A Study of the Effect of Monetary Policy and International Reserves on Zambia's Economic Growth

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ABSTRACT

The objective of this study was to determine the effect of monetary policy and international reserves on economic growth in Zambia using annual time series data from 1980-2022. A number of studies have been carried in Zambia on the effect of monetary policy on Zambia's economic growth. Therefore, the study sought to determine the effect of monetary policy and international reserves in Zambia. The variables included in the study were GDP growth (GDPTH) as the dependent variable and International reserves (FXR), exchange rate (EXR), interest rate (IR) and inflation (INF) as independent variables. Data on these variables was obtained from World Bank. The study employed a research design by using the method of ARDL analysis, the data was entered in the software package stata which was used to perform the ARDL model to estimate the long and short run relationship between the dependent variable and independent variables. The ARDL bound test was used to analysis cointegration and long run relationship and the ECM was used for analyzing short run relationship. The results showed that cointegration was there and there was a long- run relationship, all the variables were discovered to have a statistically significant in the long-run. Exchange rate and inflation have a statistically significant negative impact on economic growth in Zambia in the long- run while exchange rate is insignificant in the short-run. Interest rate and international reserves have a statistically significance positive impact on economic growth in Zambia while interest rate is insignificant after in second lag in the short run. Diagnostic test for serial correlation (Breush-Godfrey serial correlation LM test), normality (Jarque-Bera), heteroscedasticity (Breush-Pagan-Godfrey test) and stability (CUSUM-of-square test) were conducted to evaluate the estimated model. The study found that the estimated ARDL model could provide information on the behaviour monetary policy and international reserves' impact on Zambia's economic growth. The study recommended diversification of international reserves, exchange rate management, interest rate policies and inflation targeting.

Keywords-- ARDL, International Reserves, Interest Rate, Inflation, GDP Growth, Exchange Rate

I. INTRODUCTION

The history of monetary policy in Zambia is characterized by shifts in response to domestic and international economic conditions. From the era of the Kwacha's redenomination to the adoption of inflation targeting, Zambia's monetary policy has undergone transformations aimed at achieving stability, fostering investment, and promoting inclusive economic growth. Until 1991, monetary policy in Zambia was conducted using direct instruments. The objective of monetary policy was output growth. Inspired by the development theories of the day, interest rates were controlled to keep investment capital costs low. In 1992, monetary policy reforms began to be implemented. Interest rates were freed and the exchange rate was liberalized the following year. The main goal of monetary policy changed from output growth to the control of inflation. In terms of actual policy implementation, the reforms entailed shifting the emphasis from statutory ratios to more indirect methods. Efforts towards this were started in 1993 and by 1995, open market operations had replaced the frequent use of statutory ratios as the prime instrument of policy. Monetary policy, administered by the Bank of Zambia, plays a pivotal role in influencing economic variables such as inflation, interest rates, and money supply. Through tools like policy rates and open market operations, the central bank endeavours to strike a balance that encourages investment, curtails inflationary pressures, and supports overall economic expansion (Zambia Monetary Policy Framework, 2019) Zambia's exposure to external vulnerabilities, including fluctuations in global commodity prices, underscores the significance of international reserves. The country's reliance on copper exports necessitates a robust reserve position to mitigate external shocks, maintain exchange rate stability, and safeguard against balance of payments crises that could impede economic growth.

With regards to the domestic economy, Zambia's financial markets have remained shallow and have not effectively supported small-scale entrepreneurs in the economy who are the most dynamic creators of growth and

jobs. Hence to consolidate the economic progress made so far it was imperative that fiscal and monetary policies continued to complement each other to sustain the macroeconomic stability the country has achieved which was reflected in single digit inflation and lower budget deficits over time. The expansionary fiscal policy currently in place was aimed at addressing the significant infrastructure deficit the nation has experienced over time (BOZ: 2020). In Zambia, monetary policy is implemented by the Bank of Zambia (BoZ), which is responsible for maintaining price stability and promoting economic growth. The country's economy has been experiencing significant fluctuations in recent years, largely driven by external factors such as changes in global commodity prices, weather conditions, and political instability in neighbouring countries (BoZ, 2019).

II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Overview of Monetary Policy

Asongu (2018) opines that monetary policy is a crucial tool employed by a country's central bank to manage its money supply, interest rates, and ultimately achieve macroeconomic objectives. The primary goals of monetary policy typically include controlling inflation, promoting economic growth, and maintaining price stability. Here's an overview of key components and mechanisms associated with monetary policy

Interest Rates: Central banks use interest rates as a primary instrument to influence economic activity. By adjusting policy rates (such as the federal funds rate in the U.S.), central banks can affect the cost of borrowing for businesses and consumers. Lowering interest rates encourages borrowing and spending, stimulating economic activity (Simangolwa, 2013). Conversely, raising rates can cool down an overheating economy and control inflation.

Money Supply: Central banks also aim to regulate the money supply in the economy. They can do this by implementing open market operations, which involve buying or selling government securities to influence the amount of money in circulation. Controlling the money supply helps central banks achieve their targeted interest rates and, in turn, influence spending and investment.

Inflation Targeting: Palakkeel (2007) states that many central banks adopt inflation targeting as a key monetary policy framework. They set a specific inflation target and use various tools to keep inflation within a target range. By maintaining price stability, central banks aim to create a predictable economic environment, fostering confidence among businesses and consumers.

Exchange Rates: While not the primary focus, central banks may also consider exchange rates in their monetary policy decisions. According to Asongu (2018), changes in interest rates can influence the value of a country's currency, impacting export competitiveness and import costs.

Forward Guidance: Central banks often provide forward guidance, communicating their future policy intentions to guide market expectations. Clear communication helps businesses and investors make informed decisions based on anticipated policy actions.

Unconventional Monetary Policies: In times of economic crises, central banks may resort to unconventional measures. Quantitative easing (QE), for example, involves purchasing financial assets to inject money into the economy when standard policy tools are limited.

Global Considerations: In an interconnected global economy, central banks also consider international factors in their policy decisions. Global economic conditions, trade dynamics, and geopolitical events can influence domestic monetary policy.

Independence of Central Banks: Many central banks operate independently from the government to avoid short-term political pressures. This independence allows them to focus on long-term economic stability. Effective monetary policy requires a delicate balance and a keen understanding of the economic environment (Asongu, 2018). Central banks continuously assess economic indicators, financial market conditions, and global trends to make informed policy decisions that support sustainable economic growth and stability.

2.2 Review of Monetary Policy and Economic Growth

The relationship between monetary policy and economic growth is complex, with central banks aiming to strike a balance between stimulating economic activity and controlling inflation (Success, et al, 2012). Here's a review of the key dynamics involved:

Interest Rates: Lowering interest rates is a common strategy to stimulate economic growth. Reduced borrowing costs encourage businesses to invest and consumers to spend, boosting overall demand in the economy. However, Kakar (2011) states that excessively low interest rates over an extended period can lead to excessive risk-taking, asset bubbles, and financial imbalances, which may pose long-term risks to economic stability.

Inflation Targeting: Central banks often adopt inflation targeting to maintain price stability. While moderate inflation is considered conducive to economic growth, Asongu (2018) argues that high or unpredictable inflation can erode consumer purchasing power and disrupt business planning. Striking the right balance in setting inflation targets is crucial, as overly strict targets might result in overly contractionary policies, hindering growth.

Exchange Rates and Export Competitiveness: Monetary policy can influence exchange rates, impacting a country's export competitiveness. A weaker currency can make exports more competitive but might also lead to higher

import costs (Kakar, 2011). A balance is required to support export-led growth without causing undue economic imbalances or relying too heavily on external demand.

Unconventional Monetary Policies: Palakkeel (2007) stipulates that during economic crises, central banks may resort to unconventional measures such as quantitative easing (QE). While these tools can provide liquidity and support financial markets, their effectiveness in promoting sustainable economic growth is debated. Prolonged use of unconventional policies raises concerns about their potential side effects, including asset price bubbles and income inequality.

Transmission Mechanism: The effectiveness of monetary policy depends on the transmission mechanism – how changes in interest rates and money supply impact the real economy. This mechanism can vary based on factors such as financial market conditions, consumer confidence, and banking sector health.

Global Considerations: In an interconnected world, the impact of monetary policy extends beyond national borders. Central banks must consider global economic conditions, trade dynamics, and capital flows in their policy decisions. Policy coordination among central banks can help mitigate spill-over effects and contribute to global economic stability (Palakkeel, 2007).

Long-Term Economic Structural Reforms: according to Apergis (2019), monetary policy alone may not be sufficient for sustainable economic growth. Governments need to complement monetary measures with structural reforms addressing issues such as labour markets, education, infrastructure, and innovation.

Challenges of the Zero Lower Bound: When interest rates approach the zero lower bound, central banks face challenges in implementing traditional monetary policy. This situation has led to increased exploration of fiscal policy and unconventional measures.

In conclusion, while monetary policy plays a vital role in supporting economic growth, its effectiveness depends on a nuanced understanding of the broader economic context. Striking the right balance between stimulating growth and maintaining stability requires ongoing evaluation, adaptability, and sometimes coordination with other policy tools. Moreover, policymakers need to be mindful of potential unintended consequences and structural limitations in relying solely on monetary measures for sustained economic growth.

2.3 Overview of International Reserves

According to Simangolwa (2023), foreign reserves, also known as foreign exchange reserves or forex reserves, refer to the assets held by a country's central bank or monetary authority in foreign currencies. These reserves play a crucial role in supporting the stability and functioning of a nation's economy. Here's an overview of foreign reserves

Composition: Foreign reserves typically consist of a mix of major international currencies, such as the U.S. dollar, euro, Japanese yen, and British pound. Gold reserves and special drawing rights (SDRs) issued by the International Monetary Fund (IMF) may also be part of the composition.

Purpose: The primary purpose of foreign reserves is to meet the country's external obligations and maintain economic stability. Reserves can be used to support the national currency, facilitate international trade and payments, and provide a buffer against external shocks (Simangolwa, 2023).

Exchange Rate Stability: Foreign reserves are often employed to stabilize the exchange rate. If a country's currency is under pressure, the central bank can intervene in the foreign exchange market by buying or selling currencies to influence the exchange rate.

Trade Facilitation: Apergis (2019) is of the view that reserves are crucial for facilitating international trade. They enable a country to settle its trade transactions, pay for imports, and meet external debt obligations. Having an adequate level of reserves instils confidence among trading partners and investors.

Crisis Management: Foreign reserves serve as a financial cushion during economic crises. In times of severe market volatility, a country can use its reserves to counter speculative attacks on its currency, providing stability to the financial system.

Interest Earnings: Countries may invest their foreign reserves in interest-bearing assets, such as government bonds of other nations. This allows them to earn returns on their reserves, although the level of returns can be influenced by global interest rate trends.

IMF Requirements: Countries often hold a certain level of reserves as part of their commitment to the International Monetary Fund (IMF). Kakar (2011) states that these reserves can be drawn upon in times of balance of payments difficulties, helping countries address short-term external financing needs.

Global Payments System Participation: Adequate reserves contribute to a country's participation in the global payments system. It ensures that a nation can meet its obligations in international transactions and participate in the settlement of payments through global institutions (Apergis, 2019).

Diversification: Some countries diversify their reserves to reduce risk. Diversification may involve holding a mix of currencies and assets, including gold and other financial instruments.

Monitoring and Reporting: Central banks regularly monitor and report on their foreign reserves. Transparency in reporting helps build trust in the stability and soundness of a country's financial system.

Maintaining an appropriate level of foreign reserves is a key aspect of prudent economic management,

and central banks carefully assess the optimal level based on factors such as trade dynamics, capital flows, and potential external risks. The specific strategies and policies regarding foreign reserves can vary among countries based on their economic conditions and policy objectives.

2.4 Review of Foreign Reserves and Economic Growth

Foreign reserves play a critical role in shaping a country's economic growth by influencing various aspects of its economic stability and development. Here's a review of the relationship between foreign reserves and economic growth

Stability of the Exchange Rate: Adequate foreign reserves contribute to the stability of a country's exchange rate (Asongu, 2018). This stability is essential for fostering a favourable environment for trade and investment, which, in turn, can positively impact economic growth.

Facilitating International Trade: Shamabobo (2015) states that foreign reserves enable a country to meet its international trade obligations, pay for imports, and manage its external debt. Smooth international trade transactions contribute to economic growth by ensuring the availability of necessary goods and services.

Crisis Prevention and Management: Sufficient foreign reserves act as a buffer during times of economic crises. In the face of external shocks or financial market volatility, Chileshe et al (2018) states that a country with robust reserves can better manage currency pressures and mitigate the risk of a full-blown economic crisis.

Attracting Foreign Investment: Countries with substantial foreign reserves may be viewed more favourable by foreign investors. Reserves signal a nation's ability to weather economic challenges, making it a more attractive destination for foreign direct investment (FDI) and portfolio investment.

Interest Earnings and Fiscal Space: Foreign reserves, when invested wisely, can generate interest income. Simangolwa (2023) argues that this income can contribute to a country's fiscal space, providing additional resources for public investments in infrastructure, education, and healthcare, which are key drivers of long-term economic growth.

Reducing External Vulnerabilities: Countries with low levels of foreign reserves may be more vulnerable to external shocks, such as sudden changes in global commodity prices or shifts in investor sentiment. Robust reserves reduce external vulnerabilities, allowing for more sustainable economic development (Asongu, 2018).

Supporting Monetary Policy: Foreign reserves enhance the effectiveness of monetary policy. Central banks can use reserves to intervene in the foreign exchange market, influencing the money supply and interest rates (Chileshe et al (2018). This intervention capability can contribute to achieving domestic economic objectives.

Fulfilling International Commitments: Membership in international financial institutions often comes with requirements to maintain a certain level of foreign reserves. Simangolwa (2023) argues that meeting these commitments enhances a country's standing in the global community and facilitates access to international financial support when needed.

Diversification and Risk Management: Diversifying the composition of foreign reserves helps manage risks associated with currency fluctuations and changes in global economic conditions. Prudent risk management, facilitated by diverse reserves, supports overall economic stability.

IMF and Creditworthiness: Aizenman (2003) states that holding adequate reserves aligns with the requirements of the International Monetary Fund (IMF) and contributes to a country's creditworthiness. This can be crucial for securing favourable terms in international financial transactions.

In conclusion, foreign reserves are a cornerstone of economic stability and growth. While they do not directly generate economic output, their role in mitigating risks, ensuring financial resilience, and supporting the effective functioning of monetary and fiscal policies makes them instrumental in fostering an environment conducive to sustained economic growth. Countries that strategically manage and deploy their foreign reserves are better positioned to navigate challenges and create conditions for long-term prosperity.

2.5 Review of Similar Studies

2.5.1 Empirical Studies in Europe and Asia

Smets and Wouters (2007) developed and estimated a DSGE model with sticky prices and wages for the euro area. The model was estimated using Bayesian techniques using seven key macroeconomic variables: GDP, consumption, investment, prices, real wages, employment, and the nominal interest rate. In addition, they introduced ten orthogonal structural shocks (including productivity, labor supply, investment, preference, cost-push, and monetary policy shocks) that allowed for an empirical study of the effects of these shocks and their contribution to business cycle fluctuations in the euro area. They found that monetary policy shocks play an important role in changes in euro area output.

Using econometric regression model analysis on a monetarist approach, Lashkary and Kashani (2011) studied the impact of monetary variables on economic growth in Iran during the period 1959-2008 and found no significant relationship between money supply and real economic variables, economic growth, and employment. Using econometric regression model analysis on a monetarist approach, Lashkary and Kashani (2011) studied the impact of monetary variables on economic growth in Iran during the period 1959-2008 and found no significant relationship between money supply and real economic variables, economic growth, and employment.

Jawaid, Qadri, and Ali (2011) studied the effect of monetary, fiscal, and trade policy on economic growth in Pakistan, using annual time series data from 1981 to 2009. They used cointegration and error correction model (ECM), revealing the existence of a significant positive relationship in the long and short run between monetary policy (money supply) and economic growth.

2.5.2 Empirical Studies in Developing Countries

In recent decades foreign reserve reached an extended level in many developing countries. Fukuda and Yoshifumi (2007) found that, an increase in foreign exchange reserves raises both liquid and total debt, while shortening debt maturity. It also leads to a decline in consumption, although investment and economic growth may improve when the tradable sector is capital intensive. Kashif1 et al. (2017) argue that, economic growth has positive impact and dynamic relationship between economic growth and international reserves. Their results reveal that, 1 per cent increase in economic growth will lead 0.16 per cent upsurge in international reserves. A statement from Polterovich and Vladimir (2002), the accumulation of foreign exchange reserves is neither a necessary nor a sufficient condition of economic growth. It may well be that countries that do not accumulate reserves grow faster than others because of better investment climate, better institutions, and greater involvement in international trade achieved through greater openness of their economies even though their exchange rate is at equilibrium level.

Fukuda and Kon (2012), using an unbalanced panel of 135 developing countries, examine the effect of foreign exchange reserves accumulation on macroeconomic variables. The results of the study indicate that foreign exchange reserves shorten debt maturity and increase external debt outstanding. Foreign exchange reserves are also expected to negatively impact consumption while enhancing investment and economic growth when the tradeable sector is capital intensive. Similarly, Cruz and Kriesler (2010) analyze the potential impact of excess international reserves on economic growth using data on some selected developing countries for the period 1996-2005 and argue that this excess of resources represents a potential source to promote economic growth, which may boost aggregate demand and thus increase domestic economic activities in these countries. Furthermore, Krušković and Maričić (2015) investigate the effect of foreign exchange reserves accumulation on economic growth in emerging economies. They find that a percentage increase in reserves leads to a 0.06% increase in GDP. The results from the Granger causality imply a unidirectional causality from foreign exchange reserves to economic growth.

Sula and Oguzoglu (2021) examine the international reserves – economic growth nexus for 120 developing and developed economies over the period 1981-2010. Employing dynamic panel data models, they find that reserves have a significant positive effect on economic growth. However, this effect is conditional on the interest rate differential between the related country and the US. Specifically, their findings indicate that when the interest rate differential is equal to its sample average, a 1% rise in the reserves/GDP ratio raises the annual growth rate by 0.007%.

Amarasekara (2009) used the recursive VAR and semi-structural VAR methodology on monthly data for the period 1978 to 2005 to assess the effects of monetary policy on economic growth and inflation in the small developing open economy of Sri Lanka. The results of the recursive VAR model were consistent with the results of the semi-structural VAR model and revealed a significant negative impact of interest rates on growth. Positive innovations reduced GDP growth. However, when money growth and the exchange rate are used as policy indicators, the impact on GDP growth contrasts with the results obtained with the theory

2.5.3 Empirical Studies in Africa

Fasanya, Onakoya, and Agboluaje (2013) examined the impact of monetary policy on economic growth in Nigeria using the error correction model (ECM) on time series data covering the period 1975 to 2010. They found that a long-run relationship exists between the variables and that the inflation rate, exchange rate and external reserves are important policy instruments that drive growth in Nigeria in line with theoretical expectations. The money supply was found to be insignificant

Balogun (2007) examines the monetary and macroeconomic stability perspective of the West African currency area countries using a sample of quarterly data from 1991:Q1 to 2004:Q4. The regression results indicate that monetary policy, as captured by the money supply and credit to government, has been detrimental to real domestic output in these countries. The study also shows that interest rate policy had negative effects on GDP contrary to the 9 theoretical expectation of an inverse relationship and that exchange rate devaluations have no effect on output.

Daoui and Benyacoub (2021b) use a more recent extension of the FAVAR model, the Factor-augmented Error Correction Model (FECM), to examine the effects of monetary policy shocks on economic growth in Morocco. The study is based on a database of 117 quarterly series, spanning from 1985 to 2018, and combines the benefits of dynamic factor models and error correction models. The main objective of the study is to explore how monetary policy shocks affect economic growth in Morocco, and to compare the results obtained by the FECM model to those obtained by the factor-augmented vector autoregression (FAVAR) model. The results suggest that the FECM model, which takes into account non-stationarity in

dynamic factor modeling, is a valuable extension of the FAVAR model for studying monetary policy shocks.

Khabo and Harmse (2014) estimated the impact of monetary policy on South Africa, using OLS on annual data series from 1960 to 1997 and found that money supply (M3) and inflation were significantly related to economic growth, consistent with economic theory

A study by Mohamed Ahmed in Uganda 2018 was conducted with the purpose to evaluate the impact of fiscal policy on economic growth in a developing economy using Uganda data. The study specifically investigates effect of government expenditure, government tax revenue, and government non-tax earnings on economic growth of a developing economy using cointegration and regression analyses on annual data for the 1985 to 2016 periods. The estimates from the preliminary analysis show that both the economic growth (GDP) series and fiscal policy variables are integrated of order one. Results from cointegration model show evidence of long-run relationship between fiscal policy and economic growth. Estimates from the regression model suggest that public expenditure and tax revenue have positive and significant effect on economic growth. The results further show, however, that non-tax revenue does not have significant effect on the economic growth. These findings should propel fiscal policy-makers to formulate expenditure and tax policies to ensure productive expenditures are sustained while at the same avoid tax regimes that are directly targeted at the low-income households.

2.5.4 Empirical Studies in Zambia

Moyo (2019) carried out a study to investigate the impact of monetary policy on Zambia's economic growth. Using annual time series data from 1985-2015, the study suggested that increasing exchange rate played a significant role in increasing Zambia's economic growth. It also found that changes in the economic growth in Zambia are also driven by changes in inflation rate.

Mwange (2022) also carried out a study to investigate the impact of monetary policy on economic growth in Zambia using the VAR model from 2001 to 2021. The study results reveal that economic growth represented by Gross Domestic Product (GDP) in Zambia is negatively affected by lending rates, inflation, and an increase in private sector credit, while exchange rate and deposit rates were found to have a positive impact, on the other hand. These results confirm the presence of exchange rate and credit channels of monetary policy transmission in Zambia.

Zgambo and Chileshe (2014) analysed the effectiveness of monetary policy in Zambia. The money demand function is investigated using the Autoregressive Distributed Lag (ARDL) approach while monetary transmission mechanisms are analysed through the Vector Autoregressive (VAR) framework. The money demand function is found to be determined by real income, the exchange rate and Treasury bill rates in the long-run while in addition to these factors, inflation plays a role in the determination of money demand in the short-run. The money demand function is also found to be stable, a result that points to the importance of monetary aggregates in the conduct of monetary policy. As regards monetary transmission mechanisms, the results found monetary aggregates (broad money) as being important in the transmission of monetary policy while interest rates were found to have no significant effects on output and prices. The exchange rate is also found to be an important channel for the transmission of monetary policy. The key proposition from these results is that monetary aggregates will still continue to play a role in the Bank of Zambia's conduct of monetary policy even as the Bank moves toward the adoption of inflation targeting, where the policy rate is envisaged to be the key monetary policy tool.

2.6 Theoretical and Conceptual Framework
2.6.1 Theoretical Framework

This study was guided by two main theories, the classical view of monetary policy and the Keynesian view of monetary policy.

The Classical View of Monetary Policy: The classical economists' view of monetary policy is based on the quantity theory of money. The quantity theory of money is usually discussed in term of Fisherian equation of exchange, which is given by the expression $MV = PY$.

In the expression, M denotes the supply of money over which the central bank has some control; V denotes the velocity of circulation which is the average number of times a currency is spent on final goods and services over the course of a year; P denotes the price level GDP. Hence PY represents current nominal GDP. The equation of exchange is an identity which states that the current market value of all final goods and services (nominal GDP) must equal the supply of money multiplied by the average number of times a currency is used in transaction in a given year.

The classical economist believes that the economy is always at or near the natural level of real GDP. Thus, they assume that in the short run, the Y in the equation of exchange is fixed. They further argue that the velocity of circulation of money tends to remain constant. So that V can also be regarded as Fixed. Given that both Y and V are fixed, it follows that if the Bank of Zambia were to engage in expansionary (or contractionary) monetary policy, it will lead to an increase (or decrease) in money supply (M) and according to the IS-LM model, the increase or decrease in money supply will lead to a reduction or increase in interest rates and increase or decrease in national income or GDP.

2.6.2 Keynesian View of Monetary Policy: Keynesian theory did not buy the notion that the relationship between money and price is direct and proportional. They share the

view that it is indirect through the rate of interest. Also, they reject the notion that the economy is always at or near the natural level of real GDP so that Y in the equation of exchange can be regarded as fixed. They also reject the proposition that the velocity of circulation of money is constant.

Keynesians believe that expansionary monetary policy increases the supply of loanable funds available through banking system, causing interest rates to fall. With lower interest rate, aggregate expenditures on investment and interest-sensitive consumption goods usually increase, causing real GDP to rise. Hence, monetary policy can affect real GDP indirectly.

2.6.3 Conceptual Framework

The conceptual framework was developed from the various information that was reviewed in the literature review. Concepts, variables and theories were pulled out from the reviewed literature and guided the development of the current conceptual framework. This conceptual framework include four independent variables that is exchange rate, interest rate, inflation and foreign reserves while having only one dependent variable that is GDP.
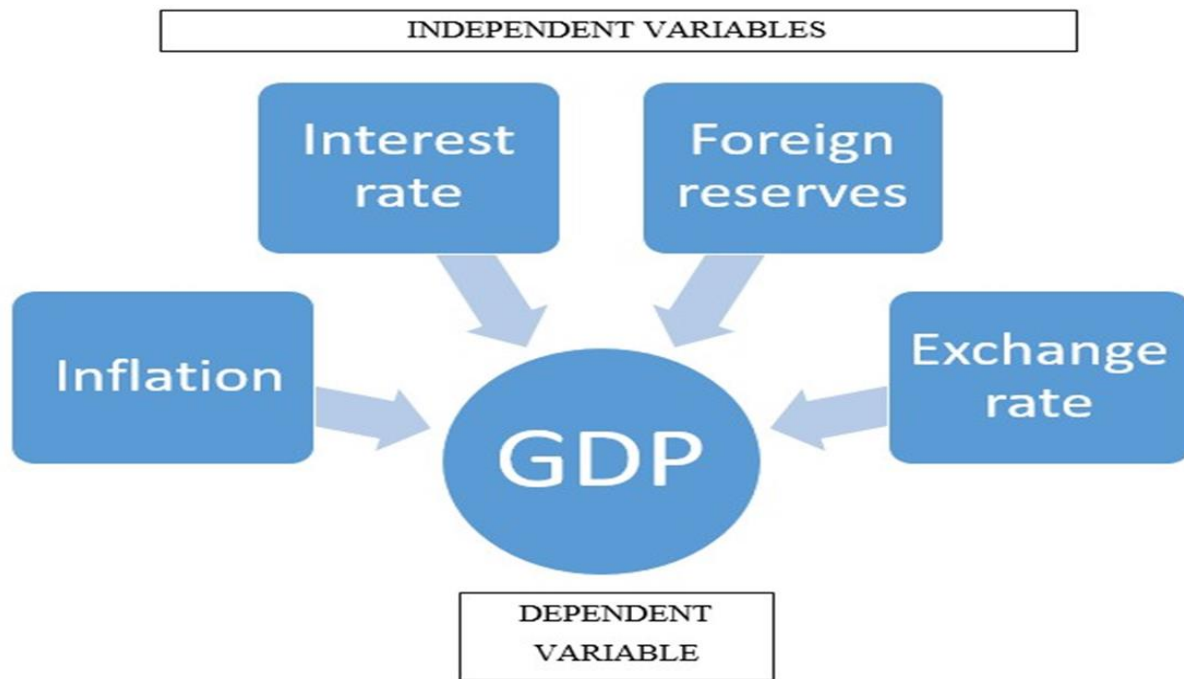

Figure 1: Conceptual framework

III.   RESEARCH METHODOLOGY

The study adopted a causal/correlational research design. The data from this study was collected from a secondary source and the use of annually time series data from 1980 to 2021. The study did not consider the period before 1980 due to non-availability of due in some specific years because of the structural adjustment programmes (SAP) and most of the data was not collected during that period on certain variables to be used in the study. The dataset to be used for the study variables over the period 1980-2021 will be obtained from the World Bank indicators and UNCTAD stats. This study adopted the Autoregressive distributed lag (ARDL) model for foreign developed by Sims (1980).   The relationship between the dependent variable   and   independent   variables   was   analyzed econometrically using a regression analysis. The study employed stata 14 and Microsoft Excel as the statistical packages.

IV.   RELIABILITY AND VALIDITY

In order to ensure reliability, the researcher tested the research instruments in a pilot study across several potential respondents to ensure that the understanding of the questionnaire was consistent across different respondents. The questionnaire was revised in order to address the issues in the questions that could not be easily understood or not similarly understood by the respondents in the pilot of the questionnaire. Thus, validity entails whether the study instruments/tools are able to measure what they ought to measure given the context in which they are applied. In

order to minimize the issues in relation to the test validity, the questionnaire was designed as a close-ended questionnaire thereby limiting the responses of the respondents to a positive response, a negative response, or no response to the question posed. Given that the questions were close-ended questions; the validity of the questionnaire was accepted due to this approach which ensured that the responses reflected the respondents' unbiased perspectives.

V.   ETHICAL CONSIDERATIONS

The researcher strictly followed the following research ethical principles, which are research approval, research permission, informed consent from respondents, anonymity and confidentiality. Study protocol were approved by the University of Zambia. While permission to conduct a research was given by the office of the Lusaka District Commissioner. The research ethics principles that were utilized include informed consent, anonymity and confidentiality. For anonymity, the dataset used for the study variables over the period 1980-2021 obtained from the World Bank indicators and UNCTAD stats were treated with confidentiality.

VI.   ANALYSIS OF THE RESULTS

6.1 Pre-Estimation Analysis

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
gdpth	43	3.514165	3.857017	-8.625442	10.29822
fxr	43	9.36e+08	1.06e+09	4.54e+07	3.08e+09
exr	43	4.279763	5.148063	.0007887	20.01849
ir	43	27.19704	20.55434	9	113.3083
inf	43	33.7546	41.3419	6.1	183.312

The central tendency as depicted by the mean of Zambia's GDP growth (gdpth) is 3.514 and the mean for exchange rate (exr) be 4.28 for our dataset. The mean values for international reserves (fxr) and interest rate (ir) is 9.36e+08 and 27.197 respectively. The standard deviations of the variables are high thus suggesting that the data points are scattered over a wide range of values.

6.2 Graphical Analysis

The is the graphical analysis of foreign reserves, exchange rate, interest rate, inflation and gross domestic product.
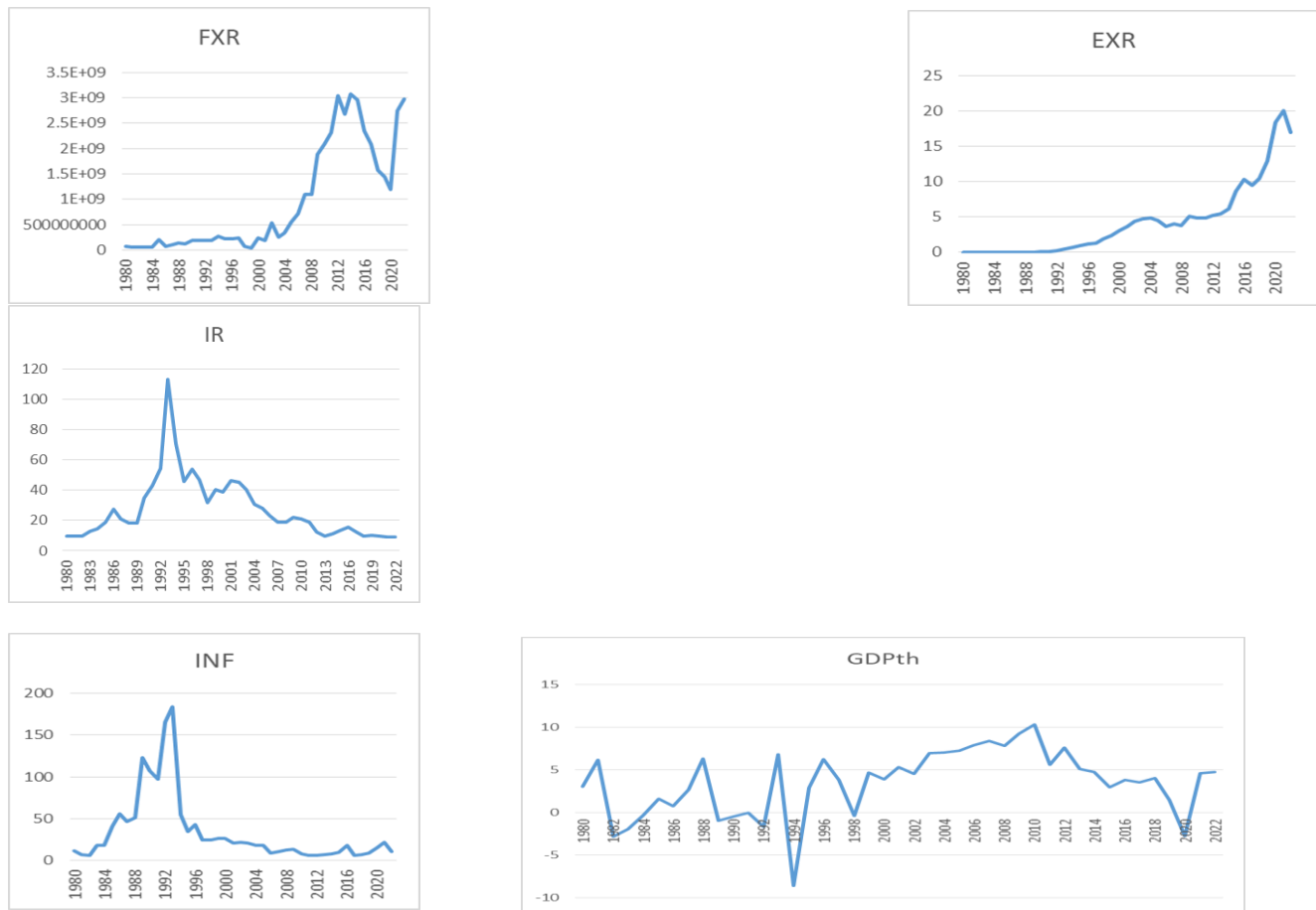
Figure 2: Graphical analysis

The figures show the line graphs of historical performance of the variables used in the study. The graphs show there is little evidence to the presence of structural breaks or outlier in the variables but the graphs on series display a stable variance.

6.3 Bound Cointegration Test

Table 2: **ARDL Bound test**

ARDL(1,1,1,3,0)		
F-statistic	8.245	
Asymptotic critical values		
	I(0)	**I(1)**
10%	3.74	5.06
5%	3.25	4.49
2.5%	2.86	4.01
1%	2.45	3.52

From the results above we can conclude that a long run relationship exists between foreign reserves and its independent variables used in this study. This arises from the fact that the calculated F-statistics (8.245) is significant at 5% critical level and is greater than the Pesaran's critical lower bound value of 3.25 and upper bound value of 4.49.

Table 3: The long run estimates

Dependent Variable: GDP growth				
Variable	Coefficient	Standard Error	t-Statistics	Prob.
FXR	2.95e-09	9.02e-10	3.27	0.003
EXR	-0.6086	0.2637	-2.31	0.029
IR	0.2167	0.0361	6.01	0.000
INF	-0.0541	0.0131	-4.14	0.000
Cons	2.9153	1.1946	2.44	0.021

From the above regression results, the following cointegration equation is constructed.
GDPTH= 2.9153 +2.95e-09(FXR) -0.6086(EXR) +0.2167(IR)-0.0541(INF)

Table 4: Short-run estimates

Dependent Variable: D (GDPTH)				
Variable	Coefficient	Std. Error	t-Statistics	Prob.
DFXR	2.90e-09	8.92e-10	3.25	0.003
DEXR	-0.5576	0.2833	-1.97	0.059
DIR	0.1718	0.0341	5.03	0.000
DIR(-1)	-0.1230	0.0273	-4.51	0.000
DIR(-2)	0.0554	0.0297	1.87	0.072
_Cons	2.9153	1.1946	2.44	0.021

The short run relationship from the Zambia's economic growth model

6.4 Diagnostic Test

Table 5: Specification error or specification bias

H_0: Model has no omitted variables	
F-statistics (3, 25)	1.03
Prob>F	0.3942

The null hypothesis states that there is no specification error while the alternative hypothesis is that there is specification error. Since the p-value of the F-statistics (0.3942) is insignificant at 5% level, we fail to reject the null hypothesis and conclude that our ARDL model has no specification error.

Table 6: Test for serial correlation

H_0: No serial correlation			
Lags(p)	Chi2	Df	Prob > chi2
1	0.719	1	0.3964

The probability value of the F-statistic (0.719) fails to reject the null hypothesis of no serial correlation. Similarly, the probability value of the Chi-square statistics (0.3964) is insignificant at 5% level and therefore we conclude there is no serial correlation in the residuals of our model

Table 7: Test for Heteroscedasticity

H_0: Constant variance (homoscedasticity)	
Chi2(1)	0.36
Prob > chi2	0.5485

The null hypothesis states that there is homoscedasticity while the alternative hypothesis is that there is heteroscedasticity. Since the p-value of the observed Chi-square (0.5485) is insignificant at 5% level, we fail to reject the null hypothesis and conclude that our ARDL model has no heteroscedasticity in the residual which is also a desirable result for the model.

Table 8: Normality test

| H_0: Normality	
Jarque-Bare Normality	26.41
Chi(2)	1.8e-06

The null hypothesis states that the residuals are normally distributed while the alternative hypothesis is that the residuals are not normally distributed. The value of the Jarque-Bera is about 1.8e-06 which is more than 0.05 meaning that we cannot reject the hypothesis but we accept the null hypothesis that the residuals are normally distributed which is good for the model.

Table 9: Test for multicollinearity

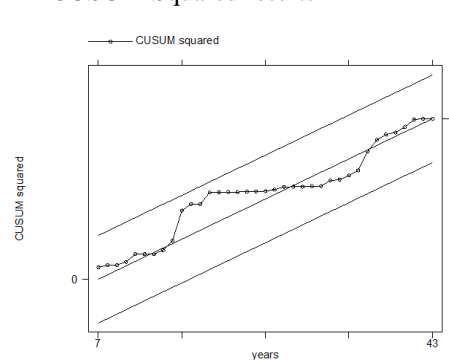| VARIABLE	VIF	1/VIF
INF	3.36	0.297913
FXR	3.00	0.333399
EXR	2.66	0.376291
IR		
D1.	2.40	0.416800
--.	2.29	0.437313
GDPTH		
L1.	2.17	0.461296
IR		
L2D.	1.81	0.551650
LD.	1.54	0.651136
EXR		
D1.	1.30	0.771856
FXR		
D1.	1.15	0.867742
MEAN VIF	2.17	

Stability Test
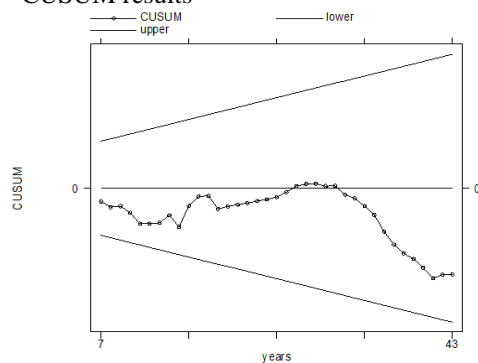
Figure 3: Stability test

From the graph above it can be seen that the line is within the two bounds. Therefore, we fail to reject the null hypothesis that the parameters are stable. The CUSUM and CUSUM squared in this case do not indicate any structural breaks in the regression coefficients. It can further be observed that the figures are statistically well within 5% critical bounds. The meaning of this is that the coefficient in the ECM model are stable.

VII.   DISCUSSION OF RESULTS

7.1 Effect of Foreign Reserves on Zambia's Economic Growth

Returning to the objectives raised in the introduction, the study now presents the following finding. One of objectives was to determine impact of international reserves on economic growth in Zambia. The results show international reserves has a significant positive long run impact on Zambia's economic growth. The coefficient of international reserves indicates that at ceteris paribus, a one unit increase in international reserves will lead to 2.95e-09 unit decrease in Zambia's economic growth on average in the long run, suggesting Zambia's economic growth is sensitive to international reserves changes in the long-run. The finding is similar to the finding of Sula and Oguzoglu (2021) for developed and developing countries and the findings of Fasanya, Onakoya and Agboluaje (2013) in Nigeria. International reserves has significant positive short-run effect on Zambia's economic growth over a one period.

7.2 Effect of Exchange Rate on Zambia's Economic Growth

One of objective was to examine the impact of exchange rate on economic growth in Zambia. The results show that exchange rate has a significant negative long run impact on Zambia's economic growth. The regression coefficient of exchange rate indicate that at ceteris paribus, a one unit increase in exchange rate will lead to a 0.6086 unit decrease in Zambia's economic growth on average in the long run. This suggests that Zambia's economic growth is sensitive to changes in exchange rate in the long run. This finding is contrary different to the findings of Mwange (2022) and Moya (2019) who found that exchange rate a statistical significant and positive impact on Zambia's economic growth in Zambia. Exchange rate had no significant short-run impact on Zambia's economic growth.

7.3 Effect of Interest Rate on Zambia's Economic Growth

The other objective this study is try to achieve is to determine the effect of interest rate on Zambia's economic growth. The results show that interest rate has a significant positive long run impact on Zambia's economic growth. The regression coefficient of exchange rate indicate that at ceteris paribus, a one unit increase in interest rate will lead to a 0.2167 unit increase in Zambia's economic growth on average in the long run. This suggests that Zambia's economic growth is sensitive to changes in interest rate in the long run. This finding is contrary to the findings of Mwange (2022) who found that interest rate a statistical significant and negative impact on Zambia's economic growth in Zambia and the findings of Balogun (2007) and Amarasekara (2009). Interest rate had significant and positive short-run impact on Zambia's economic growth then has a negative significant impact on Zambia's economic growth after the first large. Interest rate becomes insignificant after the second lag meaning interest has no significant impact on Zambia's economic growth.

7.4 Effect of Inflation on Zambia's Economic Growth

Lastly, the other objective this study is try to achieve is to determine the effect of inflation on Zambia's economic growth. The results show that inflation has a significant negative long run impact on Zambia's economic growth. The regression coefficient of inflation indicate that at ceteris paribus, a one unit increase in inflation will lead to a 0.0541 unit decrease in Zambia's economic growth on average in the long run. This suggests that Zambia's economic growth is sensitive to changes in inflation in the long run. This finding is similiar to the findings of Mwange (2022) who found that interest rate a statistical significant and negative impact on Zambia's economic growth in Zambia and the findings of Fasanya, Onakoya and Agboluaje (2013). Inflation had the same effect on Zambia's economic growth in short-run as in the long run.

VIII.   CONCLUSIONS AND RECOMMENDATION

In order of the study objectives, the study concluded that there is a statistical significant relationship between international reserves and Zambia's economic growth both in the short run and Long run because its p-value (p=0.003) is less than 0.05. International reserves had a positive impact on economic growth meaning an increase in reserves, leads to an increase in economic growth.

There is a statistical significant relationship between exchange rates and Zambia's economic growth in the long run because its p-value (p=0.029) is less than 0.05 but was insignificant in the short run because its p-value (p=0.059) was greater than 0.05. In the long run, this implies an increase in exchange rate (depreciation in Kwacha), leads to decrease in Zambia's economic growth.

There is a statistical significant relationship between interest rate and Zambia's economic growth in the long run because its p-value (p=0.000) is less than 0.05 but is statistically insignificant in the short run after the second lag this could be anticipated by people adjusting to the increasing interest rate while the positive relationship in the long run can be anticipated by the incentive to save,

higher interest rate provide individuals and business with an incentive to save money.

The study concluded that there is a statistical significant relationship between inflation and Zambia's economic growth in both in the short run and long run because its p-value (p=0.00) is less than 0.05, the study also concludes that inflation has a negative impact on Zambia's economic growth implying as inflation increases, Zambia's economic growth declines.

All the diagnostic tests conditions including no serial correlation, no heteroscedasticity and normality test were satisfied. This indicates that the model was not only stable but also well specified.

From the findings, the research suggests the following recommendations:

❑ Diversification of International Reserves, explore strategies to diversify and strengthen international reserves. This could involve considering a mix of foreign currencies, gold, and other assets to enhance resilience against external shocks.

❑ Exchange Rate Management, develop policies aimed at maintaining a stable and competitive exchange rate. Implement measures to mitigate the negative impact of exchange rate fluctuations on GDP growth, such as hedging mechanisms for businesses.

❑ Interest Rate Policy, fine-tune interest rate policies to balance the need for economic stimulus with the necessity of controlling inflation. Consideration should be given to the potential impact of interest rate changes on investment and borrowing costs.

❑ Inflation targeting, strengthen inflation targeting mechanisms to ensure price stability. Implement measures to curb inflationary pressures while avoiding overly restrictive policies that may stifle economic activity.

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