http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522- 3186



African Development Finance Journal http://journals.uonbi.ac.ke/index.php/adfj
November Vol 9 No.5, 2026 PP 233-254 ISSN 2522- 3186

Nexus between Monetary Policy and economic growth in Tanzania from 1970 to 2020

By: Dr James Daniel CHINDENGWIKE (PhD)[1]

Abstract
Macroeconomic policy frequently applied to boost economic growth as well as to fulfil macroeconomic objectives is monetary policy. This study examines the impact of monetary policy on economic growth in Tanzania. The research was directed by 4 specific objectives, which were: to examine the association between exchange rate and economic growth in Tanzania, to find out the relationship between money supply and economic growth in Tanzania, to examine the association between inflation rate and economic growth in Tanzania and to examine the effects of interest rates on economic growth in Tanzania. The study used time series data drawn from the National bureau of statistics and the Bank of Tanzania. The study specific objectives were analysed by using the Auto regressive distributed lag model (ARDL). The findings reveal that in the long the exchange rate cause to a significant positive influence on economic growth; the money supply enhances economic growth; the Interest rate was found to lead to a negative effect on economic growth though was not significant. Also, the inflation rate was found to have no significant influence on economic growth in the long run. Additionally, the study concludes that in general, monetary policy has a significant positive effect on economic growth. This study recommend that the government has to make sure that it applies a monetary policy for the better achievement of economic growth. So, this study implies that having a better monetary policy leads to stability and an increase in economic growth. Furthermore, the study also suggested that future studies can use autoregressive integrated moving averages with exogenous variables by incorporating the interest rate and exchange rate as the exogenous variables to prediction the upcoming worth of economic growth.

Keywords: *Interest rates, exchange rate, money supply, Inflation rate, Economic growth.*

1. INTRODUCTION

1.1 Background

Monetary policy is an important issue in controlling the size and rate of growth of the money supply in an economy (Mehar, 2023). Moreover, it is an effective strategy for controlling macroeconomic factors like unemployment and inflation. Usually, this policy is carried out using a variety of tools, including the interest rate adjustment through the central bank's intervention Wang, Y., Wang, X., (Zhang et al., 2023). The interest rate is adjusted by adjusting the discount rate. The discount rate is an interest rate charged by a central bank to banks for short-term loans. For instance, if a central bank raises the discount rate, banks will pay more to borrow money. Consequently, banks increase the interest rates they charge to their customers (Chindengwike,

[1]*Finance, Accounting and Economics Department, Faculty of Commerce and Business Studies, St. John's University of Tanzania, Dodoma, Tanzania, e-mail: chindengwikejames@gmail.com, ORCID: 0000-0002-1717-8759*

2022). The central bank can affect the amount of money in the economy by altering the minimum requirement. Commercial banks will have less money available to lend to their customers if the central bank raises the required reserve amount, which will result in a drop in the amount of money in flow. Repurchase agreements (repo) and reverse repurchase agreements (reverse repo) are additional terms that are employed. To directly affect the amount of money in flow outside of banks and give the economy sufficient but, if possible, non-inflationary liquidity, the BOT is the only entity authorized to issue notes and coins in Tanzania (Khan and Jain, 2025).

Worldwide Australia, for example, used its monetary policy to respond to the financial crisis in the 1990s on a global scale. As a result, the negative effects of the financial depression on the economy were significantly reduced (Challoumis, 2024). This is due to the observation that came about with the introduction of monetary policy frameworks that better anchor inflation and encourage macroeconomic stability and growth (Nasution et al., 2022). The study offers enough to policymakers and financial analysts the required knowledge and information for, implementing, formulating and interpreting policy the monetary policy in controlling economic growth and later on achieving economic stability since the study used a time series economic model to study the result of monetary policy on economic growth (Challoumis, 2024). The research is very crucial to the government since whenever the government sets its national target on economic growth should consider the issue of controlling inflation, interest rate and money supply by doing so the government can achieve economic growth and stability. Finally, because it delivers a wide range of empirical evidence and theoretical, this research report is a significant reference for other researchers planning to discover the possessions of monetary policies in connection to growth and/or (Khan and Jain, 2025).

The study offers policymakers and financial analysts the required knowledge and information for, implementing, formulating and interpreting policy the monetary policy in controlling economic growth and later on achieving economic stability since the study employed a time series economic model to study the effect of monetary policy on economic growth. The study is very crucial to the government since whenever the government sets its national target on economic growth, consider the issue of controlling inflation, interest rate and money supply by doing so the government can achieve economic growth and stability. Finally, because it provides a wide range of empirical and

theoretical evidence, this research report is a significant "reference" for other researchers planning to explore the effects of monetary policies in connection to growth and/or stability.

Akalpler and Duhok (2018) study the following macro-economic variables as interest rate, money supply, level of inflation and economic growth. The study employed the analysis of the least-squares estimates. The study found that there was a significant association between interest rate and economic growth. According to Fueki et al.(2018) conducted the study underlying factors of oil price dynamics, this paper proposes a simple but detailed Structural Vector Autoregressive (SVAR) model. The distinctive feature is that, in addition to the traditional realized aggregate demand and supply components, the position of expectations on future aggregate demand and oil supply is evaluated separately. Thus, the indicated future demand and supply shocks account for 30-35 percent of historical oil price variations. Future oil supply shocks, in particular, are nearly twice as important in determining oil price changes as realized and future demand shocks. The empirical results suggest that the impact of oil price shocks on global production varies depending on the type of shock.

Furthermore, Yin et al., (2022), investigate the influence that rising oil prices have on the rate of inflation in consumer prices across the eurozone and in Spain. Believe that price changes in oil have a minimal impact on inflation in both economies, even though fluctuations in the price of crude oil are a significant contributor to the overall variability of inflation. It has been discovered that the effect on Spain's inflation is relatively bigger than that of the eurozone. Real impacts have increased in both economies over the course of the past decade, which is indicative of consumers' increased spending on crude oil products. On the other hand, indirect and second-round influences tend to have less of an impact than they once did. Also, Ruslan et al., (2023), conducted a study on the effect of oil price shocks on economic growth and discovered that oil price shocks have an effect on economic growth in a few MENA countries that are mostly net exporters or net importers of this commodity, but their economies are too weak to affect oil prices. The fact that a single country's economic output has no bearing on global oil prices is used as an identifying constraint in the Vector Autoregressive environment.

According to Chindengwike, (2023), this study looks at the effect of variations in oil prices on economic growth in 20 Sub-Saharan African nations from 1986 to 2012. The time period covered by the study is from 1986 to 2012. These nations were divided into two groups, designated group A and group B respectively. Group A is comprised of the ten nations that export the most oil, and Group B is comprised of the countries in sub-Saharan Africa that do not export the most oil. The research was carried out with the help of data panels. OLS pooled panels and panel data were estimated using the Fixed Effect Model and the Generalized Method of Moment Model for both oil exporting countries and non-oil exporting countries. According to a model that is comprised of nations that export oil, the panel estimates that the volatility of oil prices has a positive and considerable impact on the economic development of oil exporting countries. The findings of panel B, which consists of nations that do not produce oil, reveal that fluctuations in the price of oil appear to have a positive but very moderate effect on economic growth.

1.2 Research Problem

Despite the fact that a variety of different types of literature and empirical studies support the effectiveness of monetary policy on the macroeconomic variables, there are some people who argue that changing the amount of money in circulation only affects the purported rate of economic growth and has no effect whatsoever on the real economic variables. Furthermore, increasing the amount of money in circulation can only result in an increase in industry (Konstantakopoulou, 2023). Only in industrialized countries was a correlation found between the amount of money in circulation and real economic behavior, according to the most recent empirical research on more than one hundred countries conducted by Jordà et al., (2026). Zhang (2024), The study of the collision of monetary variables on economic development in Iran by using monetarist's move toward suggests that there is no association between money and real economic variables such as economic growth and employment. This conclusion was reached because of the use of monetarist's move toward. However, in the context of the study of macroeconomic policy, there is no convincing agreement on the role that monetary policy plays in the expansion of the economy and in real economic activity.

1.3 Research Objectives

(i) To determine the nexus between exchange rate and economic growth in Tanzania.

(ii) To examine the nexus between money supply and economic growth in Tanzania.

(iii) To determine the nexus between inflation rate and economic growth in Tanzania.

(iv) To examine the nexus between interest rates and economic growth in Tanzania.

1.3 Theoretical Literature Review

1.3.1 Modern Monetary Theory

Mosler devised Modern Monetary Theory (MMT) in the 1970s, while he was a Wall Street trader (Mankiw, 2020). Eventually, he put his thoughts into action at the hedge fund he created by making a few astute wagers. The core principle of MMT is that governments that issue their own fiat currency can and should produce as much money as they need to spend since they are immune to insolvency absent a deliberate political choice to declare bankruptcy (Mankiw, 2020).

Theorists further clarify that debt is only tax revenue the government spent on the economy but did not collect. Moreover, they claim that it is inappropriate to evaluate a government's spending policies by contrasting them with those of the typical family. While proponents of the theory admit that inflation could result from such expenditure, they argue that this is exceedingly improbable and can be mitigated through future policy actions (Challoumis, 2024). They frequently bring up Japan as an example, even though their government debt is significantly larger. According to MMT, the government can print its own money, eliminating the need to sell bonds to finance its operations. Excess reserves must be drained, and the overnight interest rate objective must be met, so the government sells bonds. Bonds, which Mossler refers to as "savings accounts at the Fed," are thus not a constitutional obligation but rather a matter of policy.

2. METHODOLOGY

This study employed a quantitative research approach because the study used testing theories, shaping facts, numerical data and signifying relations between variables and forecasting future values and drafting close from quantitative data.

A time series research design was selected to determine a pattern in the variable's evolution over time, this research design employs statistical methods to classify the behavior of one or more variables in terms of significant patterns in their previous behavior.

Secondary data may include information that has already been obtained and is being considered for re-use in response to fresh inquiries for which the information gathered was not initially anticipated (Ruslan et al., 2023). Data obtaine from reliable sources such as Central BOT and the NBS. In addition to that, the data were from 1970 up to 2020 which covers 51 years as the result makes the total number of 51 pairs of observation.

The Autoregressive Distributed Lag (ARDL) Model was employed in the party of estimation since the model is robust especially for the case when we have finite and at the same time small sample size of observations 30 to 80 (Chindengwike, 2024).

for variables X, Y and Z can be expressed as:

$\Delta y_t = \beta_o + \beta_1 \Delta y_{t-1} + \gamma_1 \Delta x_{t-1} + \delta_1 \Delta z_{t-1} + \theta_0 y_{t-1} + \theta_1 x_{t-1} + \theta_2 z_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots$ *(1)*

where θ_0; θ_1 and θ_2 are coefficients for the long run, the total of which corresponds to the error correction component of the VECM

$$GDP_t = f\ (ER, MS, INFL, IR) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Whereby:

GDP_t =Gross Domestic Products;ER_t= Exchange Rates; MS =Money Supply

INFL =Inflation rate;IR =Interest Rate; ε_t = Error Term

$$GDP_t = \alpha + \beta_1 ER_t + + \beta_2 INFL_2 + \beta_3 IR_3 + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Whereby:

GDP_t =Gross Domestic Products; ER_t= Exchange Rates; α= Constant term

IR = Interest Rate; ε_t = Error Term

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522- 3186

3. RESULTS

This section includes enlightening details on the study's findings as well as a discussion of the study's specific objectives. To that end, these findings were compared to other findings to provide good details on the discussion part. Moreover, this section systematically provides information, addressing the preliminary results obtained that cut across all objectives and the main results based on each specific objective. Aside from that, this chapter is divided into eight sections, each of which contains details aimed at providing enriching details or information specific to providing justification or answers to each specific objective in this study, and finally to justifying the overall goal of this study.

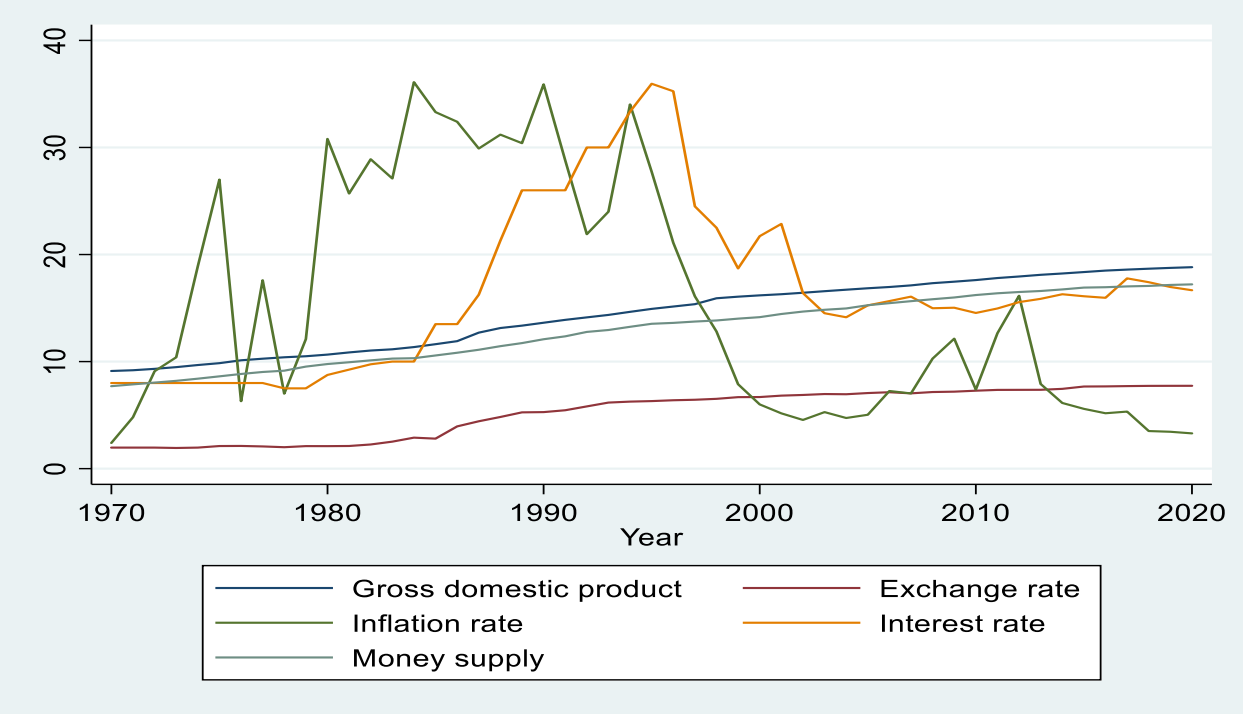


Figure 1: Show the time series plot for gross domestic product, exchange rate interest rate and inflation rate in Tanzania.

Figure 1 shows the time series plot for growth in domestic product, exchange rate, interest rate, and inflation rate in Tanzania from 1970 to 2020. From the time series plots for GDP show some patterns, such as a trend pattern by visual examination, similarly to the exchange rate, which also depicts only the trend component, and this component is recognized by visual inspection. Furthermore, the findings show that other macroeconomic variables, such as the inflation rate and

interest rate, have more than one-time series components. For the part of the interest rate where such time series components were observed, the trend component, some small cyclical patterns, and irregular patterns, similarly, the interest rate depicts the same trend component, some small cyclical patterns, and irregular patterns. The presence of these patterns indicates that the data are non-stationary, and there is a need to apply the formal statistical test to determine whether non-stationary exists with each economic variable, as well as to perform the necessary data transformation.

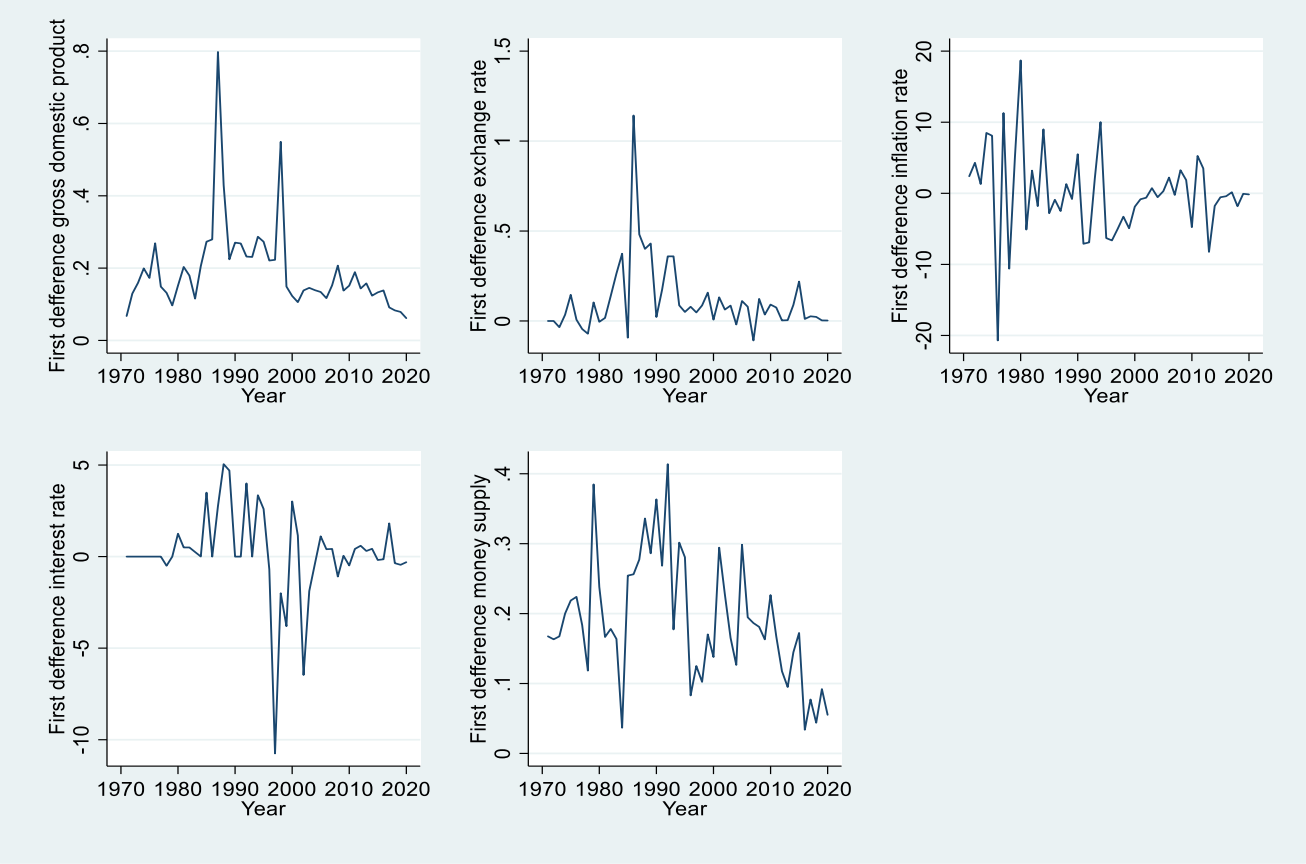


Figure 2: Show the time series plot for the first difference of the macroeconomic variables: gross domestic product, exchange rate, interest rate, and inflation rate in Tanzania.

Figure 2 shows the time series plot for the first difference of the macroeconomic variables: GDP, exchange rate, interest rate, and inflation rate in Tanzania from 1970 to 2021, for a total of 51 observations. The results of Figure 2 show that the data were now macroeconomic variables are stationary after applying the first difference transformation, which means that while there is

fluctuation in these transformed macroeconomic variables, the data fluctuate around the constant values that are meaningful and that the variation is constant over time. This shows that by visual inspection there is a tendency for stationary, though the formal statistical test of augmented in addition to that, the findings show that after applying data transformation, the time series depicts the irregular pattern, which is the residual. Since the GDP, exchange rate, interest rate, and inflation rate in Tanzania from 1970 to 2020 show the tendency to increase as time fluctuation data around the mean, this signals the presence of stationary random variables (i.e., constant mean and variance as the time goes. Therefore, this graph shows that the random variables are stationary, then no other transformation is needed so that the GDP, exchange rate, interest rate, and inflation rate are stationary

3.1 Basic Descriptive Statistics

The main properties of the data in the study are described using descriptive statistics. Furthermore, descriptive statistics aid in the clear and understandable presentation of enormous amounts of data. Each descriptive statistic summarizes a large amount of data into a concise overview of the sample and so serves as the foundation for any quantitative data analysis. In addition to that, the descriptive or summary statistics help a lot in suggesting the nature of the distribution of the data through the use of kurtosis and skewness and lastly help in suggesting whether is useful for making data transformation by applying natural logarithms or not. This study used yearly time series data for the period of 51 years from 1970 to 2020. The key variables in the study include GDP, exchange rate, interest rate, and inflation rate. The descriptive statistics findings were created, summarized, and illustrated in Table 1.

Table 1: Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
GDP	51	25600000	41500000	9173	1.490e+08	1.718	4.731
EX	51	743.118	768.974	6.9	2294.146	.712	2.246
M3	51	5440000	8760000	2219.6	29900000	1.582	4.123
Ln(GDP)	51	14.375	3.25	9.124	18.816	-.223	1.585
Ln(EX)	51	5.249	2.251	1.932	7.738	-.484	1.523
Ln(M3)	51	12.934	3.083	7.705	17.214	-.184	1.666
IF	51	15.601	11.055	2.4	36.1	.504	1.693
IT	51	16.554	7.579	7.5	35.95	.874	3.15

Table 1 depicts the findings for mean, standard deviation, maximum, minimum and skewness for both level data and natural logarithms transformed data. The findings in Table 1 show that for the transformed data there were not much differences in the values of Interest rate, Inflation rate, natural logarithms GDP, natural logarithms of money supply and natural logarithms of the exchange rate over the years, these differences are observed by taking maximum values minus the minimum values of their respective variables.

3.2 Diagnostics test

Diagnostics or post-mortem tests performed to results of Tests Before drawing any inferences from the estimation findings, several diagnostic tests were run to ensure that the models were statistically sound and that they could be utilized for forecasting (Khan and Jain, 2025). As a result, the following diagnostic tests were performed to check that the empirical models were statistically sound and that the classical linear regression model (CLRM) assumptions were not violated.

3.2.1 Breusch-Godfrey LM test for autocorrelation

The Breusch-Godfrey Serial Correlation Test was used to determine whether the error terms were serially correlated in this investigation. For the serial correlation test, the null hypothesis is that there is no serial correlation, whereas the alternative hypothesis is that the error terms are autocorrelated.

Table 2: Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	10.566	1	0.5612

Table 2 shows that the p-value is greater than the level of significance of 5% employed in this test. As a result, we fail to reject the null hypothesis at the 5% level of significance. As a result, the conclusion was reached that the regression residuals do not exhibit serial autocorrelation. As a result, the Breusch-Godfrey Serial Autocorrelation results demonstrate that the data series did not break the assumption of autocorrelation.

3.3.2 Test of the normality assumption

Table 3 shows that at a 5 percent significant level the calculated Jarque- Berra P-value is 0.3443

which is greater than 0.05. Hence, as a rule of thumb, the null hypothesis could not be rejected if the P-value calculated is greater than the 5 percent level of significance. As a result, the regression residuals were determined to have a normal distribution. Consequently, the results of the Jarque-Berra normality test show that the data series does not violate the assumption of normality distribution. According to Mehar (2023), if the residuals have a normal distribution pattern, it means that the estimates' coefficients are also normally distributed

Table 3: Jarque-Berra statistic

Model	Chi2	Prob>Chi2
Residuals	2.133	0.3443

3.3.3 Test of Heteroscedasticity assumption

The results in Table 4 indicate that at a 5 percent significant level the computed Breusch Pagan test for Heteroscedasticity P-value is 0.1129 which is greater than 0.05. Hence, as a rule of thumb, the null hypothesis could not be rejected at a 5 percent level of significance. This leads to the conclusion that the residual is homoscedasticity meaning that there is constant variance.

Table 4: Test for Heteroscedasticity

Source	chi2	df	P
Heteroscedasticity	20.58	14	0.1129
Skewness	7.41	4	0.1156
Kurtosis	0.92	1	0.3386
Total	28.91	19	0.0674

3.3.4 Model Stability Tests

Finally, the derived equations were subjected to a stability test of the model's recursive estimations. As a result, the CUSUM chart tests were employed in this study to determine whether the regression model is stable. For the CUSUM chart tests, the null hypothesis indicates that the model is stable, whereas the alternative hypothesis argues that the model is not stable. To avoid rejecting the null hypothesis that the model is stable, the cumulative sum (CUSUM) of residuals curves must normally lie within the dual standard of errors range at the 5% significant level. In this regard, CUSUM tests are performed, and the output findings are displayed in figure 4.3 and figure 4.4.

http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522- 3186

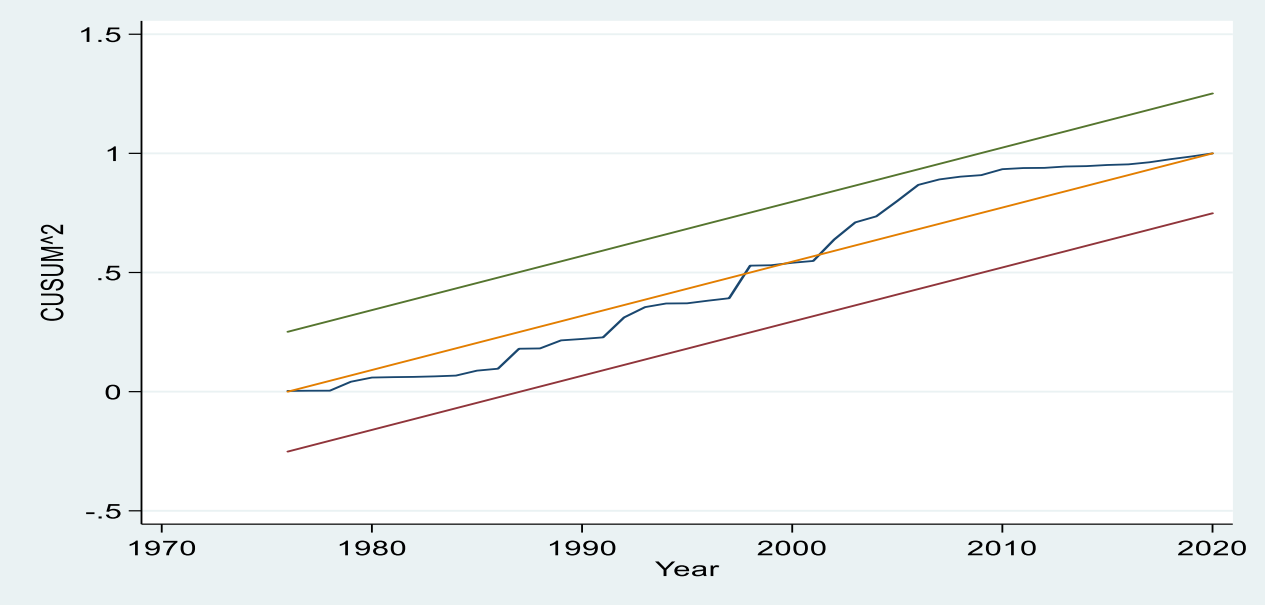


Figure 3: CUSUM Square chart

Results from figure 3 show that the residual curves lie within the dual standard of errors range (i.e., between upper and lower boundary) at a 5 percent significant level. At a level of significance of five percent, the evidence shown by these findings was adequate to support maintaining the null hypothesis that the model is stable. Because the residuals curve is located within the range of the dual standard error, the findings provided evidence in favor of the hypothesis that the regression model is robust.

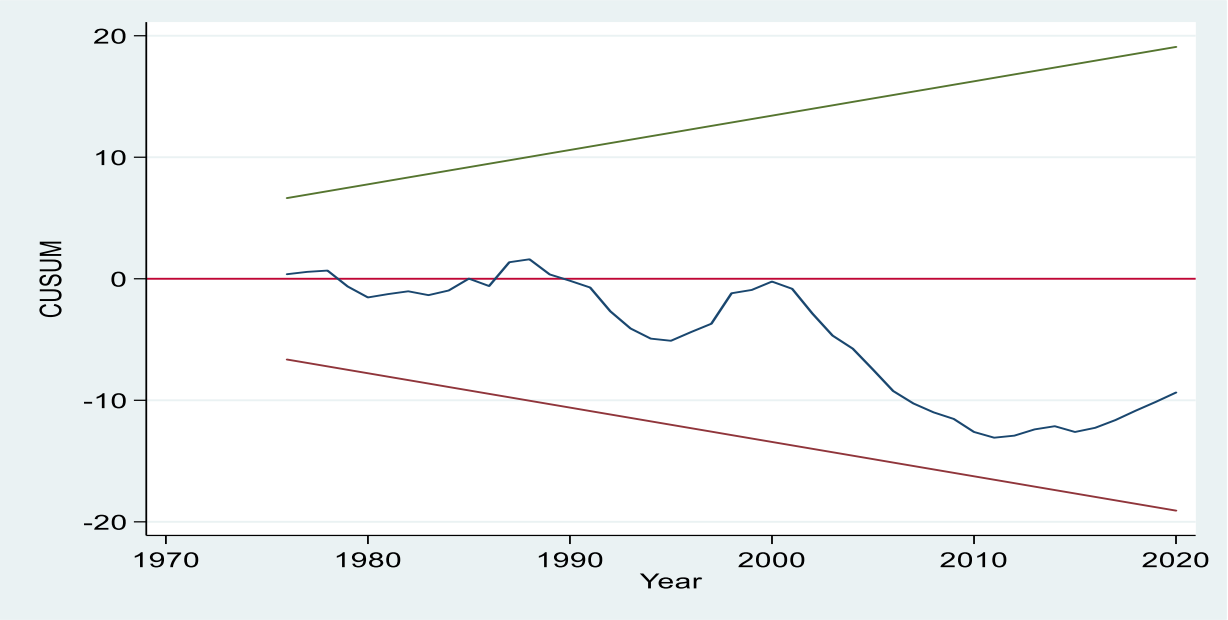


Figure 4: CUSUM chart

Figure 4 show the cusum chart for monitoring residual so as to determine the model stability. The finding in figure 4.4 depicts that residual curves lie within the dual standard of errors range at a 5 percent significant level.

3.4 Correlation Matrix

In the correlation matrix, the initial pattern of the relationship between the explanatory and the dependent variable is determined. This matrix shows the direction of the two random variables. The correlation matrix may also suggest the multicollinearity of the explanatory factors if the correlation coefficient is 0.9 or above. In addition to that, the main properties of correlation are that the correlation coefficient always lies between a negative one and a positive one, and if the correlation coefficient is one, it implies the presence of a perfect linear relationship between the variables. Furthermore, if the correlation is between 0.9 and one or between -0.9 and negative one, this presents the presence of multicollinearity. The results of the matrix test are presented in Table 5.

Table 5: Show the correlation matrix table for composite consumer price index and interest rate

	EX	**M3**	**IF**	**IT**
EX	1			
M3	0.7697	1		
	(0.000)			
IF	-0.3918	-0.4303	1	
	(0.0045)	(0.0016)		
IT	0.5653	0.4127	0.2573	1
	(0.000)	(0.0026)	(0.0683)	

Table 5 shows that there is just a strong positive linear relationship between money supply and exchange rate since the absolute coefficient of correlation r= 0.7697 which is found to be greater than 0.5 and the p-value in the parentheses was 0.000 which is below 0.05 the level of significance. This leads to rejecting the null hypothesis that there is no correlation between money supply and exchange rate. Also, the correlation coefficient between money supply and the interest was found to have a correlation coefficient of 0.4127 which is less than 0.5 addition to that the p-value was

found to be less than 0.05 this implies that there was a very weak positive association between money supply and interest. Furthermore, the findings in Table 5 depict that there is a very weak negative linear relationship between exchange rate and inflation rate since the absolute coefficient of correlation r= -0.3918 which is found to be less than 0.5 and also the p-value in the parentheses was 0.0045 which is below the 0.05 the level of significance. On the other hand, finding depicts that there is a strong positive linear relationship between exchange rate and interest rate since the absolute coefficient of correlation r= 0.5653 which is found to be less than 0.5 and also the P-value in the parentheses was 0.001 which is below 0.05 the level of significance. Lastly, this finding in table 4.5 shows that the variables or the independent variables employed in this study were independent of each other since the coefficient of each pair of independent variables were less than 0.9.

3.5 Unit Root Test or stationarity Test Results

The test of unit root or stationarity was tested for the time series data. This test is carried out to determine whether the data are stationary or non-stationary of the time series and the sequence in which the variables are integrated. If a time series means and variance are constant over time, then the time series is stationary.

The Dickey-Fuller (ADF) test is based on the null hypothesis that there is a root unit in the series and the alternative hypothesis that there is no root unit in the series. If the ADF statistics are superior to absolute asymptotic critical values, the null hypothesis that the unit root of the series is rejected is to be found stationary, and the series is to be concluded with no unit root (Judge et al., 1985). Table 6 of the ADF unit root test results show that Interest rate, GDP and consumer price index were stationary after the first difference since ADF statistics were greater than the absolute asymptotic critical values.

Table 6: Show test for stationarity both augmented dickey fuller test and Phillips's perron.

ADF Test					
Variable	**Level**		**First difference**		**order of Integration**
	Test statistics	Critical value	Test statistics	Critical value	
GDP	-1.593	-3.580	-4.175 **	-3.587	I(1)
EX	-1.053	-3.580	-5.187 **	-3.587	I(1)
M3	-2.675	-3.580	-4.236 **	-3.587	I(1)
IF	-2.058	-3.580	-9.007 **	-3.587	I(1)
IT	-1.428	-3.580	-5.263 **	-3.587	I(1)
The PP Test					
Variable	**Level**		**First difference**		**order of integration**
	Test statistics	Critical value	Test statistics	Critical value	
GDP	-1.236	-3.580	-4.187 **	-3.587	I(1)
EX	-0.969	-3.580	-5.347 **	-3.587	I(1)
M3	-2.001	-3.580	-4.336 **	-3.587	I(1)
IF	-1.931	-3.580	-9.167 **	-3.587	I(1)
IT	-1.606	-3.580	-5.233 **	-3.587	I(1)

Note that the star (**) therefore accounts for the P values that are less than 5% level of significance.

3.6 Lag length selection

Before evaluating the distributed autoregressive lag (ARDL) model or vector error correction model first a lag selection initially employed criterion. Some criteria apply when you want to select how many numbers lag is the random variable has so in these studies the following lag criterion were used in determining the maximum number of lags: final predictive error (FPE), Hannan and Quinn Information Criterion (HQIC), Schwarz Bayesian Information Criterion (SBIC) and Akaike Information Criterion (AIC). Bayesian Information Criterion (SBIC) was the priority in choosing a maximum number of lags because it has theoretical advantages compared to other selection criteria so to avoid getting bias estimate Schwarz Bayesian Information Criterion (SBIC) was given the priority in the selection (Zhang *et al.*, 2023). Table 7 shows the maximum number of lags from each random variable used in the analysis of the unit root test. In the selection of maximum lags, the rule of thumb is that the least value in any criteria is chosen.

Table 7: Lag length selection

lag	FPE	AIC	HQIC	SBIC
0	38.4132	17.8378	17.9118	18.0346
1	0.00027	5.96707	6.41147*	7.14802*
2	.000197*	5.613	6.42773	7.77806
3	0.000263	5.80423	6.98929	8.95341
4	0.000224	5.44646*	7.00186	9.57977

Table 7 show together the GDP, exchange rate, interest rate, money supply and inflation rate have one maximum number of lag since at lag one the value for Hannan Quinn Information Criterion (HQIC) and Schwarz Bayesian Information Criterion (SBIC) while final predictive error (FPE) and Akaike Information Criterion (AIC) depicts the different maximum number of lags. Since Schwarz Bayesian Information Criterion (SBIC) is very powerful in determining the number of lags so in determining the long-term relationship the maximum number of lags employed is lag one.

3.7 Johansen Co-Integration Test

Johansen co-integration helps to evaluate whether the long-term relationship between the variables exists. After a stationary check and the optimal lag length of variables are achieved the Johansen co-integration test is applied. This is done to determine which model should be applied between VEC or VAR models that can be employed after differentiation to obtain stability before re-entry in the case of stationary variables. If variables have a long-term bond or relationship, the VEC model, which is known as the Vector Correction Model (VECM), is suitable. However, it is advisable to apply the Autoregressive Distributed Lag (ARDL) proposed by Schaffer et al.(2013), in the presence of both Non-Stationary I (1) and Stationary I(0) variables.

Table 8 shows $\lambda trace$ tests rejected the null hypothesis of co-integration (r = 0) against the alternative since the trace statics were greater than the absolute asymptotic critical values, this lead concluding that there was the long-run relationship between GDP, exchange rate, interest rate, money supply and inflation rate.

Table 8: Show Johnsen Co-integration test

Null Hypotheses	Trace Statistics	Critical Value	Max-Eigen Statistics	Critical Value
r = 0	87.7819**	68.52	30.6247	33.46
r ≤ 1	57.1572**	47.21	22.8502	27.07
r ≤ 2	34.307**	29.68	17.3333	20.97
r ≤ 3	16.9737**	15.41	12.3528	14.07
r ≤ 4	4.6209**	3.76	4.6209**	3.76

Note: r: represents co-integrating vectors or relationships; when $\lambda trace$ and λmax tests are in conflict decision is made based on $\lambda trace$ statistics; ** indicates rejection of the null hypotheses at 5% levels of significance.

3.8 Autoregressive distributed lag model for determining the effect of exchange rates on economic growth in Tanzania

In this section, the result of regression analysis is presented then after that the diagnostic test is followed for the sake of testing the validity of the findings.

Table 9: Show the influence of monetary policy on economic growth in Tanzania

	(1)	(2)	(3)
Variables	**ADJ**	**LR**	**SR**
D. ln(exchange rate)			0.0202
			(0.0694)
LD. ln(exchange rate)			0.290***
			(0.0636)
D. Inflation rate			-0.00410**
			(0.00186)
D. Interest rate			0.000504
			(0.00431)
LD. Interest rate			-0.0182***
			(0.00425)
ln(exchange rate)		0.560***	
		(0.171)	
		(0.107)	
Inflation rate		0.00754	
		(0.0107)	
Interest rate		-0.0150	
		(0.0149)	
L. ln GDP	-0.240***		
	(0.0818)		
Constant			0.891***
			(0.277)
Observations	47	47	47
R-squared	0.801	0.801	0.801

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4. DISCUSSION

The findings also depict that there was non-significant relationship between the first difference in the exchange rate and economic growth in the short run since the p-value was found to be higher than the 5% level of significance. This result is in line with the findings of Challoumis (2024), who found that the exchange rate has a significant impact on economic growth. Findings show that there is no relation between money supply and economic growth in the short run since the short run money supply was not found as one among the variables that have significant or no significant influence on economic growth (I.e. GDP). Challoumis (2024), study found that money supply has a significant influence on economic growth this result is parallel to the findings obtained in this study since this study also the same result obtained in the relationship between money supply and economic growth. similar studies that found this (Nasution et al., 2022).

The findings of Khan and Jain, (2025), found there was a significant positive influence on the inflation rate and economic growth but in this study, there was a negative influence of inflation rate on economic in the short run. This contradiction might be because of the economic difference between these two studies' developed countries while our study involved middle-income countries. The finding reveals that in long run there was non-significant relationship between interest rates and economic growth since the p-value was found to be greater than the 0.05 level of significance employed. These findings are in contrast to the findings of Mehar, (2023), who found there was a significant influence of interest rate and economic growth but in this study, there was no significant influence of interest rate on the economy in long run. This contradiction might be because of the economic difference between these two studies developing countries while our study involved middle-income countries.

4.1 Proposed Theory of Change for Practical Implementation

The suggested Theory of Change describes how monetary policy affects economic growth through a succession of interrelated phases that include inputs, policy interventions, immediate outputs, intermediate outcomes, and long-term effects. Monetary policy instruments, central bank capability, financial-sector infrastructure, economic data, and regulatory frameworks are all considered inputs. These inputs allow the central bank to carry out policy interventions such as

changing the policy rate, controlling liquidity, and affecting credit conditions. Immediate output includes changes in market interest rates, bank lending conditions, liquidity, and credit availability, all of which have an impact on consumer, corporate, and investor finances.

Effective interest rate control, increased credit availability, private investment assistance, price stability, and enhanced monetary policy transmission are all required for realistic monetary policy execution to boost economic development. Maintaining price stability and strengthening the transmission of monetary policy choices to commercial banks, enterprises, and consumers are all necessary for effective implementation.

4.2 Conclusion and Recommendations

The study concluded that in the long the exchange rate leads to a significant positive influence on economic growth; the money supply enhances economic growth; the interest rate was found to lead to a negative effect on economic growth though was not significant. Also, the inflation rate was found to have no significant influence on economic growth in the long run. Additionally, the study concludes that in general, monetary policy has a significant positive influence on economic growth. This study recommend that the government must make sure that it applies a monetary policy for the better achievement of economic growth. So, this study implies that having a better monetary policy leads to stability and an increase in economic growth. Furthermore, the study also recommended that future studies could use autoregressive integrated moving averages with exogenous variables by incorporating the interest rate and exchange rate as the exogenous variables to forecast the future value of economic growth.

REFERENCES

Challoumis, C. (2024). Innovation and economic growth: a comparative study of economocracy and traditional systems. *SSRN Electronic Journal*, *1*.

Challoumis, C. (2024). Understanding The Cycle of Money-Its Impact On Tax Policy and Economic Growth. *SSRN Electronic Journal*.

Chindengwike, J. (2022). The influence of value added tax revenue on private domestic investment in developing countries. *Journal of Global Economy*, *18*(4), 289-310.

Chindengwike, J. (2023). Relationship between Public Expenditure and Economic Development in Sub-Saharan Africa Countries: The VECM Analysis. *African Development Finance Journal*.

Chindengwike, J. D. (2024). Nexus between foreign assistance and economic growth in Tanzania. *Sustainable Economies*, *2*(3), 163-163.

Fueki, T., Nakajima, J., Ohyama, S., & Tamanyu, Y. (2018). Identifying oil price shocks and their consequences: the role of expectations in the crude oil market. *International Finance*, *2*(5), 12–45.

Jordà, Ò., Singh, S. R., & Taylor, A. M. (2026). The long-run effects of monetary policy. *Review of Economics and Statistics*, 1-21.

Kalpler, E., & Duhok, D. (2018). Does monetary policy affect economic growth: evidence from Malaysia. *Journal of Economic and Administrative Sciences*.

Khan, U. A., & Jain, V. (2025). Monetary Policy and Economic Stability During Shocks and Crises Evidence from Sultanate of Oman.

Konstantakopoulou, I. (2023). Financial intermediation, economic growth, and business cycles. *Journal of Risk and Financial Management*, *16*(12), 514.

Mankiw, N. G. (2020). A skeptic's guide to modern monetary theory. *AEA Papers and Proceedings*, *110*, 141–144.

Mehar, M. A. (2023). Role of monetary policy in economic growth and development: from theory to empirical evidence. *Asian Journal of Economics and Banking*, *7*(1), 99-120.

Nasution, L. N., Rusiadi, A. N., & PUTRI, D. (2022). Impact of monetary policy on poverty levels in five asean countries.

Ruslan, D., Tanjung, A. A., Lubis, I., Siregar, K. H., & Pratama, I. (2023). Monetary policy in Indonesia: Dynamics of inflation, credibility index and output stability post covid 19: New Keynesian small macroeconomics approach. *Cuadernos de economía*, *46*(130), 21-30.

Schaffer, M. E., Baum, C., Finlay, K., Kleibergen, F., Magnusson, L., & Stillman, S. (2013). *Stata software for econometric estimation and testing; avar, weakiv, actest, ivreg2h, ranktest, ivreg2*.

Wang, Y., Wang, X., Zhang, Z., Cui, Z., & Zhang, Y. (2023). Role of fiscal and monetary policies for economic recovery in China. *Economic Analysis and Policy*, *77*, 51-63.

Yin, H. T., Chang, C. P., & Wang, H. (2022). The impact of monetary policy on green innovation: Global evidence. *Technological and Economic Development of Economy*, *28*(6), 1933-1953.

Zhang, Y. (2024). The impact of the fed's monetary policy in 2022 on China's stock market: Evidence from SSEC and SZSE. In *SHS Web of Conferences* (Vol. 181, p. 02010). EDP Sciences.