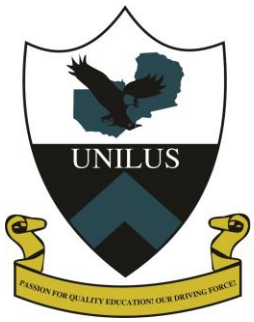

UNIVERSITY OF LUSAKA

School of Postgraduate Studies

The impact of Monetary Policy on Economic Growth in Zambia (1980-2022)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, UNIVERSITY OF LUSAKA IN PARTIAL FULFILMENT OF THE AWARD OF THE MASTER OF SCIENCE IN ECONOMICS AND FINANCE.

BY

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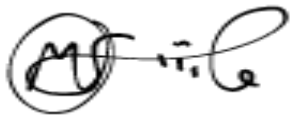
DEDICATION

I would love to dedicate this work to my dearest mother, Gertrude M. Sikwibele, as well as my lovely sisters Muyapekwa Sikwibele and Precious Kapimpa. I would like to thank them for the moral support throughout my study. And to my late father who unfortunately did not live to witness his love for me bear these wonderful fruits

MUWAHI SIKWIBELE SIGNATURE:



DR JOHN MUSANTU SIGNATURE:

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I am greatly indebted to my supervisor Dr. John Musantu for his expert advice, support and encouragement throughout the stages of this dissertation by his quick helpful feedback. Would also like to thank my family and friends for supporting me build my success in the fulfilment of my dissertation.

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ABSTRACT

This study investigates the dynamic relationship between monetary policy and economic growth in Zambia over the period 1980 to 2022, employing the Autoregressive Distributed Lag (ARDL) model. The research aims to contribute to the understanding of the intricate interactions between monetary policy tools and the long-term economic development of Zambia.

The study utilizes a comprehensive data comprising key monetary variables such as money supply, interest rates, inflation rates, and exchange rates, alongside relevant macroeconomic indicators representing economic growth. This data is collected from reliable secondary sources which include Bank of Zambia, Zambia statistical Agency and the World bank. The Autoregressive Distributed Lag model, with its ability to capture both short- and long-run dynamics, is employed to discern the causal relationship between monetary policy and economic growth.

Preliminary findings reveal a multifaceted relationship between monetary policy and economic growth in Zambia. Short-term dynamics may exhibit different patterns compared to long-term relationships, suggesting the presence of lags and adjustment processes. In summary, the study tested various hypotheses, and the outcomes reject the null hypotheses, signifying the importance of the examined variables. Notably, in the short term, a 1% decrease in the official exchange rate correlates with a notable 1.1004% surge in economic growth. Additionally, broad money growth exhibits a stimulating effect, contributing to a 0.0433% increase in economic growth for every 1% growth in broad money. Although real interest rates show marginal insignificance in the short run, they significantly contribute to long-term economic development, with a 0.1341% increase for every 1% rise. Furthermore, a positive association is observed between annual inflation and economic development, resulting in a 0.0515% increase for every 1% increase in inflation.

The implications of the findings are crucial for policymakers in Zambia, offering insights into the design and implementation of monetary policy measures to foster sustainable economic growth. Additionally, the research contributes to the broader academic literature

on the relationship between monetary policy and economic development in emerging markets, providing a case study that can inform future research in similar contexts.

In conclusion, this study employs the ARDL model to explore the impact of monetary policy on economic growth in Zambia over the past four decades, offering valuable insights for policymakers, researchers, and stakeholders interested in understanding and fostering sustainable economic development in the region.

KEY WORDS: Economic Growth, Monetary Policy, Inflation Exchange Rates, Interest Rates

CHAPTER ONE

INTRODUCTION

1.1 Introduction

A nation's monetary policy has a substantial influence on how its economy progresses and remains stable (Friedman, 1996). This is especially important in light of Zambia, a developing nation that is actively striving for sustainable growth and prosperity (World Bank, 2021). It is crucial to consider how monetary policy affects Zambia's economic expansion, considering that it has a direct bearing on the nation's capacity to realize its developmental objectives. In the Zambian context, where economic growth and stability are paramount, a deeper understanding of how monetary policy factors affect the broader economic landscape is imperative. The objective of this research is to close this knowledge gap by exploring the intricate connection between important elements of monetary policy and Zambia's economic development trajectory.

Exchange rate variations, inflation rates, and interest rate fluctuations are central aspects of monetary policy that can significantly influence economic performance (Mishkin & Serletis, 2011). These variables have a complex effect on Zambia's economic development, necessitating further research. Exchange rate variations, for instance, can affect the competitiveness of Zambian exports and imports, ultimately shaping the country's trade balance and overall economic health (Taylor & Woodford, 1999). Inflation rates directly impact the purchasing power of citizens and can erode the gains of economic growth if not managed effectively (Mishkin & Serletis, 2011). Meanwhile, interest rate fluctuations can influence investment decisions, which are fundamental drivers of economic expansion (Romer, 2012).

Through scrutinizing these monetary policy elements within the Zambian context, this study seeks to uncover their complex effects on economic development (Krugman, et al., 2012). The insights derived from this research have the potential to be immensely valuable to a wide range of stakeholders. Policymakers will gain a more comprehensive understanding of how to tailor monetary policies to support sustainable growth and stability (Bernanke, 2007). Scholars and researchers will benefit from the expanded

knowledge base, allowing them to contribute to ongoing discourse and further studies in the field. Lastly, stakeholders from the business community, financial institutions, and international organizations will be better equipped to make informed decisions and investments that align with Zambia's economic goals (IMF, 2023).

1.2 The Background

Overtime, monetary policy has been seen as a crucial tool for controlling the economy. “Currency changes, as a component of monetary policy, may have a considerable impact on economic growth. A variable currency rate can create uncertainty in international commerce and investment, thereby undermining Zambia's global competitiveness” (IMF, 2019). Examining the extent to which fluctuations in exchange rates impact economic growth is crucial because it enables policymakers to create competitive policies and support long-term growth. Throughout the previous 30 years, Zambia has adopted a variety of monetary policy models that have affected important macroeconomic variables. Underpinned by pertinent citations and references, the discussion that follows offers a summary of the various forms of monetary policy and how they affect these variables.

Fixed Exchange Rate Regime

Following the establishment of a crawling peg from 1983 to 1985 and a fixed exchange rate system between 1964 and 1982 as well as 1987 and 1991, Zambia undertook a major monetary policy experiment (Chipili, 2014). According to this system, the indigenous currency of Zambia, the Kwacha, was tightly linked to a foreign currency, usually the US dollar. The fundamental principle behind this policy was to establish a stable and predictable exchange rate, thereby fostering an environment conducive to international trade and investment (Ngoma & Chanda, 2020).

This fixed exchange rate system held the exchange rate at a constant level, effectively eliminating the day-to-day fluctuations that are characteristic of flexible or floating exchange rate systems. For businesses involved in international trade, the approach's immediate benefit was a reduction in exchange rate risk since it allowed them to plan and carry out transactions with confidence, knowing that the exchange rate would stay stable (Williamson, 1996).

However, while the fixed exchange rate regime provided a sense of stability, it came with certain limitations and vulnerabilities. One critical issue was the regime's inability to adapt to external economic shocks and changing global economic conditions. Because the exchange rate was kept rigidly fixed, it was unable to respond to factors such as fluctuations in international commodity prices, shifts in global economic sentiment, or variations in Zambia's own economic performance (McKinnon & Pill, 1996).

In practice, this meant that when Zambia faced adverse economic developments, such as a drop in the price of its primary export commodity, copper, or changes in global interest rates, the fixed exchange rate regime left little room for maneuver. The country's monetary authorities were constrained in their ability to use exchange rate adjustments as a tool to address economic imbalances, leading to vulnerability during turbulent times (Obstfeld & Taylor, 2002).

Additionally, maintaining the fixed exchange rate often required substantial foreign exchange reserves to interfere in the market for foreign exchange, which could strain the country's balance of payments and foreign currency reserves (Rodrik, 2008). Overall, while the fixed exchange rate regime initially provided stability and predictability, it also posed significant challenges for Zambia's monetary policy and economic resilience. It limited the country's flexibility to respond to external shocks and evolving global economic dynamics, ultimately prompting a shift towards more flexible exchange rate arrangements in subsequent years (Ngoma & Chanda, 2020).

Managed Floating Exchange Rate Regime

In the early 2000s, Zambia moved to a managed fluctuating currency exchange rate regime, allowing the currency to move within a set range. In order to respond to market pressures, this strategy tried to find a balance between stability and flexibility. According to Ngoma and Chanda (2020), the controlled floating exchange rate regime allowed for more effective resource allocation while also acting as a slight buffer against external shocks.

In the 1994, Zambia underwent a significant shift in its monetary policy framework by embracing a managed floating exchange rate regime. Under this new approach, the Zambian government and its central bank allowed the country's exchange rate to fluctuate within a predefined range, rather than rigidly pegging it to a fixed foreign currency as in the previous fixed exchange rate regime (Roger, et al., 2017). This transition marked a pivotal moment in Zambia's monetary history, reflecting a deliberate effort to strike a delicate balance between stability and flexibility while responding to the dynamic forces of the international money markets.

The essence of the managed floating exchange rate regime lay in the recognition that while stability was crucial for businesses engaging in international trade and investment, it was equally vital in order for the exchange rate to adjust to market forces to maintain economic resilience (McKinnon & Pill, 1996). In essence, this policy sought to harness the advantages of both stability and flexibility, creating an equilibrium that could enhance the country's ability to adapt to a rapidly changing global economic landscape (Williamson, 1996).

One of the primary benefits of the managed floating exchange rate regime was its capacity to cushion Zambia against external shocks (Obstfeld & Taylor, 2002). External shocks, such as fluctuations in global commodity prices or shifts in investor sentiment, may significantly affect a nation's exchange rate and, consequently, its economic stability. By permitting controlled fluctuations within a defined range, Zambia could, to some extent, absorb the effects of these external shocks without resorting to abrupt and potentially disruptive policy adjustments.

Furthermore, the controlled floating exchange rate system facilitated a more efficient allocation of resources within the Zambian economy (Rodrik, 2008). By allowing the exchange rate to respond to market dynamics, it encouraged the flow of resources towards sectors and activities where they were most needed or could generate the highest returns. This flexibility in resource allocation contributed to improved economic efficiency and productivity, fostering long-term economic growth.

Zambia's transition to a managed floating exchange rate regime signified a strategic move towards a balanced monetary policy framework (Ngoma & Chanda, 2020). It recognized the need for stability while acknowledging the importance of adaptability in the face of external shocks and changing global economic conditions. This shift not only provided a safety net against adverse economic events but also promoted resource efficiency, ultimately contributing to Zambia's pursuit of sustainable economic development.

Inflation Targeting Regime

In the year 2008, the Bank of Zambia embarked on a significant shift in its monetary policy framework by publicly declaring its intent to transition from a monetary aggregate targeting framework to an inflation targeting regime. This marked a pivotal moment in Zambia's monetary history, reflecting a conscious effort to reshape the nation's approach to monetary policy in the pursuit of macroeconomic stability and controlled inflation levels (Cheelo & Banda, 2017).

Under the newly adopted inflation targeting framework, the Bank of Zambia (BoZ), set specific inflation targets as a central pillar of its monetary policy strategy. The primary objective of this type of framework was to utilize various monetary policy tools and mechanisms to achieve and maintain these predetermined inflation targets (Bernanke, et al., 1998). This approach was driven by the recognition that inflation, if left unchecked, could undermine economic stability and erode the purchasing power of the Zambian Kwacha, potentially harming the well-being of the nation's citizens.

The core responsibility of the BoZ under this regime was to implement and manage this new framework effectively, which entailed closely monitoring inflation rates and taking proactive steps to ensure price stability (Cheelo & Banda, 2017). By committing to inflation targeting, Zambia aimed to curtail inflationary pressures, control the rise in consumer prices, and cultivate an atmosphere that supports long-term economic expansion.

The significance of the research in this regard lies in its potential to inform policymakers and decision-makers about the intricate interplay between various factors within the inflation targeting framework. The research specifically aims to clarify the effect of

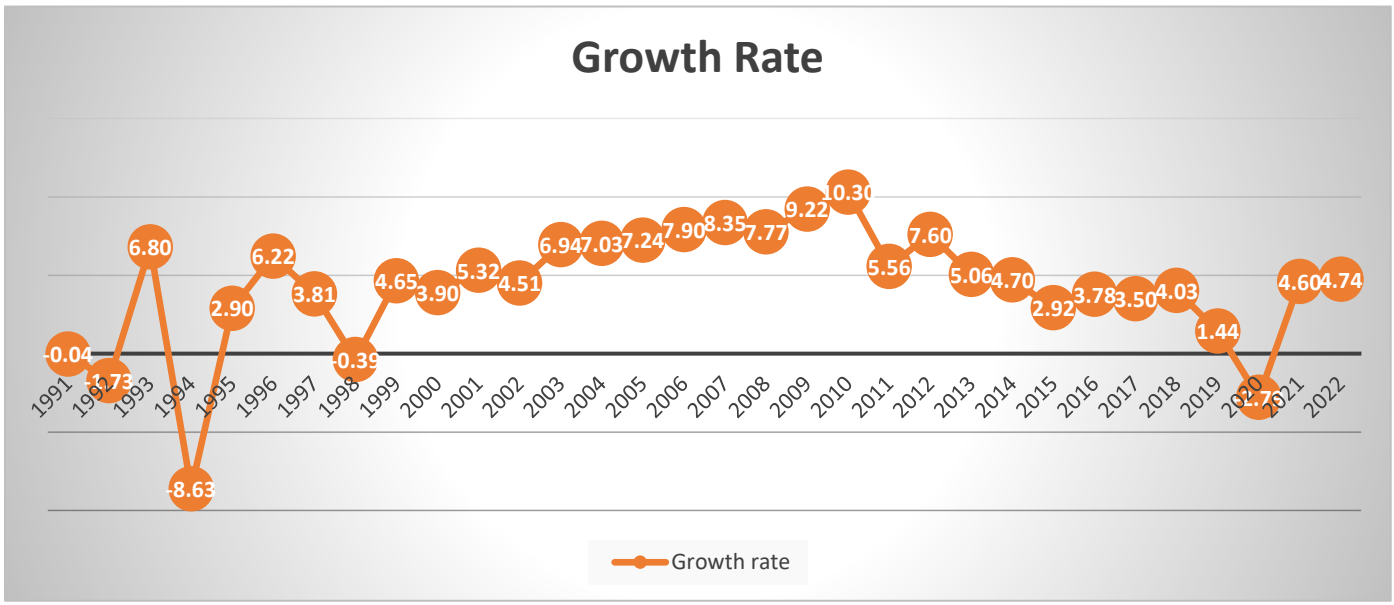
changes in interest rates, inflation rates, and exchange rates on Zambia's economic growth. These insights are invaluable for policymakers as they provide empirical evidence and data-driven analysis that can guide the formulation of evidence-based initiatives and policies aimed at stabilizing the economy and promoting long-term prosperity (Cecchetti, et al., 2002).

Economic Growth

The line graph in Figure 1 presents a comprehensive view of Zambia's year-on-year economic growth rates spanning the years 1991 to 2022. This historical perspective reveals significant fluctuations in economic performance over this period. Notably, Zambia experienced an extraordinary peak in economic growth, achieving a record-high growth rate of 10.3% in 2010. In 1994, the country's growth rate reached an unprecedented low of -8.3% due to a substantial economic crisis.

The observed economic dynamics align with the shifts in Zambia's monetary policy framework during this timeframe. Initially adopting a fixed exchange rate regime, the central bank underwent a transition to a managed float regime, reflecting the nation's evolving economic strategy. Ultimately, Zambia settled on an inflation targeting approach in 2008, signifying a pivotal transformation in its monetary policy (Bank of Zambia, 2009).

Figure 1: Trend of Economic Growth Rate



Source: Created by the researcher with data from the World Bank (2022)

During the period from 1991 to 1994, Zambia encountered a substantial economic downturn marked by consistently negative growth rates. This period is extremely important to Zambia's economic history because it began in the early 1990s, right before the country adopted a fixed exchange rate system. In terms of international trade and investment, this system, which fixed the value of the Kwacha in Zambia to a foreign currency, usually the US dollar, seemed to provide stability and predictability. But it's crucial to understand that this stability comes at the expense of the exchange rate's restricted capacity to react to shocks from the outside world (Ngoma & Chanda, 2020). The negative growth observed during these years can be linked to several factors that are well-documented in existing research by (Ngoma & Chanda, 2020). Firstly, the inflexibility of the fixed exchange rate regime rendered Zambia vulnerable to external shocks, such as fluctuations in global commodity prices (particularly copper, a crucial export for Zambia) and shifts in international financial conditions. When such external shocks occurred, the fixed exchange rate regime prevented the exchange rate from responding and adjusting appropriately, thereby limiting the country's capacity to navigate these challenges effectively (Ngoma & Chanda, 2020).

Moreover, policy instability and resource mismanagement exacerbated the economic crises during this period. Structural adjustment programs, often mandated by international financial institutions, brought about significant policy changes, including fiscal austerity measures and trade liberalization. These programs aimed to address Zambia's economic imbalances and improve its economic prospects. However, the abruptness of these reforms and their social and economic impacts contributed to the challenges faced during this period (Cheelo & Banda, 2017).

It is noteworthy that during this period, the economic growth rate reached a high of 6.8% in 1993 and a low of -8.6% in 1994 (World Bank, 2022). This wide range of growth rates underscores the volatility and instability that characterized Zambia's economy under the fixed exchange rate regime. The low point in 1994 most likely exhibits the detrimental effects of restricted exchange rate flexibility in the face of outside shocks, whereas the high point in 1993 might be linked to particular advantageous circumstances.

1995-2010: Periods of Growth

The period from 1995 to 2010 marked a significant phase in Zambia's economic history as the country transitioned to managed floating exchange rate regimes (Zgambo & Chileshe, 2014). The exchange rate's ability to react to market forces was more flexible under these regimes. This flexibility was crucial for the country's economic performance, and several factors contributed to the positive growth observed during these years. The transition to managed floating exchange rate regimes was instrumental in allowing the Zambian Kwacha to adjust to changing market conditions, including fluctuations in global commodity prices, particularly copper. The exchange rate's ability to respond to these market forces was a key driver of economic growth, as it enabled Zambia to adapt swiftly to external opportunities and challenges. Increased exchange rate flexibility made it possible for the economy to allocate resources more effectively. (Zgambo & Chileshe, 2014).

During this period, Zambia experienced remarkable economic growth, with the growth rate reaching a high of 10.3% in 2010 and demonstrating resilience even during the global economic uncertainties of the late 1990s and early 2000s (World Bank, 2022). This positive performance can be partially attributed to the increased flexibility of the exchange rate, as well as other factors such as comprehensive economic reforms, improved governance, and favorable copper prices.

In particular, the year 2005 stands out as a critical juncture in Zambia's economic policy. Following strong economic performance in previous years, the government set ambitious macroeconomic objectives. These objectives included keeping inflation under control at a maximum of 15.0%, attaining a real GDP growth rate of at least 6.0% raising gross international reserves to a minimum of 1.3 months' worth of imports (Bank of Zambia, 2006).

The government committed to fiscal discipline by capping domestic borrowing at 1.6% of GDP in order to support these monetary policy goals. However, this period was not without its challenges. Factors such as rising international oil prices, disruptions in fuel supply due to refinery shutdowns, and partial droughts affecting maize supply led to inflationary pressures (Bank of Zambia, 2006).

Furthermore, substantial donor balance of payments support inflows followed the achievement of the Enhanced HIPC Initiative Completion Point in April 2005. Although this was good for the economy, it also made the financial system's liquidity rise. The Bank of Zambia (BoZ), had to manage this liquidity in order to successfully reduce inflationary pressures (Bank of Zambia, 2006).

2009-2010: Spike in Growth

A remarkable spike in economic growth was observed in Zambia during the years 2009 and 2010. This economic boom followed Zambia's adoption of a monetary policy framework that targets inflation. The shift to inflation targeting marked a significant change in the country's monetary policy approach, emphasizing the central bank's pledge to uphold price stability through the establishment of targeted inflation rates (Bank of Zambia, 2010).

Several factors contributed to this noteworthy economic growth, with a peak growth rate of 10.3% achieved in 2010 (WDI, 2022). Firstly, the adoption of the inflation targeting framework allowed for a more dynamic and responsive monetary policy stance. This flexibility enabled timely responses to various factors, including increased copper prices, higher levels of investment, and potentially expansionary monetary policies. These elements worked in synergy to stimulate economic growth and capitalize on favorable external conditions (Bank of Zambia, 2010).

Attaining the 10.0% annual inflation target was the principal goal of Zambia's monetary policy in 2009. The growth rates of reserves and broad money were to be restricted to 19.0% in order to support this goal. (Bank of Zambia, 2010). Prudent fiscal management was also emphasized as a complementary measure to monetary policy. However, the implementation of monetary policy during this period faced notable challenges. The global recession's negative consequences persisted in affecting government revenue, foreign exchange earnings, exchange rates, and inflation forecasts. Additionally, rising production costs due to increased energy and water service costs added to the challenges faced by monetary policymakers (Bank of Zambia, 2010).

In 2010, monetary policy remained committed to sustaining macroeconomic stability, with a focus on maintaining single-digit inflation. The objective was to attain an annual inflation target of 8.0%. Monetary policy aimed to achieve this by limiting the growth in reserve and broad money to 8.0% and 23.5%, respectively, with continued support from prudent fiscal management (Bank of Zambia, 2011). Despite the challenges, including upward adjustments in electricity tariffs and unanticipated increases in maize purchase financing due to an unprecedented bumper harvest, monetary policy outcomes were positive. Inflation slowed down to 7.9% in 2010 from 9.9% in 2009, closely aligning with the end-year projection of 8.0%. This accomplishment proved how successful monetary policy is at preserving price stability and fostering long-term economic growth (Bank of Zambia, 2011).

2016-2022: Fluctuating Growth Rates

The years spanning from 2016 to 2022 in Zambia were marked by fluctuating growth rates, prompting the need for a deeper analysis of the economic dynamics during this period. This phase of Zambia's economic history necessitates a comprehensive assessment of the usefulness of the exchange rate regime and the monetary policy responses in navigating external challenges and adapting to changes in global economic conditions. During this period, the economic growth rate exhibited considerable variability, with a high of 4.7% in 2022 and a low of -2.8 in 2020 (figure 1) (WDI, 2022). Such fluctuations underscore the economic challenges and uncertainties faced by Zambia during these years.

In 2017, Zambia's monetary policy remained centered on maintaining single-digit inflation, with a goal of 9.0% at year's end. This commitment to price stability was underpinned by a gradual decrease in inflation as of March 2016, accomplished by maintaining a reasonably tight policy stance throughout 2016 and significantly tightening monetary policy in November 2015. In order to mitigate threats to the stability of the financial system and promote economic expansion, the Bank of Zambia took a few actions. These included alterations to the policy rate corridor and the Overnight Lending Facility (OLF) rate. Additionally, the Policy Rate was lowered from 15.5% in 2016 to 10.25%, and the

Statutory Reserve Ratio (SRR) was decreased from 18.0% in 2016 to 8.0% (Bank of Zambia, 2018).

However, challenges persisted, including the government's increased dependence on domestic borrowing to fund fiscal deficits, which limited private sector credit expansion and hampered economic activity. The effectiveness of monetary policy was further hampered by structural issues in the financial system, such as poor secondary market trading in government securities and restricted financial inclusion. (Bank of Zambia, 2018)

In 2018, monetary policy in Zambia aimed to maintain inflation in the target range of 6-8%. The formulation of monetary policy considered various macroeconomic indicators, including credit conditions, economic growth, fiscal policy, financial sector stability, and inflation outcomes. February 2018 saw a reduction in the Policy Rate to 9.75%, where it stayed for the remainder of the year. This accommodative monetary policy stance aimed to boost private sector credit, support business operations, and guarantee the financial sector's stability (Bank of Zambia, 2019). To further reinforce the monetary policy framework, the statutory reserve ratio was also lowered from 8.0% to 5.0%. Challenges persisted in 2018, including fiscal deficits crowding out private sector credit, high lending to the government keeping yield rates on government securities elevated, and vulnerabilities in the financial sector due to high non-performing loans (Bank of Zambia, 2019).

The year 2020 witnessed a significant economic contraction in Zambia, primarily caused by the global COVID-19 pandemic. This offers a priceless opportunity to investigate how monetary policy affects crisis management. and how the exchange rate regime and monetary policies were adapted to mitigate the pandemic's impact on Zambia's economy.

Monetary policy responses in 2020 initially began with relative tightness due to rising inflationary pressures. Nonetheless, monetary policy was loosened in the second half of the year to address the risks presented by the COVID-19 shock. Measures included reductions in the Policy Rate to 8.0% in August from 11.5% in May and various liquidity support measures for the financial sector (Bank of Zambia, 2021).

These steps were taken to protect the financial sector's stability and lessen the pandemic's negative economic effects. Although inflation departed from the intended range of 6 to 8%, the relaxation of monetary policy was considered necessary to address the challenges posed by the pandemic (Bank of Zambia, 2021).

In 2022, Zambia's macroeconomic objectives included achieving a real GDP growth rate of at least 3.5%, reducing inflation to single digits by the end of 2022 and within the target band of 6-8% by mid-2023, and maintaining international reserves of at least 3.0 months of import cover, among other goals (Bank of Zambia, 2023). Monetary policy in 2022 remained focused on containing inflationary pressures and anchoring inflationary expectations to achieve the single-digit target. The Monetary Policy Rate was maintained at 9.0% throughout the year. Various factors, including progress in fiscal consolidation, structural reforms, and external debt restructuring discussions, influenced this monetary policy stance. Despite facing challenges, including global financial conditions, the consequences of COVID-19 and the Russia-Ukraine conflict, the Bank of Zambia remained committed to its monetary policy objectives (Bank of Zambia, 2023).

In summary, the period from 1991 to 2022 in Zambia witnessed a remarkable economic journey marked by shifts in exchange rate regimes, fluctuations in economic growth rates, and dynamic monetary policy responses. The change from a fixed exchange rate regime to a managed floating regime showcased the critical importance of exchange rate flexibility in harnessing external opportunities and reforms for sustained economic growth. The spike in economic growth in 2009 and 2010 highlighted the role of monetary policy in amplifying growth during favorable conditions, while the years from 2016 to 2022 demonstrated the need for adaptive policies to navigate external challenges and changing global economic conditions. Additionally, the significant economic contraction in 2020 due to the global COVID-19 pandemic underscored the importance of investigating the role of monetary policy in crisis management.

This research topic on "The Impact of Monetary Policy on Economic Growth in Zambia (1991-2022)" was conceived out of the recognition that Zambia's economic history provides a unique case study for understanding the intricate interplay between exchange rate regimes, monetary policy decisions, and economic performance. It is evident that the

effectiveness of monetary policy and the choice of exchange rate regime measures played pivotal roles in shaping Zambia's economic trajectory over the years. However, despite the rich data and insights available, there remains a critical gap in knowledge regarding the precise mechanisms through which these policies influenced economic growth, particularly in the context of changing global dynamics.

This research holds immense importance as it directly informs policy formation and decision-making in Zambia. By delving into the historical and empirical aspects of exchange rate regimes and monetary policy, this study aims to provide policymakers with insights grounded in evidence to stabilize the economy, attract investments, and support long-term prosperity. Furthermore, it is an essential tool for researchers, economists, and organizations seeking to comprehend the complex connection between monetary policy and economic expansion, with potential applications beyond Zambia's borders. In the end, our research aims to close the information gap and support the creation of useful policies that will help Zambia meet its economic problems in the future and seize chances for long-term, sustainable growth and prosperity.

1.3 Statement of the problem

Like many other developing countries, Zambia faces a number of obstacles on the path to sustained economic growth. Economic performance is greatly impacted by monetary policy, a crucial tool of macroeconomic management. Changes in exchange rates, an essential part of monetary policy, can have a big effect on economic growth. “A variable exchange rate may cause uncertainty in commerce and investment, reducing the country's worldwide competitiveness. Exchange rate volatility has been a chronic problem for the Bank of Zambia (BoZ) in recent years” (Bank of Zambia, 2021). Additional research is necessary because it is unclear how much these oscillations impact economic growth.

Additionally, inflation rates have an immense impact on economic growth. “Inflationary pressures weaken buying power, undermine consumer and investor confidence, and skew resource allocation” (Mankiw, 2014). Over the past ten years, Zambia's inflation rate has varied, averaging 15.7% in 2020 (WDI, 2022). Examining the relationship between inflation rates and economic growth is essential to developing appropriate policy actions that might lessen unfavorable effects and advance long-term development. The stance

of monetary policy determines the overall economic activity, which consequently affects borrowing costs, investment decisions, and borrowing costs. Changes in the macroeconomic environment and central bank policy measures have been documented as causing interest rate fluctuations in Zambia. But more research is needed to understand how interest rate fluctuations affect economic growth so that monetary policies that promote investment and productivity may be created. The elements that significantly influence economic growth include currency value volatility, inflation rates, and interest rates, specifically, Knowing the connection between these monetary policy determinants

1.4 Research Objectives

1.4.1 General objective

Assessing the impact of monetary policy on Zambia's economic development is the main goal of this study.

1.4.2 Specific objectives

The following are the specific objectives:

i. To determine the effect of exchange rate fluctuations on Economic growth in Zambia.
ii. To ascertain the effect of inflation rates fluctuations on Economic growth in Zambia.
iii. To evaluate the effect of interest rates fluctuations on Economic growth in Zambia.
iv. To assess the effect of money supply on Economic growth in Zambia.

1.5 Research Questions

i. What is the impact of fluctuations in exchange rates on economic growth in Zambia?

ii. How do fluctuations in inflation rates influence economic growth in Zambia?

iii. What is the relationship between fluctuations in interest rates and economic growth in Zambia?

iv. How does the variation in money supply affect economic growth in Zambia?

1.6 Hypotheses

i. H0: Zambia's economic growth is not significantly impacted by changes in exchange rates.

H1: Zambia's economic growth is significantly impacted by changes in exchange rates.

ii. H0: Zambia's economic growth is not significantly impacted by changes in the inflation rate

H2: Zambia's economic growth is significantly impacted by changes in the inflation rate.

iii. H0: Zambia's economic growth is not significantly impacted by changes in interest rates.

H3: The growth of Zambia's economy is significantly impacted by changes in interest rates.

iv. H0: In Zambia, there is no statistically significant correlation between the money supply and economic growth.

H4: In Zambia, the relationship between the money supply and economic growth is statistically significant.

1.6 Scope of the study

This paper examines how monetary policy affects Zambia's economic growth, with a focus on the effects of interest rate fluctuations, inflation, and currency rate movements. Utilizing relevant macroeconomic data and statistical methods, the research was quantitative in nature. The research period was extended from 1980 to 2022 in order to capture the changes and dynamics of the variables that were being examined. The World Bank, the Bank of Zambia, and other pertinent national and international databases were among the reliable sources from which secondary data was acquired. Factors including interest rates, currency rates, inflation rates, and measures of economic growth were included in the data. Zambia was the main subject of the research because of its unique economic and political circumstances. The research compared and contrasted itself with foreign literature in order to provide a broader viewpoint.

1.8 Significance of the study

The scholarly community, stakeholders, and policymakers in Zambia as well as the greater academic and business community will be greatly impacted by this study. The results will advance knowledge by providing a clearer picture of how monetary policy affects Zambia's economic expansion. The study's findings will help Zambian decision-makers create monetary policies that are more sustainable. By comprehending the relationship between exchange rate volatility, inflation rates, interest rates, and economic growth, policymakers may develop focused measures to stabilize the economy, stimulate investment, and foster sustainable growth. The research will broaden our understanding of the association between monetary policy and economic growth in academic literature. By doing empirical research, this work fills a vacuum in the existing literature and offers contextually relevant findings.

1.9 Limitations

It is critical to recognize the study's possible shortcomings. These include limitations on data, potential endogeneity issues, and the generalizability of results beyond the study's purview. Nonetheless, efforts were made to address these shortcomings and provide reliable and precise findings.

1.10 Definition of key terms and concepts

Monetary Policy: “the acts and policies taken by a country's central bank or monetary authority to govern and control the money supply, interest rates, and credit availability. It seeks particular macroeconomic goals such as price stability, low inflation, and long-term economic growth” (Mishkin & Serletis, 2011).

Exchange rate fluctuations: “Fluctuations in the value of one currency compared to another in the foreign exchange market. These oscillations can be caused by a variety of variables, including supply and demand dynamics, macroeconomic circumstances, and market expectations” (Ison & Wall, 2007).

Fluctuations in Inflation Rates: “variations or changes in the general price level of goods and services in an economy over a given time period. Inflation rates reflect how quickly or slowly prices are growing or declining. Changes in aggregate demand, supply

shocks, government actions, and monetary variables can all cause fluctuations in inflation rates" (Mishkin & Serletis, 2011).

Fluctuations in Interest Rates: "changes or variations in the cost of borrowing or the return on investment over time. Monetary policy actions, market circumstances, inflation expectations, and the general status of the economy all influence interest rates. Interest rate fluctuations can have an impact on borrowing costs, investment decisions, and overall economic activity" (Mishkin & Serletis, 2011).

1.11 The Organization of the report

Chapter One: Introduction; the first chapter serves as the foundation for the entire research effort. It begins by providing readers with a clear overview of the research topic, offering context for what follows in the study. It also explains why this research is significant, showcasing its relevance to both the academic community and relevant stakeholders. Within this chapter, the problem statement is defined, outlining the primary challenge or issue the research aims to address. This clear definition serves as a guiding beacon for the creation of research goals and questions, helping to narrow the study's focus. Additionally, the research objectives are outlined in this chapter, effectively serving as a roadmap for the study's direction. Furthermore, the scope of the research is defined, clarifying what will and won't be included in the study. Lastly, key terms related to the topic are explained in this section to ensure everyone, including those who may not be experts in the field, understands the specialized language used throughout the study.

Chapter Two: Literature Review; In the second section, a comprehensive review of existing literature is conducted. This involves examining previous studies and credible sources that are relevant to the research. The primary goal is to understand what is already recognized about the study topic and to recognize any gaps in knowledge where the current study can contribute. This chapter critically evaluates prior research, providing insights into the existing body of knowledge and informing the framework and methods used in the study.

Chapter Three: Research Methods and Procedures; Chapter three is dedicated to explaining the research methods and procedures employed in the study. It offers

transparency regarding the research's scope, including details about the size of the sample group and how the sample was selected. This chapter also delves into the tools used to collect data and justifies why these particular methods were chosen based on how well they align with the research goals. Furthermore, it outlines the steps taken to process data, including any statistical techniques used, all in an effort to ensure the accuracy and reliability of the study results.

Chapter Four: Presentation and Interpretation of Findings; Section four is where the research findings are presented and interpreted. Various methods are employed to analyze the data and uncover patterns and relationships within it. The goal is to give a thorough grasp of the research issue through an in-depth and perceptive analysis of the findings

Chapter Five: In-Depth Analysis of Research Results; Chapter five extends the analysis of research results in depth. The results are examined, analyzed, and contextualized in relation to the study goals. Patterns and trends discovered in the data analysis are highlighted, adding depth to the overall narrative of the research.

Chapter Six: Conclusion and Recommendations; In the final chapter, chapter six, a concise summary of the research results is provided, aligning them with the original research objectives. Recommendations based on the findings are presented, offering practical insights for potential actions or improvements. This chapter also discusses possible areas for organizational or policy changes based on the research findings. Finally, it suggests directions for future research, inspiring and guiding future researchers to build on the current findings and address unresolved questions.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

A thorough analysis of the body of research is provided in this chapter, playing a pivotal role in shaping the research framework and methods employed in this study. This section probes into a critical examination of prior studies and credible sources pertinent to the research topic. Its primary objective is to explain the existing body of knowledge surrounding the research area and to pinpoint gaps in understanding where the current study can make valuable contributions. The study starts with a discussion of relevant empirical literature done by other scholars, followed by a review of theories and finally a conceptual framework is presented.

2.1 Empirical Literature

In this section, the body of extant literature is thoroughly reviewed, spanning global, regional (African), and local (Zambian) contexts. By examining a wide spectrum of related studies, this review aims to provide a thorough understanding of the research topic, identify gaps in knowledge, and inform the current study's framework and methods.

2.1.1 Global Perspective

This segment extends the reach by examining viewpoints from around the world regarding how monetary policy affects economic growth. It synthesizes findings from international studies to discern common trends, varying approaches, and lessons learned. This global context offers valuable insights that can inform the study of Zambia's economic development.

To start with, Srithilat & Sun (2017) conducted a comprehensive study in Lao PDR, titled "The Impact of Monetary Policy on Economic Development." This research spanned from 1989 to 2016 and primarily aimed to assess how monetary policy variables, including money supply, interest rates, inflation rates, and real exchange rates, influenced the country's economic development (Srithilat & Sun, 2017). To examine the connections

between these variables, the study used sophisticated econometric methods like unit root testing, Johansen Cointegration, and Error Correction Models. The findings of the study revealed that money supply, interest rates, and inflation rates had a negative impact on real GDP per capita in the long run, while the real exchange rate had a positive effect. Additionally, the study identified short-run causality between money supply, real exchange rates, and real GDP per capita, underscoring the intricate dynamics of monetary policy in Lao PDR's economic development (Srithilat & Sun, 2017).

A parallel investigation was conducted by Sultana (2023) in Bangladesh, focusing on "The Impact of Monetary Policy on Economic Growth (1990-2018)." The money supply, interest rates, inflation rates, exchange rates, remittance inflow, and balance of payments were among the factors particularly examined in this study, which investigated the connection between Bangladesh's economic growth and monetary policy (Sultana, 2023). Sultana adopted the ordinary least squares (OLS) approach to scrutinize the data. The study's findings revealed several key insights. Firstly, broad money supply, interest rates, and inflation rates were found to have a positive influence on Bangladesh's economic growth. Increased money supply, stable inflation, and supportive interest rates were associated with sustained GDP growth exceeding 6% (Sultana, 2023).

Additionally, Bangladesh's adoption of a controlled exchange rate system was identified as contributing positively to economic growth. However, the study also highlighted the adverse influence of long-term negative balances of payments on economic development. Importantly, a decrease in remittance inflows was recognized as a negative factor affecting GDP growth. The study concluded that an effective monetary policy was crucial for ensuring sustained GDP growth in Bangladesh and mitigating sudden financial shocks, underscoring the importance of policymakers' understanding of the relationships between monetary policy variables and economic growth (Sultana, 2023). These two studies, conducted in Bangladesh and the Lao PDR, offer important insights into the intricate link that exists between monetary policy and economic development in different contexts. They highlight the dynamics at play and emphasize the importance of evidence-based policymaking to promote economic stability and growth.

2.1.2 Regional Perspective

This subsection shifts the focus to the African region, examining studies conducted in various African countries. It seeks to understand how monetary policy has been deployed to drive economic growth across the continent. By considering regional dynamics and challenges, this review enriches the analysis of monetary policy's impact on economic development.

A study on South Africa was carried out by Chipote and Makhetha-Kosi (2014), spanning the years 2000-2010. This research employed robust econometric techniques, including Augmented Dickey-Fuller and Phillips Perron unit root tests, Johansen co-integration, and the Error Correction Mechanism, to analyze the interactions between monetary policy instruments and economic growth (Chipote & Makhetha-Kosi, 2014). The variables had a long-term association, according to the study. Importantly, it revealed that money supply, the repo rate, and exchange rates were insignificant drivers of growth in South Africa, while inflation emerged as a significant factor. As a result, the study suggested that in order to support sustained economic growth, monetary policy should work to create an environment that is conducive to investment and draw in both domestic and international capital. Furthermore, it emphasized how crucial it is for the government to invest more money on productive industries in order to support monetary policy efforts in promoting economic growth (Chipote & Makhetha-Kosi, 2014).

Tanzania's economic growth from 1975 to 2013 was examined by Twinoburyo and Odhiambo (2017) in relation to monetary policy. The study looked at the relationship between interest rates and the money supply, two proxies for monetary policy, and economic development using the autoregressive distributed lag (ARDL) bounds-testing method. Regardless of the proxy employed, the findings indicated that monetary policy had no long-term effect on economic growth. Short-term results, however, showed neutrality in monetary policy, especially when interest rates were taken into account. On the other hand, the money supply served as a stand-in for the relationship between monetary policy and economic growth, which was primarily negative (Twinoburyo & Odhiambo, 2017).

The impact of monetary policy on Nigeria's economic growth from 1986 to 2016 was studied by Ufoeze et al. (2018). A variety of monetary policy variables were included in the analysis, with the natural log of GDP serving as the dependent variable. These variables included the monetary policy rate, money supply, exchange rate, loan rate, and investment (Ufoeze, et al., 2018). The data was analyzed using unit root and co-integration tests together with Ordinary Least Squares (OLS) in this study. The study emphasized a number of significant findings and found a long-term association between the factors. The money supply had a major positive impact on economic growth, but investment, interest rates, and monetary policy rates had little to no positive benefits. However, the exchange rate negatively affected Nigeria's GDP. The study also demonstrated the causal links between a number of factors, showing that investment and money supply are the main drivers of economic growth. Overall, it was demonstrated that monetary policy may account for a sizable amount of the variations in Nigeria's economic growth, highlighting its potential as a tool for managing the country's economy, maintaining price stability, and increasing output (Ufoeze, et al., 2018).

2.1.3 Local Perspective

Finally, this subsection narrows its scope to local studies conducted in Zambia. These studies provide critical insights into the country's specific economic landscape, policy decisions, and their outcomes. By closely examining research conducted within Zambia, the review identifies areas where additional inquiry is warranted.

Zgambo & Chileshe (2014) conducted an empirical analysis focusing on Zambia's monetary policy. The study investigated the money demand function and the monetary transmission mechanisms (MTMs) in Zambia (Zgambo & Chileshe, 2014). Utilizing the Autoregressive Distributed Lag (ARDL) approach for the money demand function and the Vector Autoregressive (VAR) framework for MTMs, the research yielded several key findings. Long-term factors affecting the money demand function included real income, the exchange rate, and Treasury bill rates; short-term factors included inflation. Notably, it was shown that monetary aggregates, particularly broad money, were crucial in the transmission of monetary policy, but interest rates had no noticeable impact on output or prices. The exchange rate emerged as an important channel for the transmission of

monetary policy. These results highlighted the continued relevance of monetary aggregates in the Bank of Zambia's monetary policy, even as the country moved toward adopting inflation targeting (Zgambo & Chileshe, 2014).

Moyo (2019) conducted a similar study in Zambia titled "The Impact of Monetary Policy on Zambia's Economic Growth." Multiple linear regressions were used in this study, which covered the years 1985 to 2015, to investigate how monetary policy affects economic growth (Moyo, 2019). The study's conclusions highlighted how ineffective Zambia's broad money supply was as a tool for monetary policy. On the other hand, it was determined that the inflation rate and currency rate were important monetary policy instruments that had a significant impact on economic growth. The significance of preserving currency rate stability and controlling inflation in order to promote economic growth in Zambia was highlighted by these findings. In order to encourage reasonable economic development, the report also suggested monetary policies that support an investment climate that is conducive to attracting investments from both domestic and foreign sources. Multiple linear regressions were used in this 1985–2015 study to investigate the impact of monetary policy on economic Growth (Moyo, 2019).

Mwange (2022) carried out studies to evaluate the efficiency of Zambia's monetary policy transmission channels and look at how monetary policy affects the real economy. Using the Johansen cointegration method, Error Correction Model (ECM), and Granger causality test, the study provided valuable insights into Zambia's monetary policy landscape. The findings indicated that lending rates, inflation, and increased private sector credit negatively affected economic growth in Zambia, while the exchange rate and deposit rates had a positive impact. These findings confirmed that the nation's monetary policy is transmitted through both credit and exchange rate channels. The study provided insights into the efficacy of different monetary policy transmission channels in Zambia and added to the theoretical and empirical literature on the effects of monetary policy on the real sector.(Mwange, 2022).

2.1.4 Gaps in Literature

While assessing existing literature, this subsection identifies research gaps and challenges that persist across different perspectives. The current study's objectives and

research questions are based on these shortcomings. Additionally, the section acknowledges methodological challenges and limitations encountered in prior research.

Table 1: Gaps in Literature

Study Title	Methodology	Study Findings	Limitations
Impact of Monetary Policy on Economic Development: Evidence from Lao PDR (Srithilat & Sun, 2017)	Time series data (1989-2016), Johansen Cointegration, Error Correction Model	Money supply, interest rate, and inflation rate negatively affect real GDP per capita in the long run. The real exchange rate has an advantageous impact. Real GDP per capita, real exchange rate, and money supply are all correlated in the short term	Limited to Lao PDR; applicability to other economies may vary. Data limited to a specific time frame. Temporal constraints may not account for long-term trends. External forces like global shocks not considered. Lack of analysis of monetary policy actions beyond the study period.
The Impact of Monetary Policy on Economic Growth (1990-2018) (Sultana, 2023)	Time series data (1990-2018), Ordinary Least Squares (OLS)	Broad money supply, interest rate, and inflation rate positively influence Bangladesh's economic growth. Exchange rate stability and remittance inflow are beneficial. Negative balance of payments harms growth.	Specific to Bangladesh; results may not apply universally. Data quality and limitations. No consideration of external forces like global shocks or analysis of monetary policy actions beyond the study period.
Role of Monetary Policy in Promoting Economic Growth in South Africa (Chipote & Makhetha-Kosi, 2014)	Time series data (2000-2010), Augmented Dickey-Fuller, Johansen Cointegration, Error Correction Model	Money supply, repo rate, and exchange rate are insignificant monetary policy instruments for growth in South Africa. Inflation is significant. Investment climate and government spending are critical for growth.	Time frame limited to the study period (2000-2010). Temporal constraints may not account for long-term trends. External forces like global shocks not considered. No analysis of monetary policy actions beyond the study period.
The Role of Monetary Policy in Promoting Economic Growth in Tanzania (Twinoburyo & Odhiambo, 2017)	Time series data (1975-2013), Autoregressive Distributed Lag (ARDL)	No long-term impact of monetary policy on economic growth in Tanzania. Short-term results show monetary policy neutrality. Different results depending on proxy used.	Data limitations and potential omitted variables (inflation, exchange rates). Endogeneity issues not fully addressed. Lack of analysis of external forces like global shocks or monetary policy actions
Effect of Monetary Policy on Economic Growth in Nigeria (Ufoeze, et al., 2018)	Time series data (1986-2016), Ordinary Least Squared (OLS)	There are negligible beneficial benefits of investment, interest rates, and monetary policy rate on Nigeria's economic growth. The money supply is quite beneficial. An important drawback of exchange rates.	Data limitations and potential omitted variables. Endogeneity issues not fully addressed. No analysis of external forces like global shocks or monetary policy actions beyond the study period

Study Title	Methodology	Study Findings	Limitations
Effectiveness of Monetary Policy in Zambia (Zgambo & Chileshe, 2014)	Time series data, Autoregressive Distributed Lag (ARDL), Vector Autoregressive (VAR)	Money demand function determined by real income, exchange rate, Treasury bill rates in the long run. Inflation plays a role in the short run. Monetary aggregates and exchange rate important in transmission.	External forces like global shocks (e.g., political regime changes) not considered. Lack of analysis of monetary policy actions beyond the study period.
The Impact of Monetary Policy on Zambia's Economic Growth, 2019 (Moyo, 2019)	Time series data (1985-2015), Multiple Linear Regressions	Broad money supply is an insignificant monetary policy instrument in Zambia. Currency rate and inflation rate significantly influence economic growth. Monetary policies should support a favorable investment climate.	Data limitations and potential omitted variables. Endogeneity concerns not fully addressed. No analysis of external forces like global shocks (e.g., political regime changes) or monetary policy actions beyond the study period.
Impact of Monetary Policy on the Real Sector in Zambia (Mwange, 2022)	Time series data, Johansen cointegration, Error Correction Model	Lending rates, inflation, and increased private sector credit negatively affect Zambia's economic growth. Exchange rate and deposit rates have a positive impact. Exchange rate and credit channels exist.	External forces like global shocks (e.g., COVID-19) not considered. Lack of analysis of monetary policy actions beyond the study period.

Limitations:

1. **Temporal Constraints**: Many of the reviewed studies are limited by their study period. They analyze data within a specific time frame, which may not capture the dynamics of economic growth over a more extended period. For example, some studies focus on a decade or two, which might overlook long-term patterns and fundamental shifts in the financial system.
2. **Excluded Variables**: Several studies do not include certain crucial variables in their analyses. For instance, some omit variables such as lending rates, deposit rates, or fiscal policies that may significantly impact economic growth. The omission of these variables can limit the comprehensiveness of the analysis.

3. **Lack of External Factors**: Many studies do not consider the influence of external forces on the economy. External factors, such as global economic trends, changes in international commodity prices, or geopolitical events, can have substantial effects on economic growth. Ignoring these external forces may lead to incomplete analyses.

Failure to Account for External Forces:

One notable limitation in several of these studies is the lack of consideration for external forces that extend beyond their study periods:

1. **COVID-19 and Global Shocks**: Occurrences like the COVID-19 pandemic have significantly altered the global economy. These studies typically do not account for such unprecedented global shocks and their implications for economic growth. In reality, events like the pandemic can disrupt economies and render historical data less applicable to the current context.
2. **Monetary Policy Evolution**: Monetary policy is not static and evolves over time. Many studies do not consider how monetary policy actions taken beyond their study periods may have influenced economic growth. Changes in policy regimes, targets, or tools can have lasting effects on economic performance.
3. **Long-Term Policy Effects**: Some studies may not fully capture the long-term effects of monetary policy actions. Monetary policy decisions can have lagged impacts that extend beyond the study period. Focusing solely on short-term effects may miss important dynamics.

Given these constraints, it's critical to understand that the economic environment is susceptible to a range of outside influences and changes in policy that go beyond the purview of individual studies. A comprehensive analysis should consider the interaction of these factors, including the long-term and evolving nature of monetary policy, and the potential impact of unexpected global shocks like the COVID-19 pandemic.

2.2 Theoretical Framework

Both Keynesian and monetarist theories contend that there are several ways in which monetary policy influences economic activity. Understanding the significance of the connection between monetary policy and economic growth is crucial. This segment provides a thorough review to the theories related to monetary policy.

2.2.1 The Monetary Theory and Monetarism

The Monetary Theory, a school of thought, provides valuable insights into the pivotal role of money supply in shaping economic growth. Within this framework, Monetarism, pioneered by Milton Friedman, stands as a prominent school of thought that has refined classical macroeconomic principles. Monetarism is based on an advanced interpretation of the quantity theory of money, which provides a thorough knowledge of the connection between the money supply and the state of the economy. (Friedman, 1996).

Friedman's Quantity Theory of Money

Milton Friedman's Monetarism states that an economy's stability and prosperity are greatly influenced by the quantity of money in circulation. According to Friedman's theory, stable economic growth requires a set rate of increase in the money supply. It emphasizes that monetary authorities, including central banks, should refrain from excessive interference in money supply control to maintain economic stability (Mishkin & Serletis, 2011).

Money's Multifaceted Nature

Friedman's theory recognizes that money supply is not limited to mere transactional needs; it extends to various forms of wealth, encompassing bonds, equities, physical assets, and human capital. Each form of wealth possesses distinct characteristics and yields, contributing to the overall demand for money. These diverse elements collectively influence aggregate money demand and subsequently impact economic output (Mankiw, 2014).

Short-Run and Long-Run Implications

Monetary Economists assert that economies may not consistently operate at full employment levels of real GDP. In the short-run, they contend that expansionary monetary policies can stimulate aggregate demand, potentially increasing real GDP. However, in the long-run, when the economy approaches full employment, the quantity theory of money maintains its relevance, elucidating the interconnectedness between money supply, price levels, and real GDP. Overextended expansionary monetary policies in the long-term can lead to inflation, with limited effects on gross domestic product (Romer, 2012).

Model Specification: The Quantity Theory of Money

In line with the Monetarist perspective, A mathematical representation of the Quantity Theory of Money is as follows: (Mishkin & Serletis, 2011):

$$MV=PY$$

Where:

- The money supply is denoted by M
- The letter V stands for velocity of money, which represents the speed at which money moves throughout the economy.
- The price level, or P, represents the mean cost of products and services.
- Y stands for real GDP, which is the entire amount of goods and services produced.

Through shedding light on the intricate relationships between the money supply, velocity, price levels, and real GDP, this model encapsulates the fundamental concepts of monetary theory. It offers a theoretical framework for examining how monetary policy dynamics impact economic growth. The study intends to use this theoretical framework to examine the intricate relationship between monetary policy and economic development in Zambia, in keeping with the theories put forward by Milton Friedman and the monetarist school of thought.

2.2.2 The Neoclassical Theory

The Neoclassical Theory offers a distinctive perspective on long-term economic growth, centering on factors such as capital accumulation, technological advancement, and labor productivity. According to this theory, sustained economic growth primarily stems from the accumulation of physical capital (e.g., machinery, infrastructure, and equipment) and human capital (comprising the knowledge, skills, and education of the workforce). In line with this hypothesis, elevating both the quantity and quality of capital, coupled with technological innovations, results in heightened levels of production and productivity (Mankiw, 2020).

Diminishing Returns and Technological Advancement

The idea of declining returns on capital accumulation is a cornerstone of neoclassical theory. As capital grows and technology advances, the marginal productivity of capital falls over time due to diminishing returns. This suggests that the additional production produced by each new unit of capital gradually declines as the capital stock grows. Nevertheless, technological progress plays a crucial role in mitigating this effect. By enhancing the efficiency and productivity of capital, technological advancement counters the diminishing returns associated with capital accumulation, fostering sustained economic growth over the long term (Romer, 2012).

Market Forces, Supply and Demand Dynamics, and Resource Allocation

The Neoclassical Theory underscores the significance of market forces, supply and demand dynamics, and efficient resource allocation in driving economic growth. It posits that free markets, characterized by prices that adjust to equate supply and demand, serve as vital drivers of economic growth by incentivizing investment, innovation, and effective allocation of resources (Mankiw, 2020).

Policy Implications and Growth Drivers

The influence of Neoclassical Theory extends to understanding long-term growth patterns and formulating economic policies. It offers a framework for analyzing the factors that influence economic growth, highlighting the importance of investments in human and

physical capital as well as the role that technical innovation plays in raising production and productivity.

2.2.3 Keynesian View of Monetary Policy

The Keynesian View of Monetary Policy challenges several classical economic assumptions and provides a unique perspective on the relationship between money, prices, and economic activity (Keynes, 1936). This theory, rooted in the ideas of economist John Maynard Keynes, offers a different lens through which to understand the impact of monetary policy on an economy. Keynesians depart from the traditional quantity theory of money, which maintains that changes in the money supply correspond to changes in prices in a direct and proportionate manner. Instead, they emphasize that the connection between money and prices is indirect and operates through the interest rate mechanism. This view is in contrast to the classical notion of a straightforward quantity theory of money, which suggests that changes in the money supply directly affect prices (Mankiw, 2014).

Furthermore, Keynesians challenge the classical belief that an economy is always operating at or near its natural level of real GDP. In the classical framework, it's assumed that the level of output (represented as Y in the equation of exchange) is relatively fixed. However, Keynesians argue that economies can experience significant fluctuations and may not always be at full employment. This perspective acknowledges the possibility of recessions and economic downturns (Mankiw, 2014).

Additionally, Keynesians reject the idea that the velocity of money (the rate at which money changes hands in the economy) is constant. Classical economics often assumes a constant velocity, simplifying the relationship between money supply and economic activity. Keynesians argue that velocity can vary in response to economic conditions and policy changes (Ison & Wall, 2007).

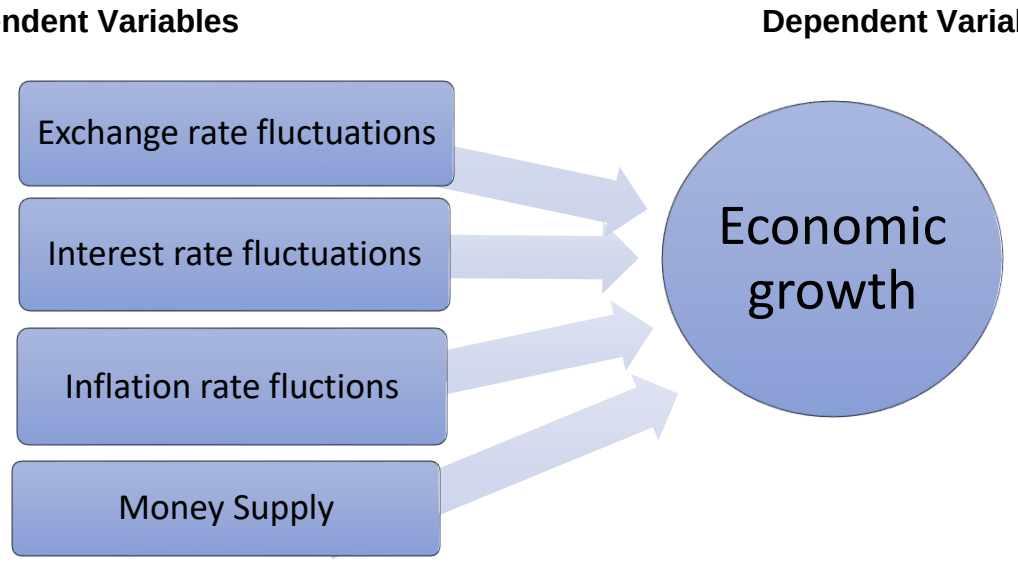
Keynesians claim that by affecting interest rates, expansionary monetary policies, such as raising the money supply, have an impact on the economy (Mankiw, 2014). The quantity of loanable cash rises when the central bank finances the banking sector. The increase of capital causes interest rates to drop. In consequence, lower interest rates encourage overall spending on investments and consumption items that are sensitive to

interest rates. Businesses and consumers are more likely to invest and spend as credit becomes more affordable. Real GDP eventually rises as a result of this increased economic activity.

2.3 Conceptual Framework

The links between the independent variables (variations in interest rates, inflation rates, and exchange rates) and the dependent variable (economic growth) are visually represented by the conceptual framework. The presentation of this conceptual framework is seen in Figure 2.

Figure 2. Conceptual Framework:



"Economic Growth," the dependent variable in this study, is a gauge of the overall growth or contraction of the Zambian economy during a given period of time. Indicators like the Gross Domestic Product (GDP), which measures the entire amount of final products and services produced inside a nation's boundaries, are commonly used to quantify economic growth. GDP is a measure of the overall level of economic activity that takes into account government spending, investment, consumption, and net exports (WDI, 2022).

The hypothesized relationships between the variables under research are visually outlined in the suggested conceptual framework. The expected relationships between the variables are represented by the arrows in this framework. In accordance with the

specified research objectives, the study posits that fluctuations in exchange rates, inflation rates, interest rates, and money supply have direct impacts on economic growth. Empirical analysis was conducted to rigorously examine and test these hypotheses, providing valuable insights into the dynamics of the Zambian economy.

1. **Exchange Rate Fluctuations and Economic Growth:** Zambia's economic growth is expected to be directly impacted by changes in exchange rates. When the local currency appreciates, exports become more costly and may not be as popular abroad as they could be if Zambian goods had a declining value. Due to the fact that it depends on a number of variables, including the state of the global economy and economic structure, the relationship between exchange rates and economic growth is complicated.(Islam & Hossain, 2018).

2. **Inflation Rate Fluctuations and Economic Growth:** Both favorable and unfavorable effects of inflation on economic growth are possible. Positive economic growth is typically linked to low and stable inflation rates because they promote investment and price stability. Nevertheless, unstable and high rates of inflation can reduce buying power and breed uncertainty, which can stifle investment and impede economic expansion (Romer, 2012).

3. **Interest Rate Fluctuations and Economic Growth:** Interest rates and economic growth have a significant relationship. Reduced interest rates have the potential to encourage borrowing and investment, which would boost growth and economic activity. On the other hand, high interest rates could deter people from borrowing and investing, which could impede economic growth (Twinoburyo & Odhiambo, 2017).

4. **Money Supply Fluctuations and Economic Growth:** Changes in the money supply may have an effect on economic expansion. When properly controlled, a rise in the money supply can boost economic activity by giving consumers and companies access to liquidity. But rapid expansion of the money supply can also result in inflation, which is bad for economic expansion (Ufoeze, et al., 2018).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter serves as a comprehensive guide to the research methodology and procedures utilized throughout the study. It provides a transparent account of the research approach and design, elucidating crucial aspects such as the sample size determination and the sample selection. Additionally, this chapter clarifies the data collection sources utilized, shedding light on the origins of the data harnessed for the study. Furthermore, it meticulously outlines the data processing steps, incorporating insights into any statistical techniques harnessed, all meticulously orchestrated to fortify the precision and dependability of the research outcomes.

3.1 Research Approach

The study embraced a rigorous quantitative approach, characterized by the collection and systematic analysis of numerical data. This method, as defined by Creswell and Creswell (2017), involves the careful gathering of quantitative data to test hypotheses and derive statistically significant conclusions (Creswell & Creswell, 2017). In the context of this research, the chosen quantitative approach was instrumental in examining the empirical connections between key independent variables, including Exchange Rate, Inflation Rate, Interest Rate, and Money Supply, and their impact on economic growth in Zambia. This approach allows for a comprehensive and data-driven analysis of these monetary policy factors and their influence on the overall economic growth of the country.

3.2 Research Design

The research adopted a correlational research design, a choice that is well-justified for several reasons. Firstly, a correlational research design is particularly suitable for examining the relationships between variables without any manipulation or intervention (Creswell & Creswell, 2017). In this study, the primary objective is to explore the empirical links between key monetary policy factors (Exchange Rate, Inflation Rate, Interest Rate,

and Money Supply) and economic development in Zambia. These variables are naturally occurring and cannot be manipulated for ethical and practical reasons. Therefore, a correlational design aligns perfectly with the research's exploratory nature, allowing the researcher to assess the degree and direction of associations between these variables.

Secondly, the correlational research design enables the study to capture real-world complexities. Monetary policy and economic development are multifaceted phenomena influenced by various internal and external factors. By using a correlational approach, the researcher can analyze the naturally occurring relationships between monetary policy variables and economic growth without oversimplifying or artificially controlling the intricate dynamics at play. This approach acknowledges the complexity of the economic environment and avoids making assumptions that could limit the study's applicability. Additionally, a correlational design offers practical advantages in terms of data collection and analysis (Creswell & Creswell, 2017). It allows for the quantitative examination of multiple variables simultaneously, providing a comprehensive view of their interplay. Given the study's focus on monetary policy and economic development, quantitative methods are highly suitable for capturing and quantifying these relationships.

3.3 Data

Reputable organizations such the World Bank, the Bank of Zambia, and Zambia Statistical Agency (ZamStats) served as the primary data sources. These organizations provide comprehensive and precise economic data for research.

3.4 Sample size

The study utilized a comprehensive dataset covering a substantial timeframe, ranging from 1980 to 2022. This period has been deliberately selected to facilitate an extensive historical analysis. Incorporating such a wide temporal scope allows for a robust examination of how monetary policy dynamics have impacted the country's economic growth over several decades. By encompassing over four decades of data, the research can capture various economic cycles, policy shifts, and external influences that might have played pivotal roles in shaping Zambia's economic landscape.

3.5 Model specification

In the pursuit of examining the impact of monetary policy variables on Zambia's economic growth, the researcher adopted a growth equation framework inspired by the work of Srithilat and Sun (2017) and Sultana (2023). The primary dependent variable, "GDPgrowth," signifies the annual percentage growth rate of the Gross Domestic Product (GDP). Within this framework, the key monetary policy variables served as the independent variables: exchange rate fluctuations (EXC), inflation rate fluctuations (INF), interest rate fluctuations (INT), and money supply (MS).

The model equation can be represented as follows:

$$\mathrm{GDPgrowth} = \beta_0 + \beta_1 \mathrm{EXC} + \beta_2 \mathrm{INF} + \beta_3 \mathrm{INT} + \beta_4 \mathrm{MS} + \varepsilon$$

Where:

- **GDP growth** represents the annual percentage growth rate of the Gross Domestic Product.
- **EXC** accounts for exchange rate fluctuations, encapsulating the effects of changes in the exchange rate on economic growth.
- **INF** encapsulates inflation rate fluctuations, signifying the impact of changes in the inflation rate on economic growth.
- **INT** represents interest rate fluctuations, illustrating the effects of interest rate changes on economic growth.
- **MS** denotes changes in money supply.
- **β_0**, the intercept term, plays a pivotal role in the model. It accounts for the expected value of the dependent variable, GDP growth, when all independent variables (exchange rate fluctuations, inflation rate fluctuations, interest rate fluctuations, and changes in money supply) are equal to zero.
- **β_1, β_2, β_3,** and **β_4** symbolize the regression coefficients, quantifying the estimated influence of each independent variable on **GDP_growth**.
- **ε** stands for the error term, encompassing unexplained variations in **GDP_growth** not accounted for by the independent variables.

Using an appropriate econometric method, such as ordinary least squares (OLS) regression, the research evaluated the values of the regression coefficients (β_0, β_1, β_2, and β_3). The analysis conducted yielded significant insights into the impact of fluctuations

in the money supply, interest rates, inflation, and exchange rates on Zambia's economic growth.

Secondary data sources served as the primary means of data collection. The study drew upon a variety of reputable and authoritative sources to gather the necessary information for analysis. The selected sources include:

1. **Zambia Statistical Agency (ZamStats):** ZamStats is a key data repository for economic and demographic statistics in Zambia. It provides a wide array of official data, including GDP figures, inflation rates, and other relevant macroeconomic indicators.
2. **Bank of Zambia (BoZ):** As the nation's central bank, the BoZ is a vital source of financial and monetary data. It offers insights into monetary policy decisions, interest rates, money supply, and exchange rate information, all of which are pivotal variables in this study.
3. **World Bank Publications and Reports:** The World Bank publishes comprehensive reports and datasets on global economic trends and country-specific data. These reports often include valuable information on economic growth, monetary policy, and other related factors for Zambia.

The selection of these sources was based on their reliability, authority, and accessibility, ensuring that the data used in the research is of high quality and credibility. By utilizing data from these well-established institutions, the research aimed to enhance the accuracy, rigor, and validity of its findings. Additionally, the comprehensive nature of these sources enabled a thorough analysis of the relationship between monetary policy and economic growth in Zambia.

3.7 Data Analysis Methods

In the data analysis phase, EViews 10 was employed to estimate an Autoregressive Distributed Lag (ARDL) time series model, providing valuable insights. This analytical process was systematically divided into pre-estimation and post-estimation tests, each fulfilling a specific role in uncovering patterns and relationships within the data.

Pre-Estimation Tests:

Unit Root Test: Prior to conducting any estimation, the time series data underwent the Augmented Dickey-Fuller (ADF) Test. This crucial test assesses the stationarity of the data. “Nonstationary data could result in spurious regression outcomes, thereby compromising the reliability and validity of subsequent analyses” (Gujarati, 2004).

Estimation: The primary model used for this research is the Autoregressive Distributed Lag (ARDL) model, a well-established technique for analyzing time series data. EViews 10 statistical software was employed for the Ordinary Least Squares (OLS) estimation procedure. This method is recognized for its effectiveness in estimating the parameters of a linear regression model.

Bounds Tests: As part of the estimation process, Bounds Tests are applied to evaluate the existence of cointegration among the variables. This was essential for determining the long-run relationship between the variables. After the bounds test was conducted. A long run equation was estimated.

Post-Estimation Tests:

Autocorrelation Tests: Following regression analysis, Autocorrelation Tests were conducted to detect any serial correlation in the residuals. “Autocorrelated residuals can lead to biased parameter estimates, and addressing this issue is crucial for maintaining the reliability of regression results” (Gujarati, 2004).

Heteroscedasticity Test: Another post-estimation test involved assessing heteroscedasticity in residuals. “This test determines whether the residuals exhibit varying levels of variance across observations. Identifying and addressing heteroscedastic residuals is vital for accurate parameter estimation and inference” (Gujarati, 2004).

Normality Test: The final post-estimation step involved a Normality Test to evaluate the distribution of residuals. “Ensuring that the residuals follow a normal distribution is fundamental for valid hypothesis testing and parameter estimation” (Gujarati, 2004).

Stability Tests: Stability were assessed using the Cumulative Sum (CUSUM) Stability Test and the CUSUM of Squares Test. These tests visually represent the trajectory of

cumulative sums of estimated coefficients over time, ensuring the stability of the model throughout the study period. The lines within these tests remaining within the 5% boundary indicate model stability, affirming the reliability of the estimated relationships between variables over time.

3.8 Study Variables

Dependent Variable: Economic Growth

As the dependent variable in this study, economic growth is the main focus. It shows the general growth or decline of the Zambian economy during a given time frame. Economic growth, which is commonly gauged by metrics like GDP, represents the total amount of economic activity in a nation. Factors contributing to economic growth include investment, consumption, government spending, and net exports (WDI, 2022).

Independent Variables:

1. **Exchange Rate:** The exchange rate refers to the value at which one currency can be exchanged for another (Ison & Wall, 2007). In this study, it is considered as an independent variable. Fluctuations in the exchange rate can impact economic growth by influencing trade balances, exports, and imports (Mankiw, 2010). A weaker currency, for example, may make exports more competitive, potentially boosting economic growth.

2. **Interest Rate:** The interest rate represents the cost of borrowing or the return on savings. It is another independent variable in this study (Mankiw, 2010). Changes in interest rates can affect economic growth by influencing consumer spending, business investment decisions, and overall credit availability. Lower interest rates, for instance, may stimulate borrowing and investment, potentially leading to economic expansion (Mishkin & Serletis, 2011).

3. **Money Supply:** The money supply represents the total amount of money in circulation within an economy (Mishkin & Serletis, 2011). It is a significant independent variable in this study. Variations in the money supply can impact economic growth by

influencing consumer spending, investment, and overall liquidity in the market. An increase in the money supply can boost economic activity (Mankiw, 2014).

Control Variable: Inflation Rate

The study's control variable is the inflation rate, despite not being its primary focus. The rate at which the average cost of goods and services rises, decreasing the purchasing power of a currency, is referred to as inflation, according to Miskin and Serletis (2011). Through the use of a control variable, the inflation rate is introduced in an attempt to account for potential effects on the relationship between the independent variables (money supply, interest rate, and exchange rate) and the dependent variable (economic growth). Overinflation can have a negative impact on a number of economic activities and reduce the real value of money.

CHAPTER FOUR

ANALYSIS AND PRESENTATION OF FINDINGS

4.0 Introduction

This section explores the core of the research effort by presenting and interpreting the gathered data. Employing a variety of analytical methods, this chapter strives to unearth underlying patterns and relationships within the data, providing a detailed and insightful examination of the research topic. The ultimate aim is to offer a comprehensive understanding of the findings and their implications. The research findings are generated through an in-depth analysis using the EViews 10 statistical package, enabling rigorous exploration of the dataset The main data source for this study consists of time series data spanning from 1980 to 2022. The expanded duration facilitates a thorough analysis of the interplay between monetary policy variables and economic development in Zambia.

4.1 Unit Root Tests

A time series variable's stationarity can be ascertained using the Augmented Dickey-Fuller (ADF) unit root test. The ADF unit root test results for the variables under consideration are shown in table (2). The following are the outcomes:

Table 2: ADF Unit Root Test

Variable	Level P-Value	First Difference P-Value	Conclusion
GDPPCG	0.0005	-	I(0)
OER	0.9944	0.0000	I(1)
BMG	0.3840	0.0000	I(1)
RIR	0.2897	0.0000	I(1)
INFLD	0.3207	0.0000	I(1)

Source: “Generated by the researcher using EViews”, (2023).

1. **GDPPCG (GDP per capita growth):** For the level series, the p-value is 0.0005, which is below the 0.05 significance level. Therefore, the null hypothesis of non-stationarity is rejected. This means that the variable exhibits stationarity at level, it implies that the original series is integrated of order 0, denoted as I(0).

2. **OER (Official Exchange Rate):** The p-value for the series at the level is 0.9944, exceeding the significance level of 0.05.

Therefore, the null hypothesis of non-stationarity is not rejected. However, the p-value for the first difference series is 0.0000, indicating that the first difference series is stationary. Hence, OER is integrated of order 1, denoted as I(1).

3. **BMG (Broad Money Growth):** The p-value for the series at the level is 0.3840, indicating a value higher than 0.05. Therefore, the null hypothesis of non-stationarity is not rejected. However, the p-value for the first difference series is 0.0000, suggesting that the first difference series is stationary. Thus, BMG is integrated of order 1, I(1).

4. **RIR (Real Interest Rate):** The p-value for the level series is 0.2897, which surpasses 0.05. The p-value for the first difference series is 0.0000, implying that the first difference series is stationary. Consequently, RIR is integrated of order 1, I(1).

5. **INFLD (Annual Inflation):** The p-value for the level series is 0.3207, which surpasses than 0.05. However, the p-value for the first difference series is 0.0000, signifying that the first difference series is stationary. Thus, INFLD is integrated of order 1, I(1).

To sum up, the Unit Root Test Results demonstrate that the GDPPCG variable is stationary at level (I(0)), while OER, BMG, RIR, and INFLD are integrated of order 1 (I(1)) as their first differences are stationary. The integration order of these variables is crucial for subsequent time series analyses and modelling.

4.2 Bounds Test

The F-Bounds test plays a significant part in the analysis of time series data by examining. The presence of a cointegration relationship between variables. In this context, the test evaluates whether the factors have a consistent, long-term relationship. under investigation. According to the test's null hypothesis, "No levels relationship," there is neither cointegration nor a long-term equilibrium link between the variables. In other words, it suggests that these variables do not have a sustained connection over time. The F-statistic in the test, which is 5.214576, is compared with critical values at different significance levels (10%, 5%, 2.5%, and 1%). In this case, the focus is on the 5% significance level. At the 5% significance level, the F-statistic of 5.214576 is compared to the critical values of 2.56 and 3.49. Since the test statistic exceeds the upper critical value

(3.49), it suggests that the null hypothesis is rejected. This would mean that a cointegration relationship exists (I(1)), indicating that the variables are linked in the long term. On the other hand, if the test statistic falls below the lower critical value (2.56), it implies that the null hypothesis is not rejected, signifying the absence of a cointegration relationship (I(0)).

Table 3: Bounds Test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.214576	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: “Generated by the researcher using EViews”, (2023).

4.3 Short-run Estimation

The results of the empirical analysis provide insightful observations of the relationships between monetary policy variables and economic development in Zambia. This section interprets the findings, emphasizing the significance of each variable and the robustness of the model. The scholar implemented an Autoregressive Distributed Lag model of estimation using EViews. The choice of the Autoregressive Distributed Lag (ARDL) test is justified because the variables included in the analysis are of mixed order of integration. Some variables are integrated of order 0 (I(0)), while others are integrated of order 1 (I(1)). The ARDL framework allows for the inclusion of variables with different orders of integration, making it suitable for the dataset. Estimating the short- and long-term associations between the variables is possible with this test. while accounting for their mixed integration orders. The short run estimation results are presented in table 4 below.

Table 4: Short Run Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OER	-1.100355	0.398042	-2.764420	0.0113
BMG	0.043286	0.013414	3.226815	0.0039
RIR	0.142315	0.069920	2.035384	0.0540
INFLD	0.051459	0.016623	3.095598	0.0053
CointEq(-1)*	-0.753284	0.121564	-6.196631	0.0000

R-squared	0.866245	Mean dependent var	0.179044
Adjusted R-squared	0.811752	S.D. dependent var	4.221128
S.E. of regression	1.831443	Akaike info criterion	4.295745
Sum squared resid	90.56291	Schwarz criterion	4.807610
Log likelihood	-71.76702	Hannan-Quinn criter.	4.479398
Durbin-Watson stat	2.257525		

Source: "Generated by the researcher using EViews", (2023).

Hypothesis 1: Based on the findings of the short-run ARDL model (t=-2.764420 and p=0.0113), we reject the null hypothesis suggesting an insignificant relationship between economic growth and the official exchange rate and instead accept the alternative hypothesis indicating a significant relationship in the short run.

Official Exchange Rate (OER): The official exchange rate, representing fluctuations in the exchange rate, emerges as a significant driver of economic growth. A 1% decrease in the official exchange rate corresponds to approximately a 1.1004% increase in economic development, ceteris paribus. This inverse relationship implies that a depreciating currency enhances economic development, which may stimulate exports and overall economic activity.

Hypothesis 2: Based on the findings of the short-run ARDL model (t=3.226 and p=0.0039), we reject the null hypothesis suggesting an insignificant relationship between economic growth and broad money growth and instead accept the alternative hypothesis indicating a significant relationship in the short run.

Broad Money Growth (BMG): The findings show a robust and statistically significant correlation between economic development and broad money growth. A 1% increase in broad money growth is associated with approximately a 0.0433% increase in economic development. This suggests that a well-regulated and growing money supply can stimulate economic growth.

Hypothesis 3: Based on the findings of the short-run ARDL model (t=2.035 and p=0.0.0540), we accept the null hypothesis suggesting an insignificant relationship between economic growth and real interest rate and reject the alternative hypothesis indicating a significant relationship in the short run.

Real Interest Rate (RIR): Although the coefficient for the real interest rate is marginally insignificant, the positive relationship indicates that higher real interest rates may contribute to economic development. A 1% increase in real interest rates corresponds to roughly a 0.1423% increase in economic development.

Hypothesis 4: Based on the findings of the short-run ARDL model (t=3.095598 and p=0.0056), we reject the null hypothesis suggesting an insignificant relationship between economic growth and inflation and instead accept the alternative hypothesis indicating a significant relationship in the short run.

Annual Inflation (INFLD): The analysis identifies a statistically significant positive association between annual inflation and economic development. A 1% increase in inflation corresponds to approximately a 0.0515% increase in economic development. This suggests that controlled inflation rates may facilitate higher economic development.

Error Correction Term (CointEq): The highly significant error correction term (CointEq) coefficient indicates a rapid adjustment mechanism. It reveals that the economic system corrects deviations from long-run equilibrium by approximately 75.33% in the current period for every 1% deviation. This signifies the presence of a strong adjustment process, ensuring the economy's resilience against short-term shocks.

Model Robustness: Based on the R-squared value of 0.8662, it can be inferred that the independent variables in the model account for roughly 86.62% of the variation seen in the dependent variable**.** The high R-squared value of 86.62% demonstrates that the model effectively explains variations in economic development based on the included variables. The robustness of the model increases our confidence in the results and implies that a significant amount of the variation in economic development may be explained by the factors included together.

4.4 Long-run Estimation Results

In the long-run estimation results presented in Table 5, we evaluate the significance and interpretation of each variable in log-log form, assuming all else remains constant (ceteris paribus):

Table 5: Long Run Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OER	0.192505	0.254319	0.756942	0.4571
BMG	0.122090	0.053628	2.276601	0.0329
RIR	0.134139	0.063612	2.108692	0.0466
INFLD	-0.111898	0.043166	-2.592246	0.0166
C	1.162514	2.022917	0.574672	0.5713
EC = GDPPCG - (0.1925*OER + 0.1221*BMG + 0.1341*RIR -0.1119 *INFLD + 1.1625)				

Source: "Generated by the researcher using EViews", (2023).

Hypothesis 1: According to the results from the long-run ARDL model (t=0.756942 and p=0.4571), we fail to reject the null hypothesis suggesting an insignificant relationship between economic growth and the official exchange rate and instead reject the alternative hypothesis indicating a significant relationship in the long run.

Official Exchange Rate (OER): The coefficient for OER is 0.1925, but it is not statistically significant. a 1% increase in the official exchange rate is associated with approximately a 0.1925% increase in economic development, holding other factors constant. The lack of statistical significance suggests that exchange rate fluctuations may not exert a significant long-term impact on economic development.

Hypothesis 2: According to the results from the long-run ARDL model (t=2.276601 and p=0.0329), we reject the null hypothesis suggesting an insignificant relationship between economic growth and broad money growth and instead accept the alternative hypothesis indicating a significant relationship in the long run.

Broad Money Growth (BMG): BMG exhibits a significant positive relationship with economic development. The coefficient of 0.1221 is statistically significant. A 1% increase in broad money growth corresponds to roughly a 0.1221% increase in economic

development, assuming other factors remain constant. This indicates that an expanding money supply can have a positive long-term effect on economic development.

Hypothesis 3: According to the results from the long-run ARDL model (t=2.109 and p=0.0466), we reject the null hypothesis suggesting an insignificant relationship between economic growth and real interest rate and instead accept the alternative hypothesis indicating a significant relationship in the long run.

Real Interest Rate (RIR): RIR is also statistically significant with a coefficient of 0.1341. A 1% increase in real interest rates is associated with approximately a 0.1341% increase in economic development, while holding other variables constant. This suggests that higher real interest rates may have a favourable long-term impact on economic development.

Hypothesis 4: According to the results from the long-run ARDL model (t=-2.592 and p=0.0166), we reject the null hypothesis suggesting an insignificant relationship between economic growth and annual inflation and instead accept the alternative hypothesis indicating a significant relationship in the long run

Annual Inflation (INFLD): The coefficient for INFLD is -0.1119, and it is statistically significant. A a 1% increase in annual inflation corresponds to approximately a -0.1119% decrease in economic development, given that other factors remain unaltered. This demonstrates that controlled inflation rates can contribute positively to long-term economic development.

In conclusion, these long-run estimation results provide valuable insights into the significance of monetary policy variables in influencing economic development in Zambia. Broad money growth, real interest rates, and controlled inflation rates emerge as statistically significant drivers of long-term economic development.

4.5 Post Estimation Tests

This subsection presents the results of the three main post estimation tests for autocorrelation, heteroscedasticity, normality and stability tests.

4.5.1 Test for Autocorrelation

To determine whether autocorrelation or serial correlation existed in a regression model, the Breusch-Godfrey Serial Correlation LM Test was utilized. Serial correlation implies that the error terms in a time series regression are associated with each other. The test statistics and their associated probabilities (prob values) indicate the significance of this correlation.

Prob. F(2,20): This probability value (0.2512) is associated with the F-statistic. It tells us the probability of obtaining the observed F-statistic under the null hypothesis that there is no serial correlation in the model. In this context, a high probability value which is greater than the 5% (0.05) level of significance indicates that there is no evidence of serial correlation in the model.

Table 6: Breusch-Godfrey Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.481598	Prob. F(2,20)	0.2512
Obs*R-squared	5.032603	Prob. Chi-Square(2)	0.0808

Source: “Generated by the researcher using EViews”, (2023).

4.5.2 Test for Heteroscedasticity

The Heteroskedasticity Test using the Breusch-Pagan-Godfrey test statistics and their associated probability values to assess whether heteroskedasticity, a situation in which a regression model's error terms' variance is not constant is given. Heteroskedasticity can affect the reliability of regression coefficients and hypothesis testing.

Prob. F(16,22): This probability value (0.8654) associated with The significance level of the F-statistic is more than 5%. It tells us the probability of obtaining the observed F-statistic under the null hypothesis that there is no heteroskedasticity in the model.

Table 7: Breusch-Pagan-Godfrey Heteroskedasticity Test

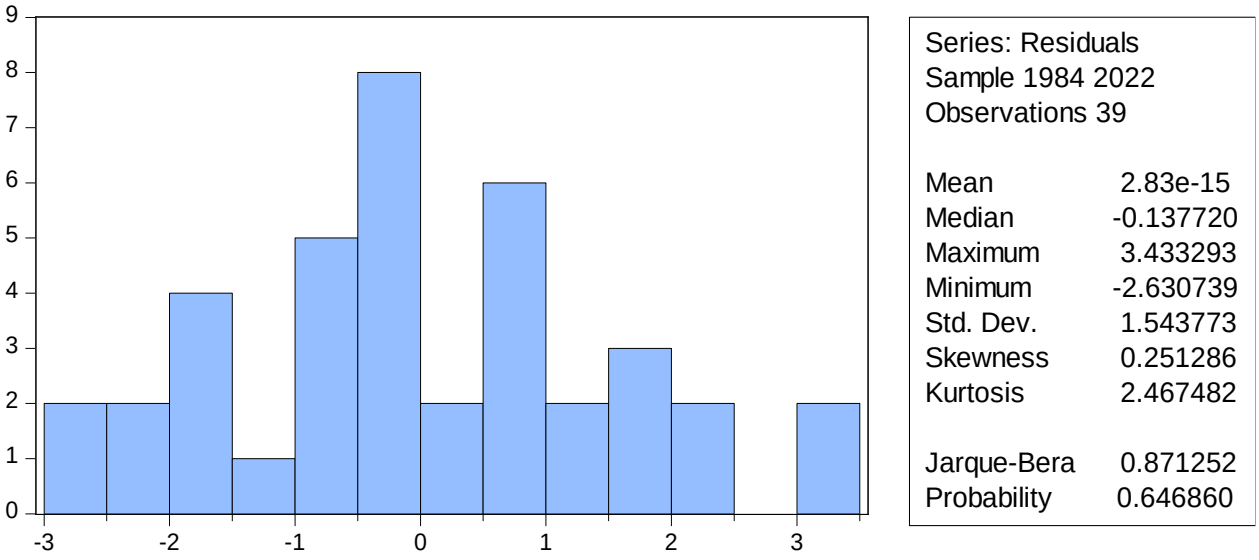
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.581346	Prob. F(16,22)	0.8654
Obs*R-squared	11.58920	Prob. Chi-Square(16)	0.7717
Scaled explained SS	2.705903	Prob. Chi-Square(16)	0.9999

Source: "Generated by the researcher using EViews", (2023).

4.5.3 Test for Normality

The normality test, as shown in Figure 3, aims to assess whether the residuals of the model follow a normal distribution. The null hypothesis assumes that the residuals are normally distributed, while the alternative hypothesis suggests otherwise. A histogram-based normality test was conducted, resulting in a Jarque-Bera statistic of 0.87 and a corresponding p-value of 0.65. In this case, the p-value (0.65) exceeds the 5% level of significance. As a result, there is no compelling evidence to reject the null hypothesis. Therefore, it suggests that the residuals of the model exhibit a normal distribution.

Figure 3: Normality



Source: "Generated by the researcher using EViews", (2023).

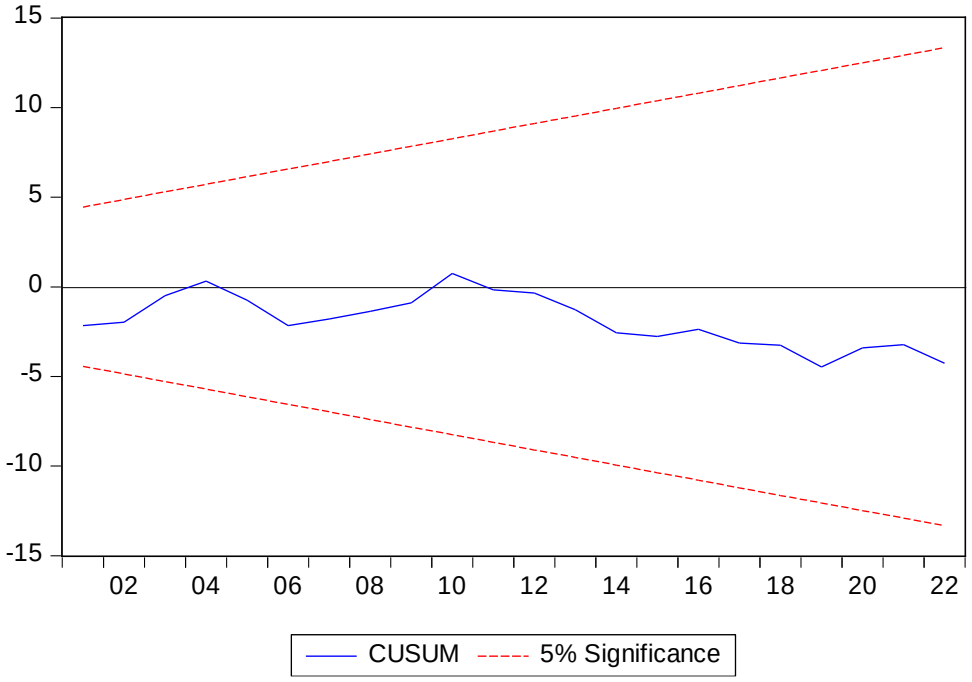
4.5.4 CUSUM and CUSUM of Squares Stability Tests

One crucial aspect of the analysis involved evaluating the stability of the model, which was accomplished by applying two widely recognized tests: the CUSUM test and the CUSUM of squares test. These tests are frequently employed to ascertain whether the

estimated model maintains its stability throughout the study. The stability of the model is visually represented in Figures 4 and 5. displaying the results of the CUSUM and CUSUM of squares tests, in that order. The two figures depict the evolution of the cumulative total of the calculated coefficients over the course of the investigation. The model's stability is supported by the fact that the lines in both figures remain inside the 5% barrier.

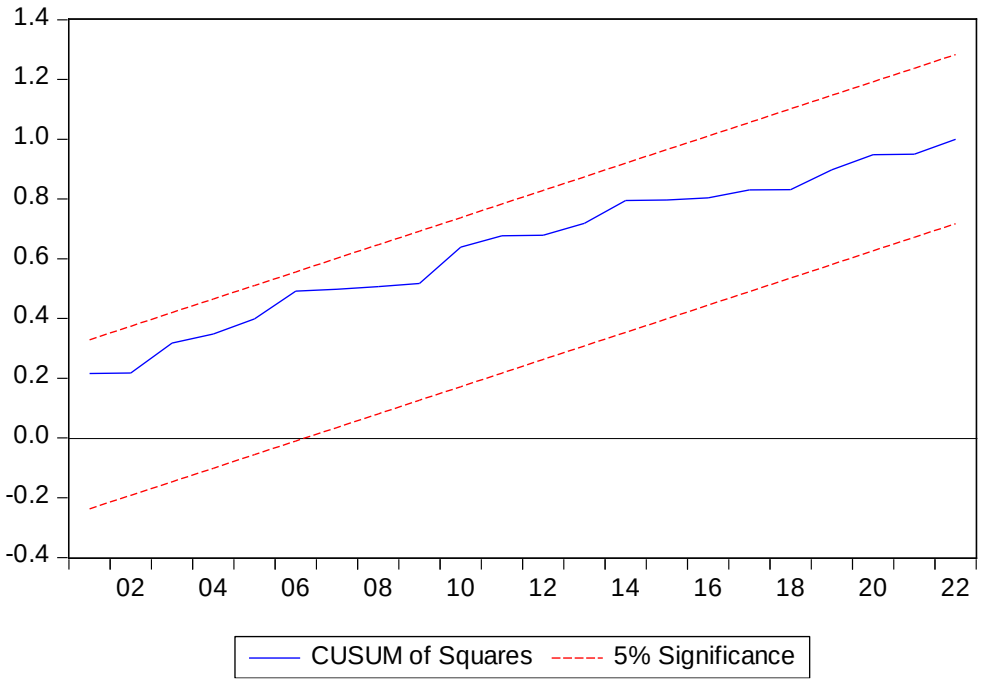
This finding implies that the estimated model maintains its stability consistently throughout the entire study period. As a result, the model's representation of the relationships between the variables does not significantly change over time. The stability of the model is reinforced by the CUSUM and CUSUM of squares test findings, affirming its reliability in depicting the relationships between the variables under investigation.

Figure 4: CUSUM Test



Source: “Generated by the researcher using EViews”, (2023).

Figure 5: CUSUM of squares test



Source: “Generated by the researcher using EViews”, (2023).

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

Section five broadens the examination of empirical data by employing a thorough Autoregressive Distributed Lag (ARDL) analysis. The interpretations and discussions of findings from both the short-run and long-run results illuminate the importance of each variable and the overall strength of the model. Patterns and trends discovered in the data analysis are highlighted, adding depth to the overall narrative of the research.

5.1.0 Interpretation and Discussion of Short-run Results

This research aimed to assess the impact of exchange rates, money supply, interest rates, and inflation on economic growth through the application of ARDL estimation. In this subsequent section, an analysis is provided regarding the impact of each predictor on the dependent variable, with the condition that all other variables remain constant

5.1.1 Official Exchange Rate (OER)

Objective 1: To investigate the effect of Official Exchange Rate on Economic Growth.

In the short term, the official exchange rate emerges as a notable catalyst for economic growth. A reduction of 1% in the official exchange rate is associated with roughly a 1.1004% rise in economic growth, suggesting that a depreciation of the currency contributes to improved economic development. This outcome is consistent with the worldwide viewpoint regarding the influence of fluctuations in exchange rates on economic advancement. Lessons from the research in Lao PDR and Bangladesh (Srithilat & Sun, 2017; Sultana, 2023), underscore the importance of understanding how exchange rate movements influence economic outcomes. The immediate relevance of this result for Zambia lies in the potential competitive advantage in global markets that a depreciated currency may confer.

5.1.2 Broad Money Growth (BMG)

Objective 2: To examine the impact of Broad Money Growth on Economic growth

In the short term, there is a robust and statistically significant positive correlation between the growth of broad money and economic growth. A rise of 1% in broad money growth corresponds to about a 0.0433% increase in economic growth, underscoring the positive impact of a well-managed and expanding money supply. This finding is consistent with empirical evidence from South Africa, Tanzania, and Nigeria (Chipote & Makhetha-Kosi, 2014; Twinoburyo & Odhiambo, 2017; Ufoeze, et al., 2018). These regional studies highlight the positive impact of money supply growth on economic progress, emphasizing the importance of a well-functioning financial system. For Zambia, this underscores the significance of strategic monetary policies aimed at sustaining a growing money supply for short-term economic gains.

5.1.3 Real Interest Rate (RIR)

Objective 3: To analyze the effect of Real Interest Rate on Economic Growth

Despite the marginal insignificance of the coefficient for the real interest rate, the positive correlation suggests that elevated real interest rates might play a role in fostering short-term economic growth. A 1% rise in real interest rates corresponds to roughly a 0.1423% surge in economic progress. The marginal significance aligns with the neoclassical perspective, where interest rates play a crucial role in influencing investment and, consequently, economic growth. Insights from the neoclassical theory provide theoretical support for the observed relationship (Mankiw, 2020). This finding implies the need for Zambian policymakers to tread carefully, recognizing the delicate balance between stimulating growth and avoiding potential adverse effects of higher interest rates. Policymakers may consider fine-tuning monetary policies to maintain a balance between stimulating economic growth and avoiding potential adverse effects of higher interest rates. Adjusting interest rates incrementally and monitoring their impact on investment can be a prudent strategy.

5.1.4 Annual Inflation (INFLD)

Objective 4: To explore the influence of Annual Inflation on Economic Growth.

A noteworthy and statistically significant positive correlation is discerned between annual inflation and short-term economic progress. A 1% rise in inflation corresponds to approximately a 0.0515% increase in economic development, implying that maintaining moderate inflation rates could promote increased economic development. This outcome aligns with the Keynesian perspective, where moderate inflation is considered conducive to economic growth. Lessons from Keynesian economics support the idea that controlled inflation can stimulate economic activity by influencing interest rates and spending patterns (Mankiw, 2014). This finding provides evidence that maintaining controlled inflation rates emerges as a crucial short-term strategy to facilitate higher economic development for the Zambian economy.

5.1.5 Error Correction Term (CointEq)

The highly significant error correction term (CointEq) coefficient indicates a rapid adjustment mechanism. This reveals that the economic system corrects deviations from long-run equilibrium by approximately 75.33% in the current period for every 1% deviation, ensuring the economy's resilience against short-term shocks The relevance of the error correction term corresponds with the findings in the empirical literature emphasizing the importance of short-run adjustments in maintaining economic stability. Insights from studies in Zambia highlight the relevance of error correction mechanisms in monetary policy (Zgambo & Chileshe, 2014). Policymakers can leverage this mechanism to swiftly address short-term shocks, contributing to overall economic resilience

5.1.5 Model Robustness

The high R-squared value of 86.62% suggests the model effectively explains variations in economic development based on the included variables. This robustness strengthens confidence in the findings, suggesting that, as a whole, the included variables explain a significant proportion of the fluctuations in economic growth. The high R-squared value reinforces the reliability of the model in explaining economic development variations. Policymakers and researchers can have confidence in the model's capacity to grasp the

intricate dynamics of Zambia's economy. It can serve as a valuable tool for formulating effective monetary policies, given its ability to explain a significant portion of economic growth variability. In conclusion, the short-run results provide insights into the immediate implications of exchange rates, money supply, real interest rates, and inflation on economic development in Zambia. The findings, supported by relevant literature, offer actionable insights for policymakers, highlighting areas for strategic intervention to foster short term economic expansion.

5.2.0 Interpretation and Discussion of Long-run Results

Examining the long-term implications of monetary policy variables on economic development in Zambia enhances comprehension. The subsequent section offers an analysis of the long-run results.

5.2.1 Official Exchange Rate (OER)

Objective 1: To investigate the effect of Official Exchange Rate on Economic Growth.

The coefficient for OER is 0.1925, but it is not statistically significant (t-statistic = 0.757, p = 0.4571). A 1% rise in the official exchange rate corresponds to roughly a 0.1925% growth in economic development, while keeping other variables constant. in situations where prolonged fluctuations in the exchange rate may not have a notable influence on economic development. The lack of statistical significance aligns with the global and local perspectives, where long-term exchange rate fluctuations may not exert a significant impact on economic development. Lessons from studies in Lao PDR and Zambia provide context for the non-significant relationship (Srithilat & Sun, 2017; Moyo, 2019). The lack of statistical significance aligns with global perspectives. For instance, the IMF (2019) notes in its report on exchange rates that the long-term impact of exchange rate fluctuations can be limited (IMF, 2019). Policymakers may prioritize economic diversification strategies. For example, Zambia could focus on developing sectors such as technology, renewable energy, or tourism. Investing in education and infrastructure to support these sectors can be part of the diversification policy. Policymakers can consider this when designing strategies, emphasizing diversification for sustained growth.

5.2.2 Broad Money Growth (BMG)

Objective 2: To examine the impact of Broad Money Growth on Economic growth

BMG exhibits a significant positive relationship with economic development in the long run. A 1% rise in broad money growth corresponds to roughly a 0.1221% rise in economic development, indicating that an expanding money supply can have a positive long-term effect. This result aligns with viewpoints at both regional and local levels, emphasizing the enduring significance of broad money growth. Findings from research conducted in South Africa, Tanzania, Nigeria, and Zambia enhance our comprehension of the enduring influence of money supply growth on economic development (Chipote & Makhetha-Kosi, 2014; Twinoburyo & Odhiambo, 2017; Ufoeze, et al., 2018; Mwange, 2022). This finding implies that long-term economic planning should involve strategies to sustain a growing money supply to foster enduring economic development.

5.2.3 Real Interest Rate (RIR)

Objective 3: To analyze the effect of Real Interest Rate on Economic Growth

RIR is shows statistical significance with a coefficient of 0.1341 (t-statistic = 2.109, p = 0.0466). A 1% rise in real interest rates is linked to an approximately a 0.1341% increase in economic development, suggesting that higher real interest rates may have a favorable long-term impact. The importance of the real interest rate in the long run corresponds with neoclassical viewpoints regarding the influence of interest rates on shaping investment patterns over an extended period. Theoretical support from neoclassical economics reinforces the idea that real interest rates influence capital accumulation and, consequently, economic development (Mankiw, 2020). For Zambia, long-term economic strategies should consider the potential positive impact of higher real interest rates on capital formation.

5.2.4 Annual Inflation (INFLD)

Objective 4: To explore the influence of Annual Inflation on Economic Growth.

The coefficient for INFLD is -0.1119, and it is statistically significant (t-statistic = -2.592, p = 0.0166). A 1% rise in annual inflation corresponds to approximately a -0.1119% fall in economic development, demonstrating that controlled inflation rates can contribute positively to long-term economic development. The significance of controlled inflation in the long run is in line with Keynesian and monetarist perspectives. Lessons from Keynesian economics emphasize the importance of stable inflation for sustained economic growth, while insights from monetarism support the notion that excessive inflation can impede long-term development (Mankiw, 2014). For Zambia, the long-term economic vision should involve strategies to maintain controlled inflation rates for sustained economic development.

In summary, these results emphasize the interplay between monetary policy variables and economic development in Zambia. The short-term and long-term outcomes contribute to a thorough comprehension of the immediate and lasting effects of exchange rate fluctuations, broad money growth, real interest rates, and inflation on economic development. The justifications draw on empirical literature and theoretical framework to enrich the interpretation of the results and contribute to the broader discourse on monetary policy and economic development. Policymakers and researchers in Zambia can leverage these insights for informed decision-making and sustainable economic planning.

5.3 New Insights.

Zambia's economic context presents unique challenges and opportunities that influence the effectiveness of monetary policy. By analyzing the specific dynamics of the Zambian economy, the study contributes to a deeper understanding of how monetary policy interacts with local economic conditions, institutional frameworks, and external factors. This understanding is crucial for tailoring monetary policy interventions to address the specific needs and challenges of Zambia's economy. Overall, the study offers valuable new insights into the relationship between monetary policy and economic growth in

Zambia because it also considers years in which the country was highly affected by global factors such as the Covid 19 as well as the Russian war, thus providing policymakers and stakeholders with a more nuanced understanding of the factors driving economic outcomes and the implications for policy formulation and implementation.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This section provides the concluding remarks and recommendations derived from an in-depth analysis of the crucial economic indicators impacting the economic growth of Zambia. The research delved into the effects of exchange rates, money supply, interest rates, and inflation, employing the Autoregressive Distributed Lag (ARDL) estimation method. The data encompassed a comprehensive period, allowing for a thorough examination of short-term and long-term dynamics.

6.1 Summary of the Research Findings

The research aimed to test the following hypotheses:

Hypothesis 1: Official Exchange Rate (OER): The hypothesis suggested that alterations in the official exchange rate do not substantially affect economic growth. The results, based on ARDL estimation, A 1% decrease in the official exchange rate corresponds to approximately a 1.1004% increase in economic growth holding other variables constant. Hence, we discard the null hypothesis, confirming the significance of the official exchange rate in the short term.

Hypothesis 2: Broad Money Growth (BMG): The null hypothesis states that there is no appreciable relationship between the growth of broad money and economic expansion. The results refute this claim, showing that a 1% rise in broad money growth corresponds to a roughly 0.0433% increase in economic growth. This highlights the short-term stimulating effect of an expanding money supply and rejects the null hypothesis.

Hypothesis 3: Real Interest Rate (RIR): The hypothesis proposed no relationship between real interest rates and economic growth. Despite the short-term marginal insignificance of the coefficient, the positive association suggests that higher real interest rates may contribute to economic growth in the short term. This aligns with neoclassical perspectives, providing theoretical support for the observed relationship. However, real interest rate was found to be statistically significant. A 1% rise in real interest rates is linked to approximately a 0.1341% increase in economic development in the long run,

suggesting that higher real interest rates may have a favorable long-term impact. Therefore, the null hypothesis is rejected.

Hypothesis 4: Annual Inflation (INFLD): The null hypothesis predicted that annual inflation and economic development have no correlation. The results do not support this view, with a statistically significant positive association. A 1% increase in inflation corresponds to approximately a 0.0515% increase in economic development in the short run, endorsing the idea that controlled inflation rates may facilitate higher economic development.

The method of analysis, ARDL estimation, allowed for a robust examination of both short-term and long-term associations. The data encompassed a comprehensive period, ensuring a comprehensive understanding of the economic dynamics.

6.2 Recommendations

The analysis of the economic indicators forms the basis of the following recommendations:

1. **Exchange Rate Policy:** The investigation confirms the significant impact of the official exchange rate on economic development in the short-term Policymakers are recommended to implement measures ensuring exchange rate stability, such as regular monitoring, interventions, and diplomatic initiatives to mitigate excessive depreciation.
2. **Monetary Policy:** The positive association between broad money growth and economic development suggests the importance of a well-regulated and expanding money supply. Maintaining a stable financial system should be priority for policymakers with regulatory practices that supports sustainable money supply growth.
3. **Interest Rate Management:** While the association between real interest rates and economic growth is marginally insignificant, policymakers should consider the neoclassical perspective on the role of interest rates in influencing investment. Measures to encourage a favorable interest rate environment may be explored,

such as targeted lending incentives which could stimulate investment and economic growth.

4. **Inflation Control:** The positive association between inflation and economic development calls for a balanced approach to inflation targeting. Policymakers should aim for controlled inflation rates that support economic activity without causing undue instability utilizing tools like forward guidance and inflation targeting frameworks.
5. **Error Correction Mechanisms:** Acknowledging the rapid adjustment mechanism indicated by the error correction term, policymakers should prioritize the implementation of effective short-term economic stabilization measures. This could involve fiscal policies that respond swiftly to deviations from long-run equilibrium, ensuring resilience against economic shocks.

6.3 Areas of Further Research

Although this study offers valuable insights, there are opportunities for additional research to deepen our understanding of Zambia's economic dynamics. Future research could explore:

1. **Sectoral Analysis:** A more granular examination of how these monetary variables impact specific sectors of the economy could provide targeted policy recommendations.
2. **External Factors:** Considering the globalized nature of economies, investigating the influence of external factors on the identified relationships would enhance the robustness of policy recommendations.
3. **Dynamic Model:** Developing a dynamic model that incorporates feedback effects and interactions among the variables could offer a more comprehensive understanding of the economic system.

6.4 Limitations of the Study

In spite of the thorough analysis, this study has some limitations:

1. **Data Limitations:** The study relies on the availability and accuracy of the data. Any limitations or inaccuracies in the data may impact the robustness of the findings.
2. **Simplification of Variables:** The study considers a simplified relationship between variables. Real-world complexities may not be fully captured.
3. **External Shocks:** The analysis does not account for unexpected external shocks, which could influence the identified relationships.

To sum up, this study offers valuable insights into the mone

tary factors that impact economic growth in Zambia. The recommendations aim to guide policymakers in formulating effective strategies for sustainable economic development, recognizing the interconnectedness of exchange rates, money supply, interest rates, and inflation.

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Appendix 1: Estimation Outputs

Unit Root Tests

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.685289	0.0005
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPPCG)
Method: Least Squares
Date: 10/29/23 Time: 08:46
Sample (adjusted): 1981 2022
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPPCG(-1)	-0.710428	0.151630	-4.685289	0.0000
C	0.352438	0.546704	0.644660	0.5228

R-squared	0.354338	Mean dependent var	0.044463
Adjusted R-squared	0.338197	S.D. dependent var	4.323649
S.E. of regression	3.517345	Akaike info criterion	5.399738
Sum squared resid	494.8686	Schwarz criterion	5.482484
Log likelihood	-111.3945	Hannan-Quinn criter.	5.430068
F-statistic	21.95194	Durbin-Watson stat	2.119539
Prob(F-statistic)	0.000032		

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.990654	0.2897
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

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

Null Hypothesis: D(RIR) has a unit root

Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.466785	0.0000
Test critical values:	1% level	-3.600987	
	5% level	-2.935001	
	10% level	-2.605836	

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

Null Hypothesis: BMG has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.781583	0.3840
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Null Hypothesis: D(BMG) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.483452	0.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.898604	0.9944
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.165713	0.9665
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

Null Hypothesis: D(OER,2) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.703371	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: INFLD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.919022	0.3207
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLD)
Method: Least Squares
Date: 10/29/23 Time: 08:47
Sample (adjusted): 1981 2022
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLD(-1)	-0.169806	0.088485	-1.919022	0.0621
C	5.487046	4.394908	1.248501	0.2191

R-squared	0.084305	Mean dependent var	-0.074595

Adjusted R-squared	0.061412	S.D. dependent var	22.10122
S.E. of regression	21.41182	Akaike info criterion	9.012212
Sum squared resid	18338.65	Schwarz criterion	9.094958
Log likelihood	-187.2564	Hannan-Quinn criter.	9.042541
F-statistic	3.682647	Durbin-Watson stat	1.636467
Prob(F-statistic)	0.062136		

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.550149	0.0000
Test critical values:	1% level	-3.600987	
	5% level	-2.935001	
	10% level	-2.605836	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFLD,2)
Method: Least Squares
Date: 10/29/23 Time: 08:47
Sample (adjusted): 1982 2022
Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFLD(-1))	-0.891255	0.160582	-5.550149	0.0000
C	-0.006082	3.517101	-0.001729	0.9986

R-squared	0.441294	Mean dependent var	-0.350040
Adjusted R-squared	0.426968	S.D. dependent var	29.74541
S.E. of regression	22.51694	Akaike info criterion	9.113963
Sum squared resid	19773.49	Schwarz criterion	9.197552
Log likelihood	-184.8362	Hannan-Quinn criter.	9.144402
F-statistic	30.80416	Durbin-Watson stat	1.921499
Prob(F-statistic)	0.000002		

Short-run Estimation

ECM

ARDL Error Correction Regression
Dependent Variable: D(GDPPCG)
Selected Model: ARDL(2, 3, 1, 2, 4)
Case 2: Restricted Constant and No Trend
Date: 10/20/23 Time: 19:39
Sample: 1980 2022
Included observations: 39

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPPCG(-1))	-0.155739	0.106504	-1.462284	0.1578
D(OER)	-1.563512	0.302585	-5.167187	0.0000
D(OER(-1))	0.089721	0.404683	0.221706	0.8266
D(OER(-2))	-1.100355	0.398042	-2.764420	0.0113
D(BMG)	0.043286	0.013414	3.226815	0.0039
D(RIR)	0.327385	0.056110	5.834712	0.0000
D(RIR(-1))	0.142315	0.069920	2.035384	0.0540
D(INFLD)	0.030970	0.025103	1.233687	0.2303
D(INFLD(-1))	0.104424	0.031402	3.325385	0.0031
D(INFLD(-2))	-0.022696	0.016349	-1.388196	0.1790
D(INFLD(-3))	0.051459	0.016623	3.095598	0.0053
CointEq(-1)*	-0.753284	0.121564	-6.196631	0.0000

R-squared	0.866245	Mean dependent var	0.179044
Adjusted R-squared	0.811752	S.D. dependent var	4.221128
S.E. of regression	1.831443	Akaike info criterion	4.295745
Sum squared resid	90.56291	Schwarz criterion	4.807610
Log likelihood	-71.76702	Hannan-Quinn criter.	4.479398
Durbin-Watson stat	2.257525		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.214576	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

LONGRUN AND BOUNDS TEST

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GDPPCG)
Selected Model: ARDL(2, 3, 1, 2, 4)
Case 2: Restricted Constant and No Trend
Date: 10/20/23 Time: 19:40
Sample: 1980 2022
Included observations: 39

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.875704	1.503223	0.582551	0.5661
GDPPCG(-1)*	-0.753284	0.172654	-4.362982	0.0002
OER(-1)	0.145011	0.201973	0.717973	0.4803
BMG(-1)	0.091968	0.036922	2.490912	0.0208
RIR(-1)	0.101045	0.051576	1.959162	0.0629
INFLD(-1)	-0.084291	0.027263	-3.091815	0.0053
D(GDPPCG(-1))	-0.155739	0.134060	-1.161712	0.2578
D(OER)	-1.563512	0.383141	-4.080773	0.0005
D(OER(-1))	0.089721	0.550961	0.162844	0.8721
D(OER(-2))	-1.100355	0.674240	-1.631992	0.1169
D(BMG)	0.043286	0.023135	1.871039	0.0747
D(RIR)	0.327385	0.071020	4.609747	0.0001
D(RIR(-1))	0.142315	0.089702	1.586530	0.1269
D(INFLD)	0.030970	0.031014	0.998585	0.3289
D(INFLD(-1))	0.104424	0.037902	2.755090	0.0116
D(INFLD(-2))	-0.022696	0.019394	-1.170281	0.2544
D(INFLD(-3))	0.051459	0.020351	2.528587	0.0191

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OER	0.192505	0.254319	0.756942	0.4571
BMG	0.122090	0.053628	2.276601	0.0329
RIR	0.134139	0.063612	2.108692	0.0466
INFLD	-0.111898	0.043166	-2.592246	0.0166
C	1.162514	2.022917	0.574672	0.5713

EC = GDPPCG - (0.1925*OER + 0.1221*BMG + 0.1341*RIR -0.1119
*INFLD + 1.1625)

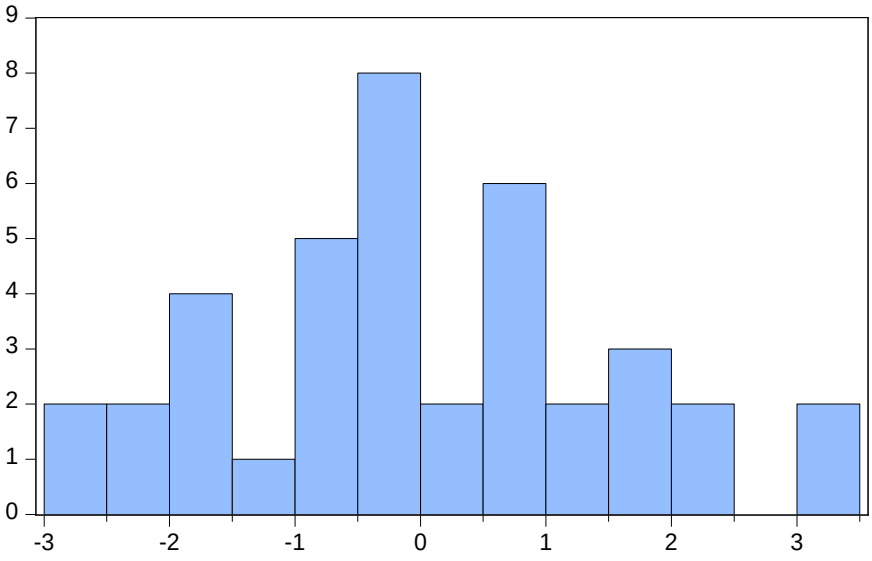
F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.214576	10%	2.2	3.09

k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
			Finite	
Actual Sample Size	39		Sample: n=40	
		10%	2.427	3.395
		5%	2.893	4
		1%	3.967	5.455
			Finite	
			Sample: n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532

Post Estimation Tests

NORMALITY TEST



Series: Residuals	
Sample 1984 2022	
Observations 39	
Mean	2.83e-15
Median	-0.137720
Maximum	3.433293
Minimum	-2.630739
Std. Dev.	1.543773
Skewness	0.251286
Kurtosis	2.467482
Jarque-Bera	0.871252
Probability	0.646860

AUTOCORRELATION

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.481598	Prob. F(2,20)	0.2512
Obs*R-squared	5.032603	Prob. Chi-Square(2)	0.0808

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 10/20/23 Time: 19:41
Sample: 1984 2022
Included observations: 39
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPPCG(-1)	0.157807	0.226679	0.696167	0.4943
GDPPCG(-2)	-7.89E-05	0.163198	-0.000484	0.9996
OER	-0.212158	0.412083	-0.514844	0.6123
OER(-1)	0.197697	0.815084	0.242547	0.8108
OER(-2)	-0.128780	0.940013	-0.136998	0.8924
OER(-3)	0.262617	0.700508	0.374896	0.7117
BMG	-0.004247	0.022792	-0.186321	0.8541
BMG(-1)	-0.005997	0.024591	-0.243869	0.8098
RIR	-0.040494	0.073406	-0.551646	0.5873
RIR(-1)	-0.053575	0.111007	-0.482629	0.6346
RIR(-2)	0.068985	0.108584	0.635316	0.5324
INFLD	-0.007369	0.031910	-0.230935	0.8197
INFLD(-1)	-0.005129	0.046092	-0.111278	0.9125
INFLD(-2)	0.020426	0.049908	0.409261	0.6867
INFLD(-3)	0.005947	0.029173	0.203866	0.8405
INFLD(-4)	0.002438	0.020209	0.120653	0.9052
C	-0.499232	1.532425	-0.325779	0.7480
RESID(-1)	-0.514045	0.358207	-1.435050	0.1667
RESID(-2)	-0.328790	0.327217	-1.004808	0.3270

R-squared	0.129041	Mean dependent var	2.83E-15
Adjusted R-squared	-0.654822	S.D. dependent var	1.543773
S.E. of regression	1.985908	Akaike info criterion	4.516559
Sum squared resid	78.87657	Schwarz criterion	5.327012
Log likelihood	-69.07289	Hannan-Quinn criter.	4.807342
F-statistic	0.164622	Durbin-Watson stat	1.986617
Prob(F-statistic)	0.999840		

Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.581346	Prob. F(16,22)	0.8654
Obs*R-squared	11.58920	Prob. Chi-Square(16)	0.7717
Scaled explained SS	2.705903	Prob. Chi-Square(16)	0.9999

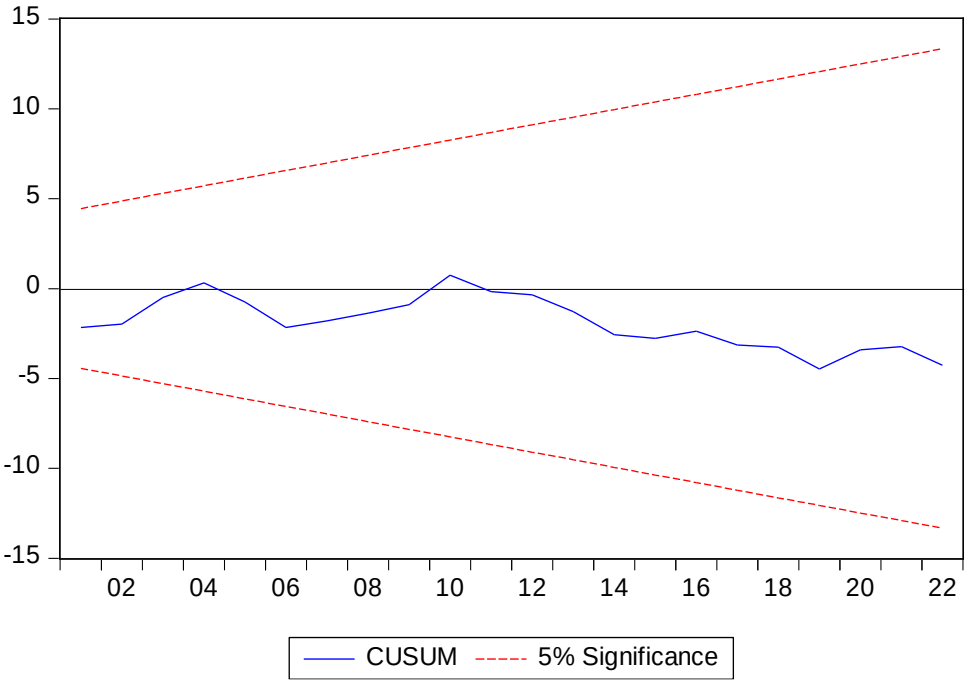
Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/20/23 Time: 19:42
Sample: 1984 2022
Included observations: 39

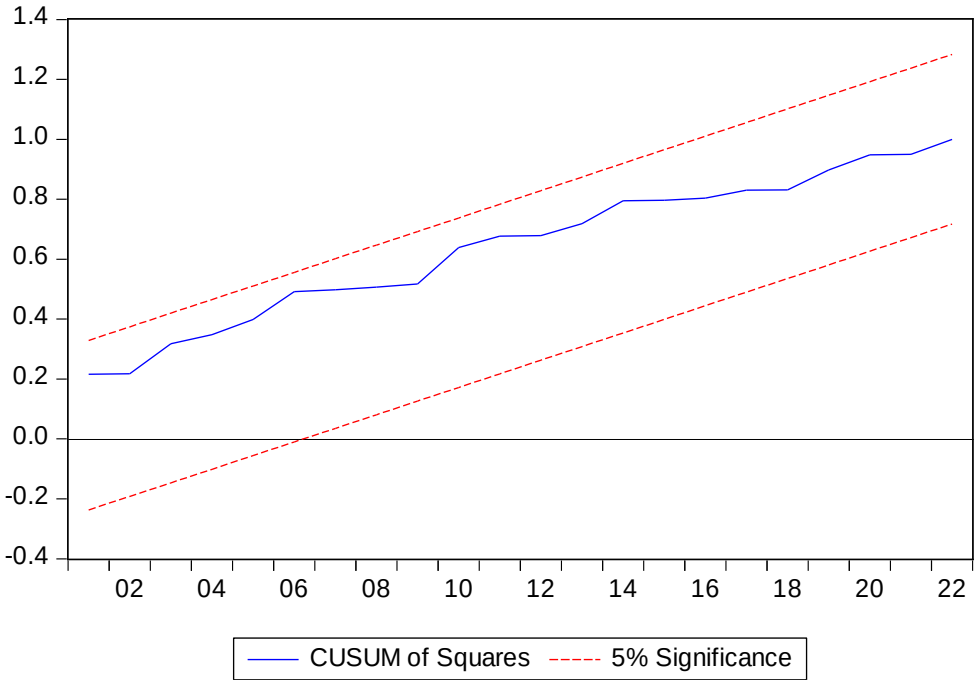
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.605988	2.326382	2.409745	0.0248
GDPPCG(-1)	0.306053	0.257588	1.188149	0.2474
GDPPCG(-2)	-0.354165	0.207471	-1.707061	0.1019
OER	0.004402	0.592948	0.007424	0.9941
OER(-1)	0.303920	1.028229	0.295577	0.7703
OER(-2)	-1.081025	1.220595	-0.885654	0.3854
OER(-3)	0.555710	1.043452	0.532569	0.5997
BMG	-0.052748	0.035803	-1.473272	0.1548

BMG(-1)	-0.013772	0.037581	-0.366472	0.7175
RIR	-0.060371	0.109911	-0.549273	0.5884
RIR(-1)	-0.062671	0.155720	-0.402460	0.6912
RIR(-2)	0.096652	0.138822	0.696227	0.4936
INFLD	-0.037194	0.047996	-0.774930	0.4466
INFLD(-1)	0.015552	0.067567	0.230178	0.8201
INFLD(-2)	0.043688	0.068587	0.636970	0.5307
INFLD(-3)	0.011813	0.045799	0.257934	0.7989
INFLD(-4)	-0.038111	0.031495	-1.210064	0.2391

R-squared	0.297159	Mean dependent var	2.322126
Adjusted R-squared	-0.213998	S.D. dependent var	2.849788
S.E. of regression	3.139942	Akaike info criterion	5.425561
Sum squared resid	216.9032	Schwarz criterion	6.150704
Log likelihood	-88.79845	Hannan-Quinn criter.	5.685736
F-statistic	0.581346	Durbin-Watson stat	2.225507
Prob(F-statistic)	0.865382		

STABILITY TESTS





Estimation Command:
==========
ARDL GDPPCG OER BMG RIR INFLD

Estimation Equation:
==========
GDPPCG = C(1)*GDPPCG(-1) + C(2)*GDPPCG(-2) + C(3)*OER + C(4)*OER(-1) + C(5)*OER(-2) + C(6)*OER(-3) + C(7)*BMG + C(8)*BMG(-1) + C(9)*RIR + C(10)*RIR(-1) + C(11)*RIR(-2) + C(12)*INFLD + C(13)*INFLD(-1) + C(14)*INFLD(-2) + C(15)*INFLD(-3) + C(16)*INFLD(-4) + C(17)

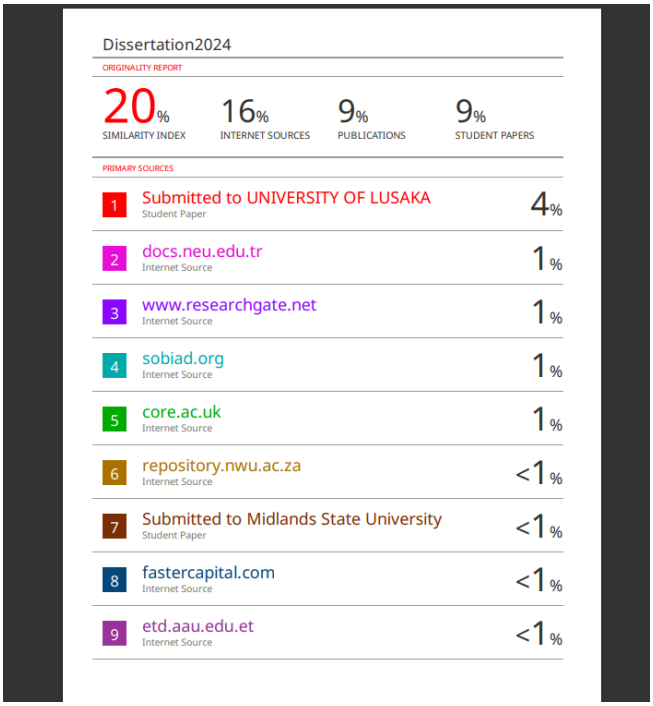
Substituted Coefficients:
==========
GDPPCG = 0.0909766846264*GDPPCG(-1) + 0.155738953551*GDPPCG(-2) - 1.56351247976*OER + 1.79824410644*OER(-1) - 1.19007543748*OER(-2) + 1.10035471282*OER(-3) + 0.0432860682335*BMG + 0.0486823147409*BMG(-1) + 0.327384842093*RIR - 0.0840252974034*RIR(-1) - 0.142314769647*RIR(-2) + 0.0309696639283*INFLD - 0.0108369203768*INFLD(-1) - 0.127119900696*INFLD(-2) + 0.0741556066616*INFLD(-3) - 0.0514594572681*INFLD(-4) + 0.875703742137

Cointegrating Equation:
D(GDPPCG) = 0.875703742137 -0.753284361823*GDPPCG(-1) + 0.145010902015*OER(-1) + 0.091968382974*BMG(-1) + 0.101044775044*RIR(-1) -0.084291007751*INFLD(-1) - 0.155738953551*D(GDPPCG(-1)) -1.563512479763*D(OER) + 0.089720724658*D(OER(-1)) - 1.100354712822*D(OER(-2)) + 0.043286068233*D(BMG) + 0.327384842093*D(RIR) + 0.142314769647*D(RIR(-1)) + 0.030969663928*D(INFLD) + 0.104423751302*D(INFLD(-1)) -0.022696149394*(GDPPCG - (0.19250486*OER(-1) + 0.12208986*BMG(-1) + 0.13413895*RIR(-1) -0.11189799*INFLD(-1) + 1.16251417) + 0.051459457268*D(INFLD(-3)))

Data

	GDPPCG	OER	BMG	RIR	INFLD
1980	0.028077	0.000789	9.005480	-2.024746	11.76292
1981	2.980784	0.000870	7.896594	2.184968	7.158618
1982	-5.897735	0.000929	33.77029	3.166990	6.138601
1983	-5.087202	0.001259	11.06741	-4.745324	18.62935
1984	-3.362979	0.001813	17.16467	-3.202506	18.33123
1985	-1.399465	0.003140	23.36376	-15.96661	41.13735
1986	-2.265505	0.007788	93.25153	-29.99827	81.98836
1987	-0.279613	0.009519	54.25725	-25.19371	62.01290
1988	3.379213	0.008266	61.60920	-11.97135	34.49030
1989	-3.625652	0.013814	65.19731	-34.54680	80.87733
1990	-3.007447	0.030289	47.87864	-34.53904	106.3889
1991	-2.497852	0.064640	97.30680	-25.77389	92.65458
1992	-4.090438	0.172214	70.12759	-41.79024	165.5340
1993	4.258957	0.452763	38.51382	-12.45597	143.6583
1994	-10.81755	0.669371	59.18717	-5.634470	80.74220
1995	0.410354	0.864119	55.47283	11.42491	30.61112
1996	3.618763	1.207900	35.00891	23.67049	24.34926
1997	1.186738	1.314498	25.05971	16.97663	25.40254
1998	-2.928854	1.862069	25.61432	12.73931	16.90687
1999	1.943906	2.388019	27.69361	19.15880	17.92387
2000	1.062292	3.110844	73.76266	4.664768	32.61387
2001	2.208315	3.610935	8.713283	16.67746	25.33126
2002	1.360081	4.398595	28.16651	21.61562	19.39092
2003	3.691828	4.733271	24.97760	19.52534	17.60772
2004	3.683416	4.778875	31.95664	9.196934	19.71682
2005	3.741432	4.465000	3.254967	9.909085	16.65020
2006	4.238000	3.601667	44.04809	7.517820	14.54225
2007	4.591261	4.001667	25.26646	5.240871	12.97021
2008	3.993096	3.745000	23.22862	7.613795	10.64024
2009	5.405936	5.045000	7.661231	15.63363	5.559686
2010	6.507553	4.797500	29.85908	6.112942	13.95091
2011	2.059096	4.861667	21.70198	6.951849	11.11231
2012	4.103279	5.147500	17.85943	4.821684	6.992016
2013	1.676101	5.396483	20.79158	-0.191720	9.731210
2014	1.352928	6.154167	12.61809	5.821128	5.435782
2015	-0.312861	8.631667	35.19247	6.179216	6.659292
2016	0.561271	10.30750	-5.702272	1.715079	13.55248
2017	0.331284	9.517500	21.35615	2.070262	10.09573
2018	0.897347	10.45833	16.47801	2.215865	7.411571
2019	-1.564237	12.89000	12.54522	2.469674	7.633470
2020	-5.595733	18.34409	46.44355	-3.749081	13.74350
2021	1.669097	20.01849	3.657025	2.479387	27.58583
2022	1.895518	16.93759	24.50389	2.720866	8.629911

V



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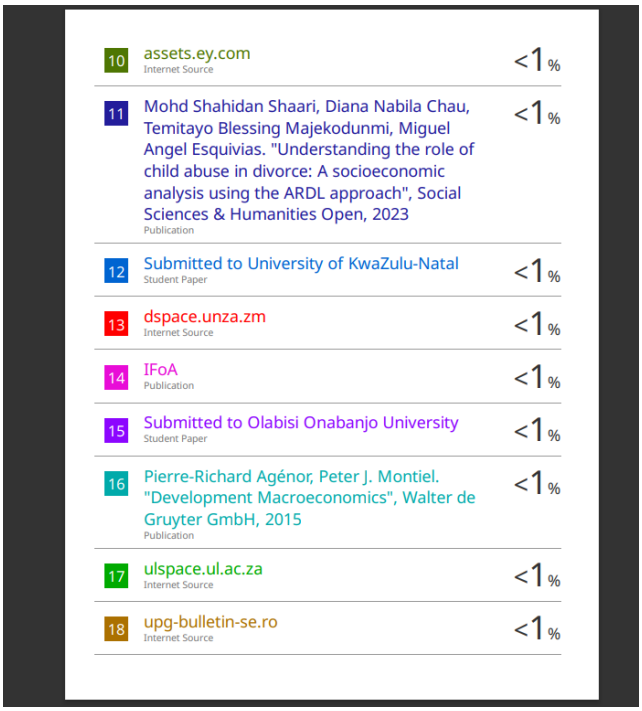

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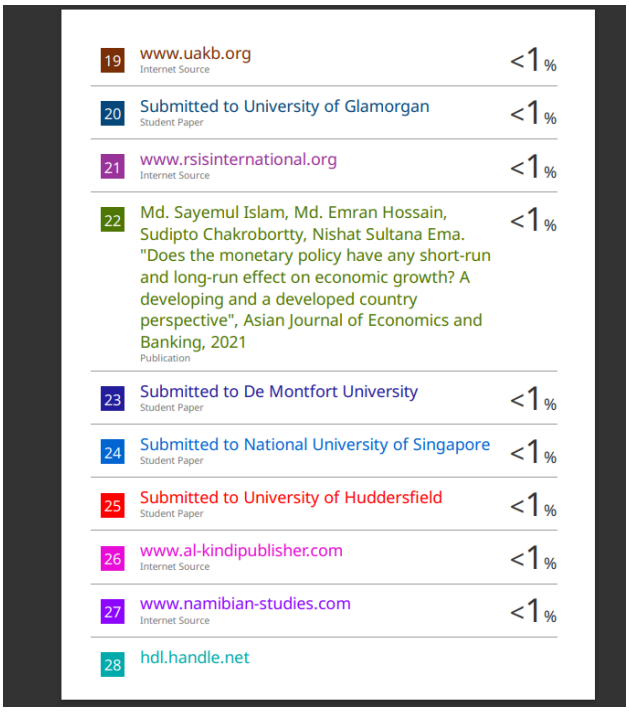

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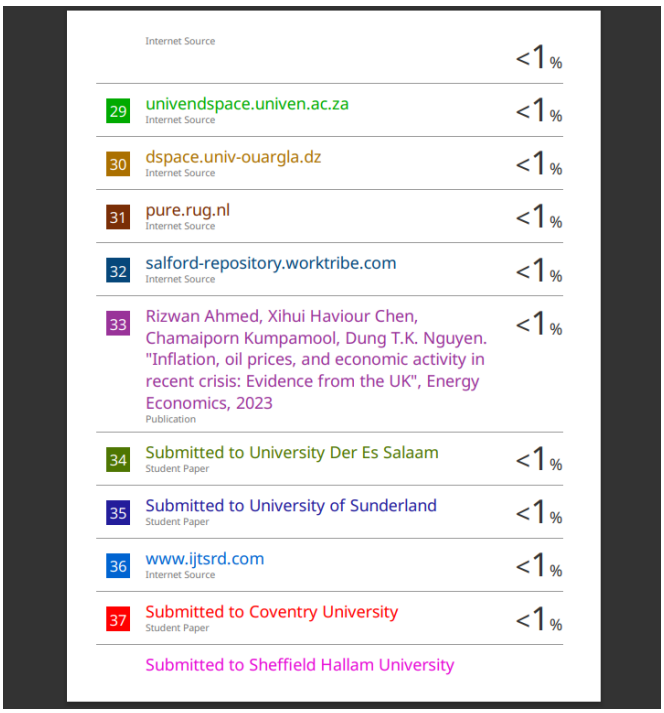

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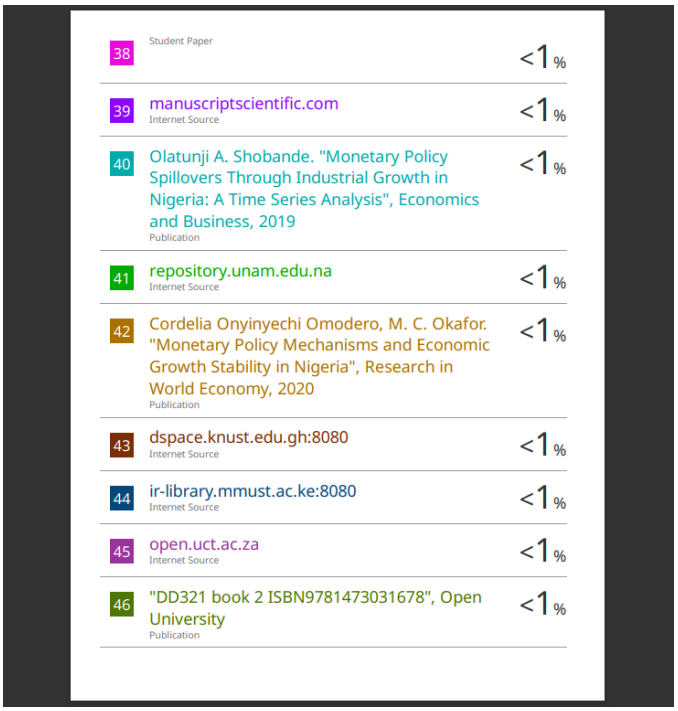

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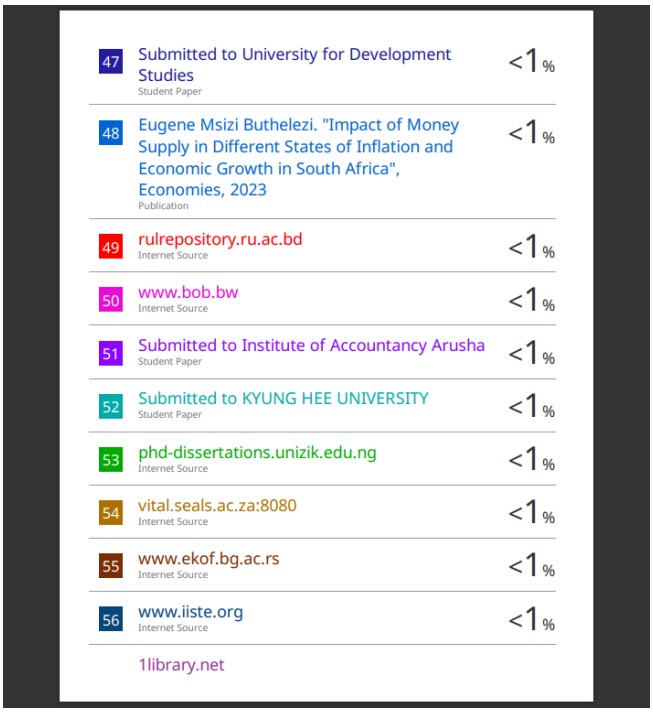

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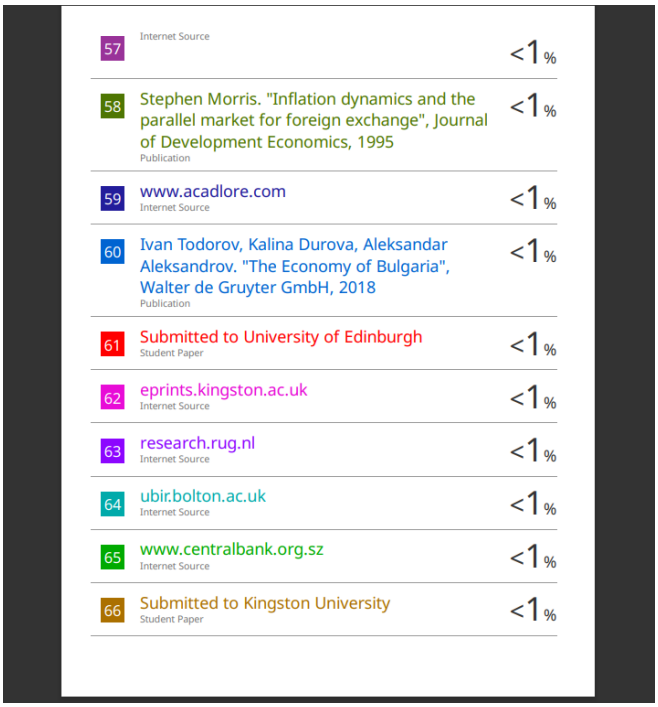

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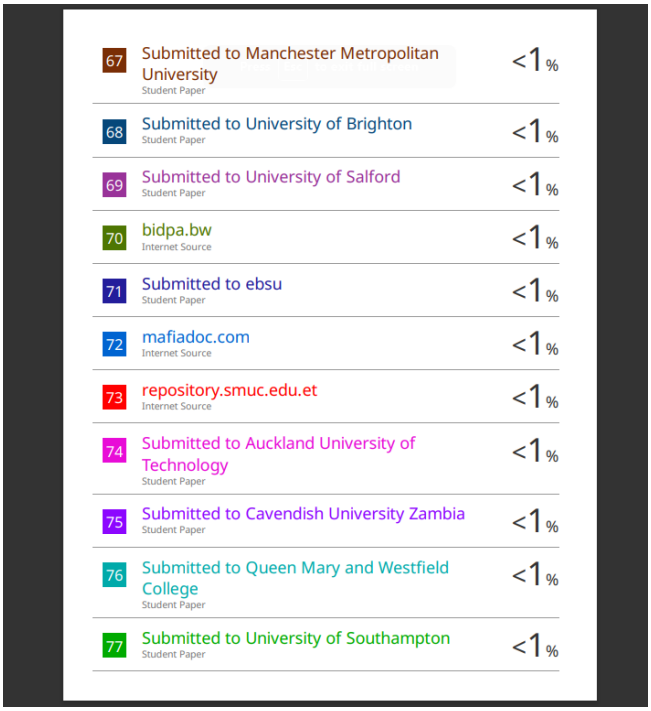

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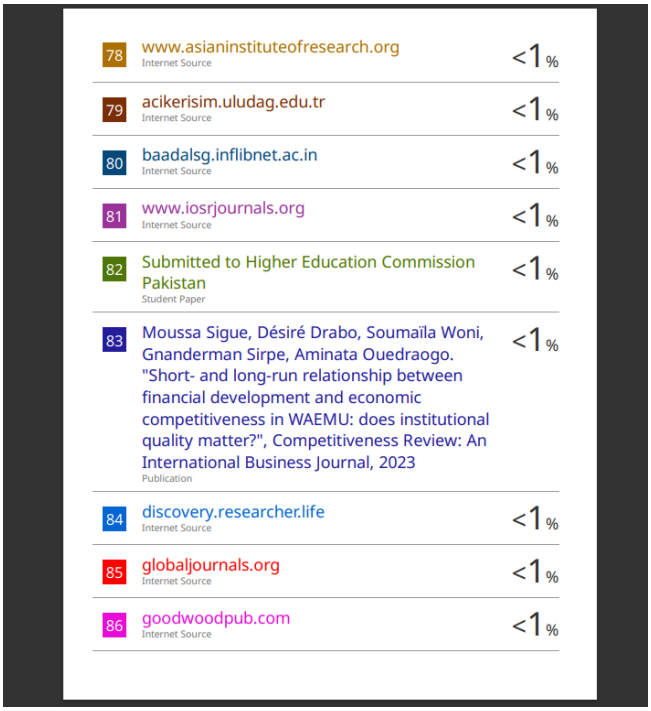

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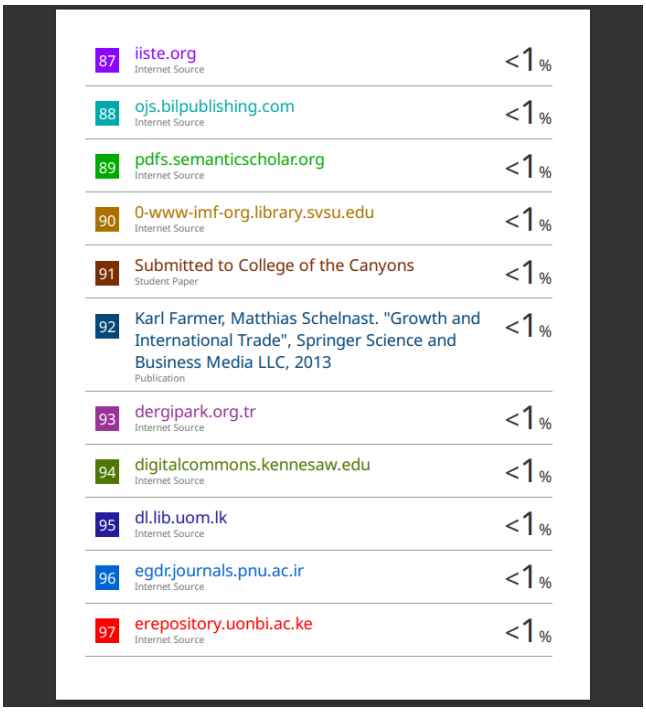

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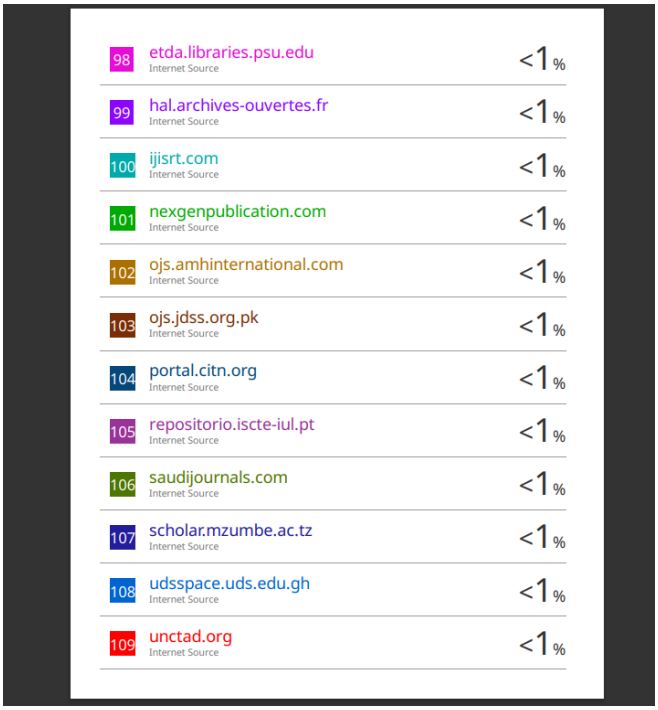

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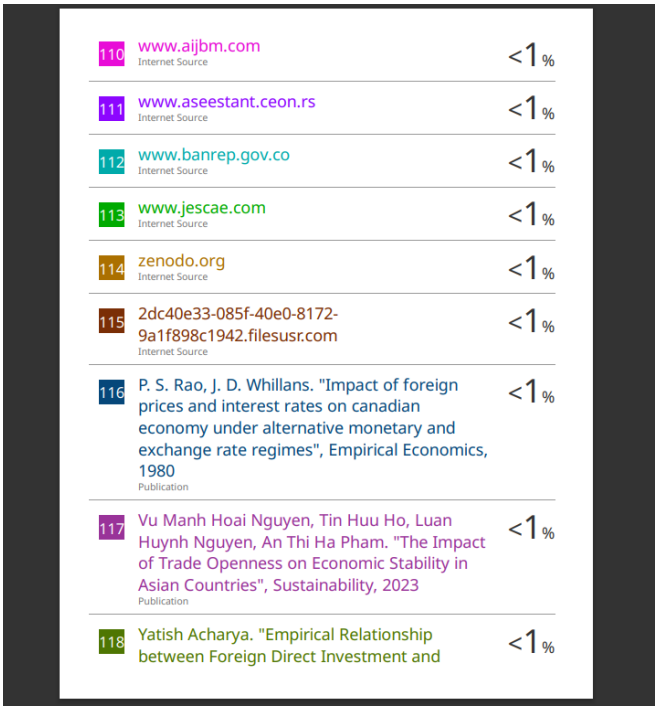

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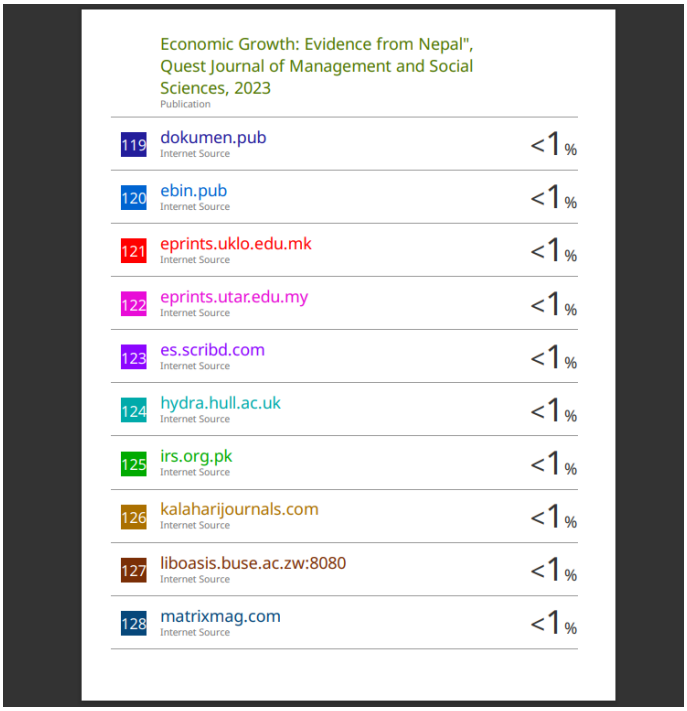

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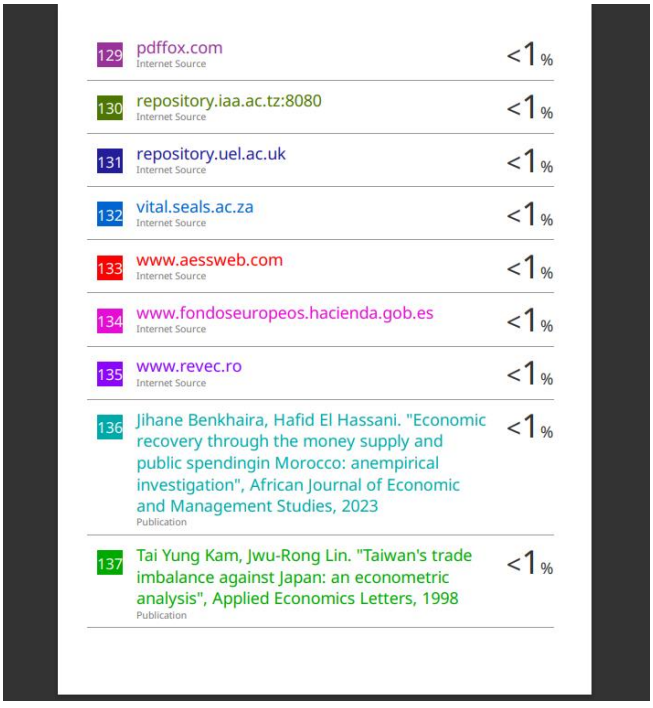

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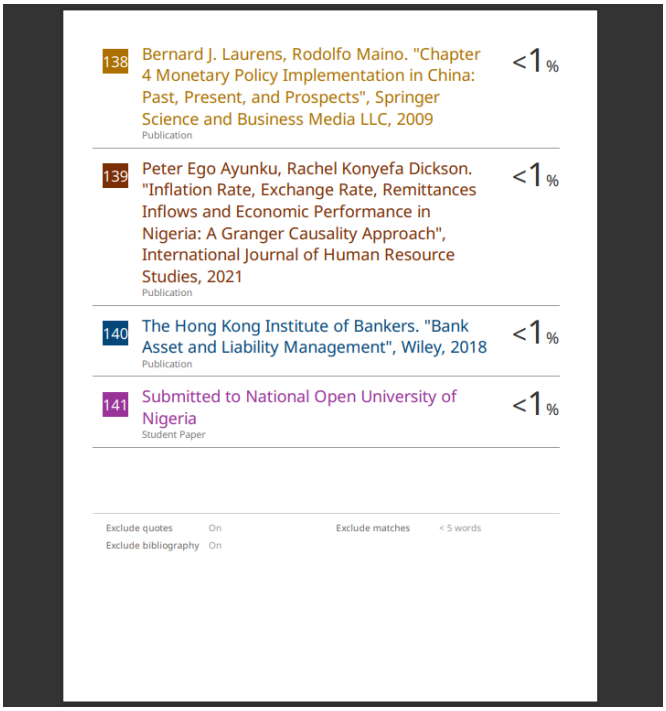

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