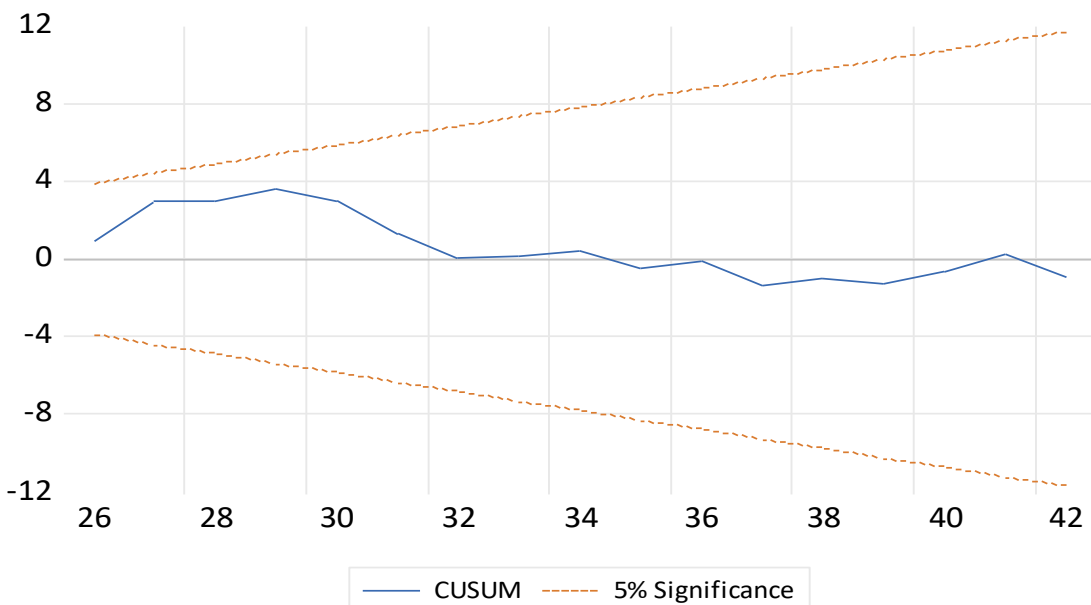
| | | | |
|---------------|----------|---------------------|--------|
| F-statistic | 0.710388 | Prob. F(2,15) | 0.5073 |
| Obs*R-squared | 3.287878 | Prob. Chi-Square(2) | 0.1932 |

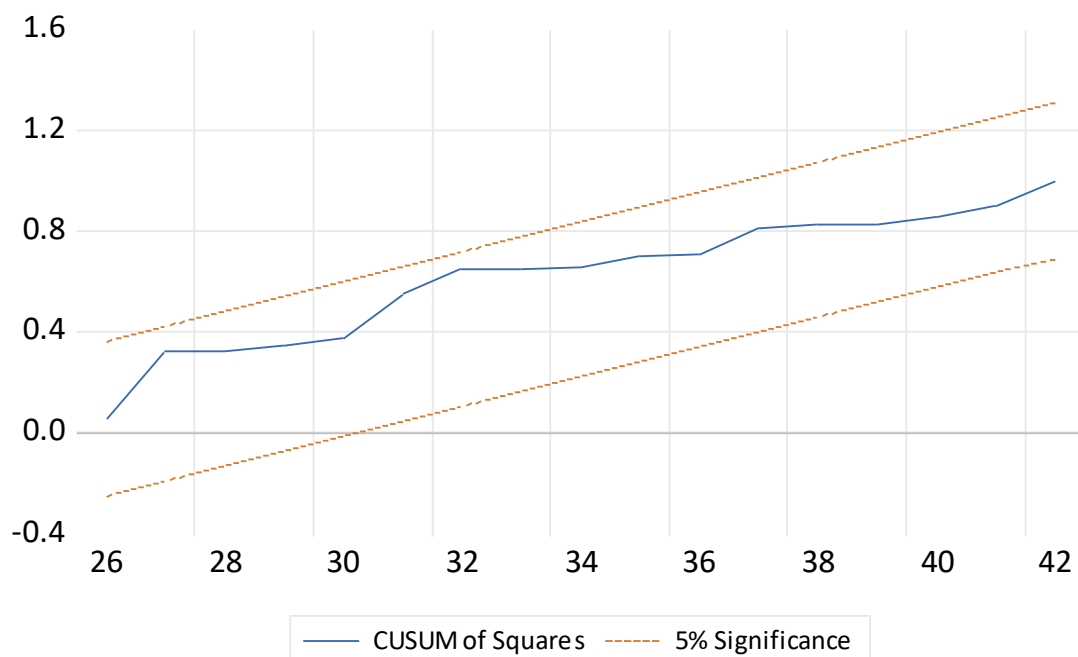


Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

| | | | |
|---------------------|----------|----------------------|--------|
| F-statistic | 0.237091 | Prob. F(20,17) | 0.9986 |
| Obs*R-squared | 8.287665 | Prob. Chi-Square(20) | 0.9898 |
| Scaled explained SS | 1.303503 | Prob. Chi-Square(20) | 1.0000 |

STABILITY TEST





Granger causality test

Pairwise Granger Causality Tests

Date: 03/17/23 Time: 12:49

Sample: 1 42

Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---------------------------------|-----|-------------|--------|
| INF does not Granger Cause FDI | 40 | 4.18286 | 0.0235 |
| FDI does not Granger Cause INF | | 3.81345 | 0.0317 |
| REER does not Granger Cause FDI | 40 | 2.50175 | 0.0965 |
| FDI does not Granger Cause REER | | 1.90611 | 0.1638 |
| RIR does not Granger Cause FDI | 40 | 1.16861 | 0.3226 |
| FDI does not Granger Cause RIR | | 0.38657 | 0.6822 |
| BM does not Granger Cause FDI | 40 | 0.57862 | 0.5659 |
| FDI does not Granger Cause BM | | 1.33349 | 0.2766 |
| REER does not Granger Cause INF | 40 | 10.4665 | 0.0003 |
| INF does not Granger Cause REER | | 6.19858 | 0.0050 |
| RIR does not Granger Cause INF | 40 | 0.31015 | 0.7353 |
| INF does not Granger Cause RIR | | 0.39399 | 0.6773 |
| BM does not Granger Cause INF | 40 | 5.12482 | 0.0112 |
| INF does not Granger Cause BM | | 2.91028 | 0.0677 |
| RIR does not Granger Cause REER | 40 | 1.29320 | 0.2872 |
| REER does not Granger Cause RIR | | 4.23881 | 0.0225 |
| BM does not Granger Cause REER | 40 | 3.92905 | 0.0289 |
| REER does not Granger Cause BM | | 2.18767 | 0.1273 |
| BM does not Granger Cause RIR | 40 | 0.57361 | 0.5687 |
| RIR does not Granger Cause BM | | 1.75957 | 0.1870 |