Linkages among real exchange rate, net exports, government expenditure, money supply, inflation rate, and economic growth in Tanzania

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Abstract*. The research delves into the interconnectedness of various macroeconomic factors, including Real Exchange Rate, Net Exports, Government Expenditure, Money Supply, Inflation Rate, and economic growth in Tanzania. Employing a vector autoregression model, the analysis spans from 1992 to 2021. The results uncover noteworthy correlations between these indicators and economic growth. Specifically, the study identifies a positive relationship between inflation rate and economic growth ($p = 0.006$), suggesting that a 1% rise in inflation leads to a 0.16% decrease in real GDP. Furthermore, fluctuations in money supply, real exchange rate, net exports, and government expenditure significantly impact economic growth ($p < 0.01$), underscoring their pivotal role in driving Tanzania's economic performance. Additionally, Granger causality tests reveal mutual causation between economic growth and these macroeconomic variables. These findings offer pertinent insights for policymakers, underscoring the necessity for targeted interventions to optimize the effectiveness of macroeconomic policies in fostering Tanzania's economic advancement.*

Keywords: *Real Exchange Rates, Net Exports, Government Expenditure, Money Supply, Inflation Rate, and Economic Growth.*
JEL Classification: *F41: E62: E52: O40: F31*

1. Introduction

It has come to light that the economic dynamics of emerging markets, particularly in Sub-Saharan Africa, have garnered increasing attention from researchers and policymakers alike due to their implications for global economic stability and development (Juma & Clark, 1995; Rodrik, D. (1998; Ndulu & O'Connell, 1999; Moshi, & Kilindo, (1999; Arieff, 2010; Kearney, 2012; Gereffi & Sturgeon, 2013; Toh, 2016; Nteegah, Nelson, & Owede, 2017; Omar Bakar, Sulong, & Chowdhury, 2022; Braiton & Odhiambo, 2023; Mbodj & Laye, 2025; Hasan & Adnan, 2025). Tanzania, as a burgeoning economic powerhouse in East Africa with rapid growth rates, presents an intriguing case for studying the interrelationships among key macroeconomic variables. Understanding the linkages among the real exchange rate, net exports, expenditures of government, supply of money, rate of inflation, and the growth of the economy is crucial for formulating effective policy interventions to foster sustainable development and mitigate economic imbalances.

Prior studies have underscored the fundamental importance of these variables in shaping economic trajectories. Notably, government expenditure has emerged as a potent driver of economic

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expansion across varied contexts (Tarschys, 1975; Barro, 1990; Easterly & Rebelo, 1993; Devarajan, Swaroop & Zou, 1996; Sen, 2013; Sidek & Asutay, 2021). Similarly, the real exchange rate assumes a pivotal role in modulating trade competitiveness and external equilibrium (Bahmani-Oskooee & Brooks, 1999; Rapetti, 2013; Guzman, Ocampo & Stiglitz, 2018; Dvoskin, Feldman, & Ianni, 2020; Okafor, Ekesiobi, Ifebi, Dimnwobi, & Asongu, 2022; Bunje, Abendin, & Wang, 2022; Touzani, & Brahim, 2025). Moreover, the intricate relationship between inflation and economic growth has engendered extensive scholarly deliberation, with certain investigations positing a deleterious impact (Fischer, 1993; Zhu, & Pollin, 2005; Qayyum, 2006; Ndanshau, 2011; Kasidi, & Mwakanemela, 2013; Silvia, Sihotang, & Sihotang, 2023; Muhammad, 2023; Ali, 2024; Jackson, 2024), while others advocate for a nonlinear nexus (Khan & Senhadji, 2001; Iqbal & Nawaz, 2009; Nasir & Saima, 2010; Eggoh & Khan, 2014; Epaphra, 2016; Galih & Safuan, 2018; Boujelbene, 2021; Tarawalie & Kamara, 2022; Ali, 2024).

Tanzania's economic landscape has undergone profound metamorphoses in recent decades, marked by shifts in policy priorities, changes in global market dynamics, and domestic reforms aimed at enhancing macroeconomic stability and fostering sustainable growth. Various internal and external factors, including trade relationships, fiscal policies, monetary measures, and inflation dynamics have shaped the country's economic trajectory (Nord, Sobolev, Dunn, Hajdenberg, Hobdari, Maziad, & Roudet, 2009; Kessy, Nyella, & O'Connell, 2016; Alexianu, 2020; Odionye, Odo, Orji, Agoh, Ihezukwu, Ojike, & Okpara, 2024; Utouh & Kitole, 2025; Bwana & Moharuma, 2025).

Government expenditure has long been recognized as a catalyst driver for economic growth, particularly in third-world countries where public investment is essential for infrastructure advancement, human capital formation, and poverty reduction (Barro, 1990; Easterly & Rebelo, 1993; Dunning & Narula, 2003; Olukayode 2009; Lin & Monga, 2010; Luiz, 2010; Keita, 2016; Rammelt, 2018; Kirui & Sang, 2020; Idike, Ukeje, Ogbulu, Aloh, Obasi, Nwachukwu, & Ejem, 2021; Prince, Ehi, Brown-Ofoeme, Collins, & Alobele, 2023; Kitole, Msoma, & Sesabo, 2025). In Tanzania, government spending is aimed towards priority drivers like education, health, infrastructure, and agriculture, to promote inclusive growth and reduce socioeconomic disparities (Kazungu & Cheyo, 2014; Pesha, 2016; World Bank, 2019; Zouhar, Jellema, Trabelsi, & Lustig, 2021; Aragie, Benfica, Pauw, Randriamamonjy, & Thurlow, 2024).

The currency conversion rate is another major of Tanzania's economic drivers, given its implications for trade competitiveness, export earnings, and balance of payments stability. A competitive RER is essential for supporting export-led growth strategies and attracting foreign investment (Bahmani-Oskooee & Brooks, 2006; Mordi, 2006; Razazadehkarsalari, Haghir, & Behrooznia, 2011; Haile, 2017; Byaro, Pelizzo, & Kinyondo, 2023; Lulu, 2025). However, in recent years, Tanzania has faced challenges related to exchange rate volatility, which has hampered its export competitiveness and external sector performance (Wondemu, & Potts, 2016; Senadza, & Diaba, 2017; IMF, 2020; Olamide, Ogujiuba, & Maredza, 2022; Utouh, & Kitole, 2024).

Inflation dynamics have also played a significant role in shaping Tanzania's macroeconomic environment, influencing consumer behaviour, investment decisions, and income distribution patterns. While moderate inflation is often considered conducive to economic growth, high and volatile inflation can erode purchasing power, distort price signals, and undermine macroeconomic stability (Fischer, 1993; Saungweme, & Odhiambo, 2022; Kimolo, Odhiambo, & Nyasha, 2024). In Tanzania, inflation is influenced by various factors like fluctuations in world market prices, currency conversion rate movements, and domestic supply constraints (Mbongo, Mutasa, & Msigwa, 2014; Milanzi & Sanga, 2019; Bank of Tanzania, 2020; Olamide, Ogujiuba, & Maredza, 2022; Mtui, 2024; Nyonzo, 2025).

However, despite the specific attention that has been given to these variables, there remains a gap in the literature regarding the nexus to the Tanzania context. This study aims to bridge the gap by employing vector autoregression (VAR) analysis to examine the dynamic interactions among these key macroeconomic indicators in Tanzania from 1992 to 2021. By doing so, this study seeks to provide invaluable insights for policy architects, economists, and stakeholders who are involved in understanding the underlying mechanisms driving Tanzania's economic performance and formulating evidence-based policy prescriptions.

2. Literature review

2.1 Theoretical framework

Understanding the intricate relationships between economic variables such as the real exchange rate, net exports, expenditures of the government, supply of money, rate of inflation, and growth of the economy requires a theoretical framework that elucidates the mechanisms through which these factors interact and influence each other. Several theoretical perspectives offer valuable insights into these dynamics. One of the foundational theories in this regard is the neoclassical growth theory, which asserts that economic growth predominantly stems from elements such as capital accumulation, technological advancement, and productivity improvements (Solow, 1956). According to this theory, net exports are believed to enhance economic growth by promoting specialization, efficiency, and access to larger markets (Michalopoulos, & Jay, 1973; Yaghmaian, 1994; Ben-David, & Loewy, 2003).

Another influential theory is the endogenous growth theory, which emphasizes the role of innovation, human capital accumulation, technological change and knowledge spillover in driving economic growth (Romer, 1986; Romer, 1990). Net Exports are also seen as a catalyst for innovation and growth, as they foster competition, knowledge diffusion, and the adoption of new technologies (Grossman & Helpman, 1991).

Moreover, the Keynesian perspective calls attention to the importance of aggregate demand and intervention from the government in promoting economic growth and stability (Keynes, 1936; Keynes, 1964). Government expenditure, particularly on infrastructure projects, education, and healthcare, can have multiplier effects on economic activity, leading to higher levels of employment, consumption, and investment (Barro, 1990). Additionally, monetary policy, through its influence on the money supply and interest rates, can impact inflation rates and ultimately affect economic growth (Friedman, 1968; Romer 1993). In the context of Tanzania, these theoretical perspectives show the shadows for determinants of economic growth and the mechanisms through which policy interventions can foster sustainable development. By integrating these theories with empirical evidence, policymakers can design more effective strategies to promote economic growth and improve living standards for the population.

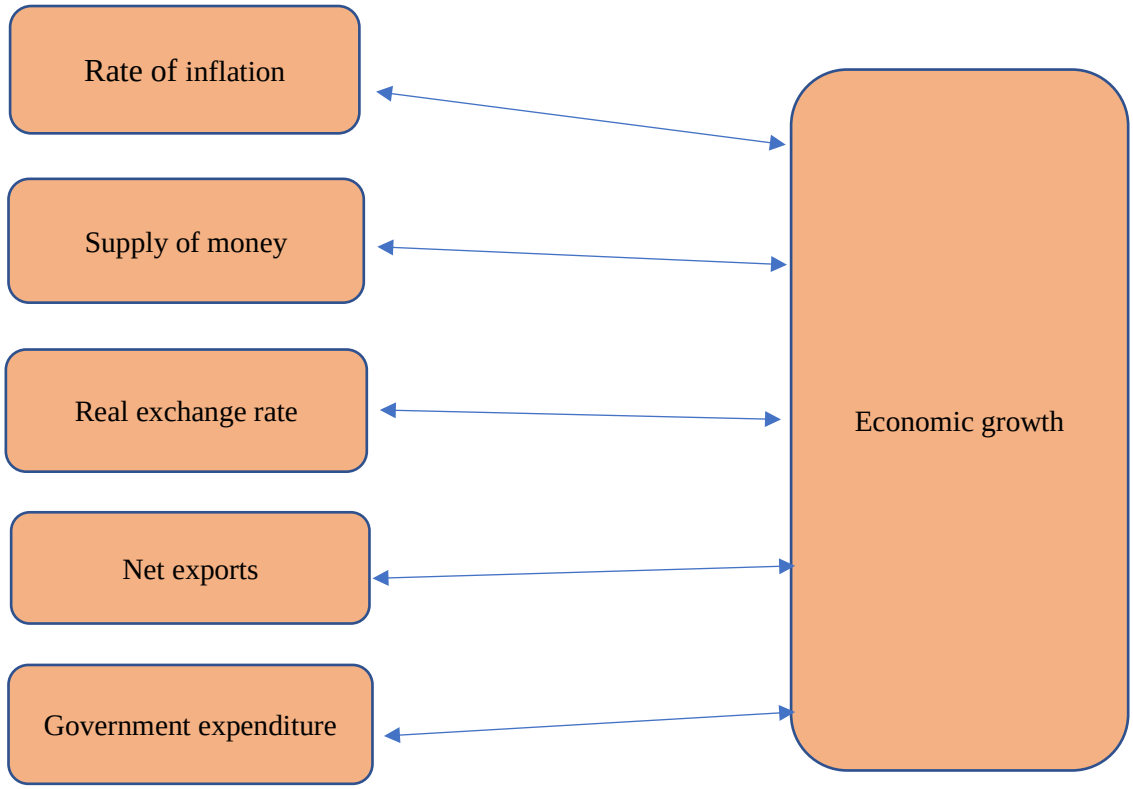
2.2 Empirical review

Recent empirical research provides insightful perspectives on the connections among the real exchange rate, net exports, expenditures of the government, supply of money, rate of inflation, and growth of the economy, particularly within developing nations such as Tanzania. Nkoro and Uko (2016) analysed the correlation between exchange rate, inflation volatility and stock prices volatility in Nigeria, a country that shares similarities with Tanzania in terms of its economic structure and challenges, their findings indicate a negative correlation between stock market price volatility and the volatility of exchange rates and inflation in Nigeria. This suggests that investors and regulators in the Nigerian stock market should consider the systematic risks associated with exchange rate and inflation volatility when structuring investment portfolios, diversification strategies, and policy formulation. However, recent studies examining the relationship between net exports and economic growth in Nigeria, Tanzania, and Kenya—countries with comparable economic structures and challenges—indicate a proportional correlation between net exports and economic growth, suggesting that trade liberalisation policies may facilitate economic progress (Onafowora, & Owoye, 1998; Hamad, Mtengwa, & Babiker, 2014; Githanga, 2015; Mordecai, & Akinsola, 2021; Utouh, 2024; Utouh, 2025).

Moreover, recent studies analysing the impact of government spending on economic growth in developing countries, including Adeniran, Ekeruche, & Iheonu, (2022), which examined the effects of public investment on Nigeria's economy, revealed that government expenditure on infrastructure projects positively influences economic growth and highlights the importance of public investment in catalysing economic development. Furthermore, empirical research has examined the nexus between monetary policy and economic growth in developing nations. Dauda & Abdulkareem (2023) explored the impact of monetary policy on economic growth in Nigeria using vector autoregression (VAR) analysis, finding that fluctuations in the money supply significantly affect economic growth, which demonstrates the importance of monetary policy in fostering macroeconomic stability and growth.

Conclusively, recent empirical studies provide compelling evidence of the interconnections among the real exchange rate, net exports, expenditures of the government, supply of money, rate of inflation, and growth of the economy in developing countries like Tanzania. Understanding these relationships can aid policymakers in designing more effective strategies to push sustainable and inclusive development in the region.

Figure 1. The conceptual framework



Source: Authors' construct.

3. Methodology and data

The paper utilizes experimental research methodology to explore the connections among the real exchange rate, net exports, expenditures of government, supply of money, rate of inflation, and growth of the economy in Tanzania. Specifically, this study employs secondary time series data, represented by real GDP, to elucidate the patterns and dynamics of economic growth in Tanzania.

The paper applied secondary data from various sources that are recorded by reputable entities, that is to say, the Central Bank of Tanzania (BOT), the National Bureau of Statistics (NBS), and the World Bank.

The relationship between various economic factors is often unclear or random. Consequently, researchers such as (Zellner, 1979; Juselius,1999; Haavelmo, 1944; Gujarati & Porter, 2009; Lütkepohl, 2005; Lütkepohl, 2013) frequently adopt an econometric approach to address the uncertain connection among economic variables. Building on this approach, the primary model in this paper considers the growth of the economy as a regressed variable, but the nexus will be analyzed by considering all other regressors as dependent variables as well. The theoretical framework integrates Tanzania's real GDP as a function of the real exchange rate, net exports, government expenditure, money supply, and inflation rate.

Thus, the Vector Autoregression Model Process is as follows:

$RGDP_t = \beta_1 + \beta_2 IFR_t + \beta_3 M2_t + \beta_4 RER_t + \beta_5 EX_t + \beta_6 GEX_t + \beta_7 RGDP_{t-1} + \beta_8 IFR_{t-1} + \beta_9 M2_{t-1} + \beta_{10} RER_{t-1} + \beta_{11} EX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

$IFR_t = \beta_1 + \beta_2\ RGDP_t + \beta_3 M2_t + \beta_4 RER_t + \beta_5 EX_t + \beta_6 GEX_t + \beta_7 RGDP_{t-1} + \beta_8 IFR_{t-1} + \beta_9 M2_{t-1} + \beta_{10} RER_{t-1} + \beta_{11} EX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

$M2_t = \beta_1 + \beta_2 IFR_t + \beta_3\ RGDP_t + \beta_4 RER_t + \beta_5 EX_t + \beta_6 GEX_t + \beta_7 RGDP_{t-1} + \beta_8 IFR_{t-1} + \beta_9 M2_{t-1} + \beta_{10} RER_{t-1} + \beta_{11} EX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

$RER_t = \beta_1 + \beta_2 IFR_t + \beta_3 M2_t + \beta_4\ RGDP_t + \beta_5 EX_t + \beta_6 GEX_t + \beta_7 RGDP_{t-1} + \beta_8 IFR_{t-1} + \beta_9 M2_{t-1} + \beta_{10} RER_{t-1} + \beta_{11} EX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

$EX_t = \beta_1 + \beta_2 IFR_t + \beta_3 M2_t + \beta_4 RER_t + \beta_5\ RGDP_t + \beta_6 GEX_t + \beta_7 RGDP_{t-1} + \beta_8 IFR_{t-1} + \beta_9 M2_{t-1} + \beta_{10} RER_{t-1} + \beta_{11} EX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

$GEX_t = \beta_1 + \beta_2 IFR_t + \beta_3 M2_t + \beta_4 RER_t + \beta_5 EX_t + \beta_6\ RGDP_t + \beta_7 RGDP_{t-1} + \beta_8 IFR_{t-1} + \beta_9 M2_{t-1} + \beta_{10} RER_{t-1} + \beta_{11} EX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

Where:

$RGDP_t$: Real Gross Domestic Product (proxy of economic growth)

IFR_t: Rate of inflation

$M2_t$: Broader money

RER_t: Real exchange rate

EX_t: Net exports

GEX_t: Expenditures of government

ε_t : Error term.

Note: The study applies t and t-1 in the model to indicate time series data.

To address skewness and accurately represent the percentage rate of change in the data, a transformation using logarithms was applied. This approach reduced the values within the data set and diminished the potential misrepresentation of the variable under assessment. It is a method commonly used to alleviate heteroscedasticity in comparison to standard regression techniques (Gujarati and Porter, 2009). The use of logarithms has become increasingly popular in analytical practices; therefore, in keeping with this trend, the current study converted the original variables into their natural logarithmic form to satisfy the assumptions of Ordinary Least Squares (OLS) regression.

The following is the transformed VAR econometric model in which each explanatory variable will also be regressed as a dependent variable.

$RGDP_t = \beta_1 + \beta_2 lnIFR_t + \beta_3 lnM2_t + \beta_4 lnRER_t + \beta_5 lnEX_t + \beta_6 lnGEX_t + \beta_7 lnRGDP_{t-1} + \beta_8 lnIFR_{t-1} + \beta_9 lnM2_{t-1} + \beta_{10} lnRER_{t-1} + \beta_{11} lnEX_{t-1} + \beta_{12} GEX_{t-1} + \varepsilon_t$

Where:

$ln\,RGDP_t$: applied log on real Gross Domestic Product.

$ln\,IFR_t$: applied log on inflation rate

$ln\,M2_t$: log of broader classification of money

$ln\,RER_t$: log of real exchange rate

$lnEX_t$: log of net exports

$ln\,GEX_t$: applied log on government expenditures, and

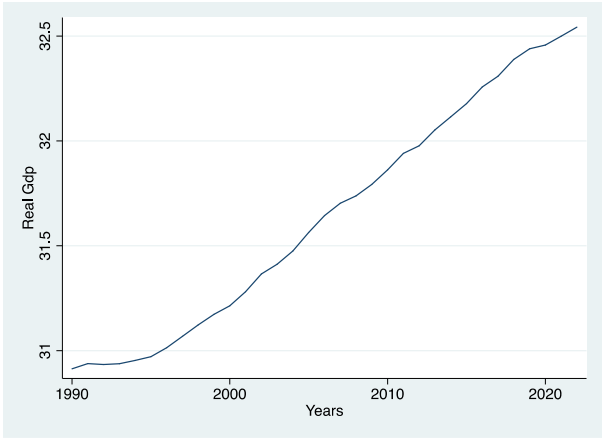
ε_t: Error term

4. Research results and comments

4.1 Trend analysis

Trend analysis commonly involves methods aimed at identifying a fundamental pattern of behaviour within a time series. In pursuit of recognising such patterns or trends, researchers typically employ graphical visualisation techniques to discern regular fluctuations, whether upward or downward in each data variable. This technique was exemplified through the graphical representations depicted in Figure 2.

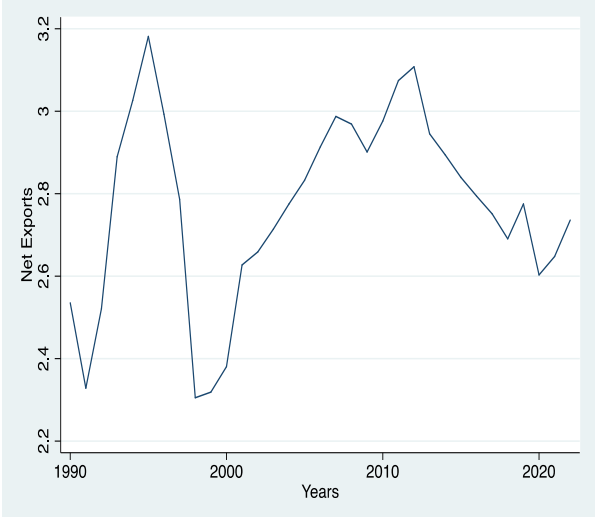
Figure 2. Visual of economic growth



Source: authors' computations using STATA.

Figure 2 illustrates the graph representing the log of real GDP spanning from 1990 to 2021. The depiction of real GDP showcases upward and steady growth, beginning just below 31 in 1990 and increasing to above 32.5 by around 2021, reflecting regular increases throughout the specified years. A consistent rise in real GDP over an extended period typically indicates improvements in a country's economic well-being, reflecting an increase in the production of goods and services. The absence of significant declines or volatility suggests that the economy has shown resilience to external shocks, or that any downturns encountered were mild and quickly recovered from. This pattern supports interpretations of sustained development, potential structural reforms, or the implementation of favourable macroeconomic policies during the observed period.

Figure 3. Visual of net exports (EX)



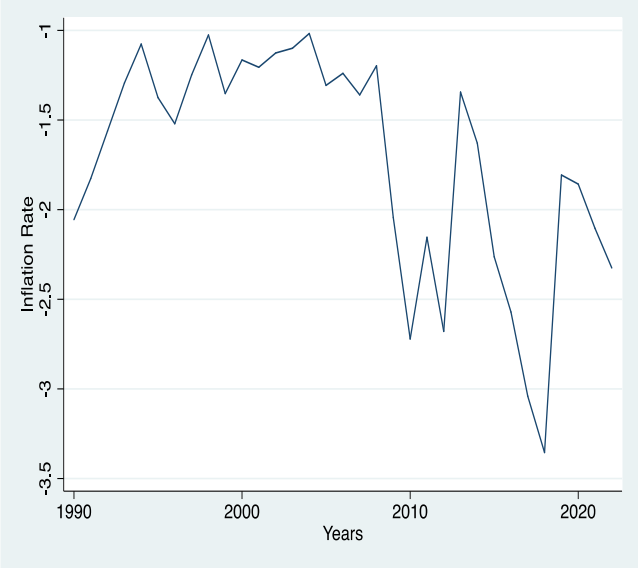
Source: authors' computations using STATA.

Figure 3 presents a time series visualisation of Net Exports (EX), highlighting the patterns of Net Exports from 1990 to 2021, demonstrating Tanzania's export performance in relation to global trade with the rest of the world. The trend displays fluctuations, characterised by increases and decreases in net exports over the years. A notable peak is observed around the mid-1990s, exceeding 3.2, followed by a significant decline in the late 1990s before experiencing a rise towards the early 2000s. From the early 2000s onwards, net exports generally trend upwards, although some yearly variations are evident. Another peak is apparent around 2010, near 3.1. Following 2010, there is a gradual decrease, although some recovery is noted around 2020-2022.

Before conducting formal statistical tests, it is recommended to visually inspect the time series data, as demonstrated in Figures 2 and 3. These plots offer an initial indication of the characteristics of the time series under examination. Any discernible patterns, such as upward or downward trends over the observed years, may suggest changes in the variable's mean and indicate potential unpredictability in the series. This intuitive understanding serves as the basis for more rigorous tests of stationarity, as outlined by Gujarati and Porter (2009).

Figure 4 depicts the graph illustrating the log of the yearly inflation rate from 1990 to the year 2020. The graph does not show a discernible trend across years; the annual inflation rate fluctuates irregularly, with occasional drops noted, particularly in the late 90s. The inflation rate appears to be negative throughout the entire period, indicating that the country experienced deflation rather than inflation each year. From 1990 to around 2008, the inflation rate fluctuated between approximately -1% and -1.7%, with relatively minor changes observed. After 2008, the inflation rate became significantly more volatile, dropping sharply during several periods, with declines reaching nearly -3.5% around 2017. In the period around 2020, there was a sudden and substantial negative spike, followed by a rapid recovery; however, the inflation rate remained negative, albeit at a less severe level afterwards. Such trends are typically a concern for policymakers, as deflation can lead to decreased consumer spending, lower production levels, and potentially higher unemployment rates.

Figure 4. Visual of annual inflation rate

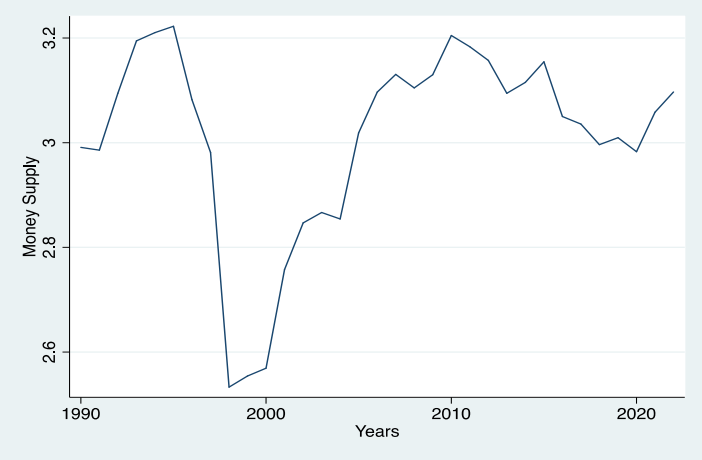


Source: authors' computations using STATA.

Figure 5 presents a graph depicting the logarithm of the broad money supply (M2) from 1990 to 2020. Throughout this period, the graph reveals a consistent upward trend in the broad money supply, indicating regular increases over the years. In the late 1990s and early 2000s, a significant decline in the money supply marked the lowest point in the series, possibly indicating a period of economic contraction, a policy change, or a financial crisis that impacted liquidity in the economy. Following this decline, the money supply gradually recovered, steadily rising from the early 2000s and reaching another peak after 2010. From 2010 onwards, the money supply has exhibited moderate fluctuations

but generally remains above the levels observed prior to 2000, with minor dips occurring between 2017 and 2020, followed by a slight uptick towards the end of the period.

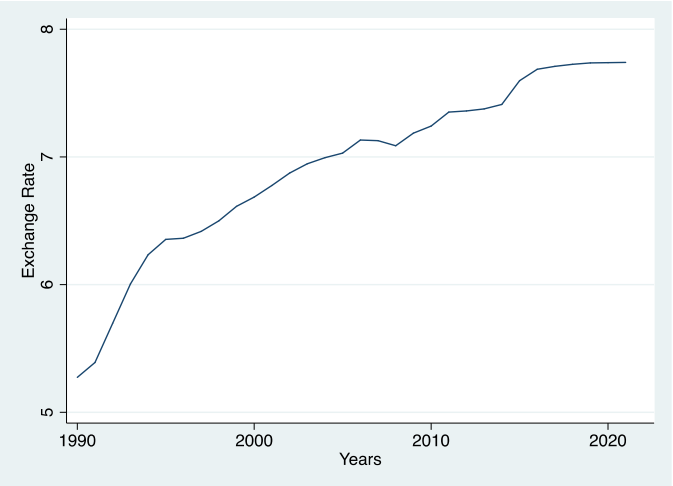
Figure 5. Visual of money supply



Source: authors' computation using STATA.

Figure 6 depicts the log of the real exchange rate from 1990 to 2020. Throughout this period, the graph illustrates a distinct pattern, indicating a significant and consistent increase in the real exchange rate over the years. A rising real exchange rate typically implies that domestic currency has depreciated in comparison to a basket of foreign currencies, after adjusting for inflation. This trend may indicate a reduction in the competitiveness of domestic goods in international markets, especially if it is not accompanied by corresponding improvements in productivity. Policymakers and researchers frequently interpret such trends as signs of macroeconomic imbalances, structural changes, or the impacts of prolonged inflation and external shocks over time.

Figure 6. Visual of real exchange rate (RER)

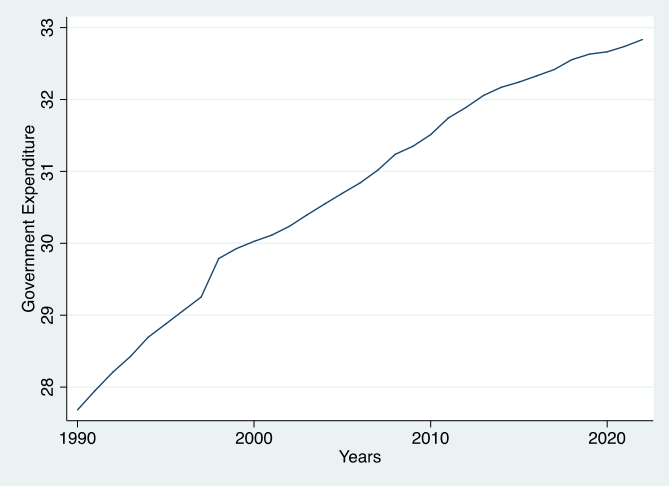


Source: authors' computations using STATA.

Figure 7 illustrates the log representation of government expenditures from 1990 to 2020. This period reveals a clear pattern, indicating a significant and consistent increase in total government expenditure over the years. Government expenditure shows a steady upward trajectory. In 1990, it began just below 28 units (the specific units are not detailed but likely represent either a percentage of GDP or billions in local currency). The late 1990s marked a phase of accelerated expenditure growth, which continued but at a somewhat slower pace post-2000. By 2021, government expenditure had risen

to slightly above 33 units, reflecting sustained growth over the years. This trend suggests continuous increases in government spending over more than three decades, likely driven by policy priorities, economic growth, inflation, and the expanding responsibilities of the public sector. In summary, the graph illustrates a persistent rise in government expenditure from 1990 to 2021, with particularly notable growth in the early 2000s before transitioning to a more stable upward trend in the subsequent years.

Figure 7. Visual of government expenditure (GEX)



Source: authors' computations using STATA.

Table 1. Vector autoregression results

	Coefficients	Standard Errors	Z-Score	Probability> Z	[95% Confi	interval]
dLreal_gdp						
dLnreal_gdp						
L1.	0.289	0.159	1.810	0.070	-0.023	0.602
dLnexport						
L1.	-0.026	0.037	-0.690	0.490	-0.098	0.047
dLnmoney2						
L1.	0.024	0.050	0.490	0.627	-0.073	0.121
dLninflation						
L1.	-0.016	0.006	-2.750	0.006	-0.028	-0.005
Lnexpenditure						
L1.	-0.020	0.012	-1.610	0.107	-0.044	0.004
Lnexchange_rate						
L1.	0.058	0.030	1.940	0.052	-0.001	0.116
_cons	0.247	0.183	1.350	0.176	-0.111	0.605
dLnexport						
dLnreal_gdp						
L1.	0.799	1.307	0.610	0.541	-1.762	3.360
dLnexport						
L1.	0.436	0.304	1.440	0.150	-0.158	1.031
dLnmoney2						
L1.	0.011	0.406	0.030	0.978	-0.784	0.806
dLninflation						
L1.	-0.045	0.049	-0.920	0.360	-0.141	0.051
Lnexpenditure						
L1.	0.237	0.101	2.340	0.019	0.039	0.435
Lnexchange_rate						
L1.	-0.625	0.244	-2.560	0.010	-1.102	-0.147
_cons	-2.969	1.496	-1.980	0.047	-5.901	-0.037

	Coefficients	Standard Errors	Z-Score	Probability> Z	[95% Confi	interval]
dLnmoney2						
dLnreal_gdp						
L1.	0.521	1.032	0.510	0.614	-1.501	2.543
dLnexport						
L1.	0.228	0.240	0.950	0.341	-0.242	0.698
dLnmoney2						
L1.	0.033	0.320	0.100	0.919	-0.595	0.661
dLninflation						
L1.	-0.006	0.039	-0.150	0.881	-0.082	0.070
Lnexpenditure						
L1.	0.161	0.080	2.020	0.043	0.005	0.318
Lnexchange_rate						
L1.	-0.380	0.192	-1.980	0.048	-0.758	-0.003
_cons	-2.335	1.181	-1.980	0.048	-4.650	-0.020
dLninflation						
dLnreal_gdp						
L1.	2.466	5.030	0.490	0.624	-7.392	12.324
dLnexport						
L1.	0.787	1.169	0.670	0.501	-1.503	3.077
dLnmoney2						
L1.	-0.475	1.562	-0.300	0.761	-3.537	2.587
dLninflation						
L1.	-0.209	0.188	-1.110	0.266	-0.579	0.160
Lnexpenditure						
L1.	0.282	0.389	0.720	0.469	-0.481	1.045
Lnexchange_rate						
L1.	-0.778	0.938	-0.830	0.407	-2.617	1.060
_cons	-3.377	5.759	-0.590	0.558	-14.665	7.910
Lnexpenditure						
dLnreal_gdp						
L1.	0.236	0.741	0.320	0.750	-1.216	1.687
dLnexport						
L1.	-0.143	0.172	-0.830	0.406	-0.480	0.194
dLnmoney2						
L1.	0.116	0.230	0.500	0.615	-0.335	0.566
dLninflation						
L1.	-0.007	0.028	-0.270	0.791	-0.062	0.047
Lnexpenditure						
L1.	0.934	0.057	16.290	0.000	0.821	1.046
Lnexchange_rate						
L1.	0.061	0.138	0.440	0.658	-0.210	0.332
_cons	1.758	0.848	2.070	0.038	0.096	3.419
Lnexchange_rate						
dLnreal_gdp						
L1.	0.102	0.409	0.250	0.802	-0.699	0.904
dLnexport						
L1.	0.049	0.095	0.520	0.605	-0.137	0.235
dLnmoney2						
L1.	0.090	0.127	0.710	0.481	-0.159	0.338
dLninflation						
L1.	-0.018	0.015	-1.170	0.244	-0.048	0.012
Lnexpenditure						
L1.	0.161	0.032	5.080	0.000	0.099	0.223
Lnexchange_rate						
L1.	0.532	0.076	6.980	0.000	0.383	0.682
_cons	-1.613	0.468	-3.450	0.001	-2.530	-0.695

	Coefficients	Standard Errors	Z-Score	Probability> Z	[95% Confi	interval]

Vector autoregression
Sample: 1992 - 2021 Number of obs = 30
Log likelihood = 237.5114 AIC = -13.03409
FPE = 9.28e-14 HQIC = -12.40654
Det(Sigma_ml) = 5.35e-15 SBIC = -11.07242

Equation	Parms	RMSE	R-sq	chi2	P>chi2
dLnreal_gdp	7	.017631	0.5792	41.29598	0.0000
dLnexport	7	.144456	0.3233	14.33091	0.0262
dLnmoney2	7	.114073	0.1798	6.5775	0.3617
dLninflation	7	.556097	0.0666	2.1413	0.9063
Lnexpenditure	7	.081874	0.9973	10960.9	0.0000
Lnexchange_rate	7	.045207	0.9949	5828.61	0.0000

Source: authors' computations using STATA.

4.2 Interpretation of coefficients

Assuming other factors are constant, this means that a 1% increase in lagged GDP growth is associated with a 0.289% increase in current GDP growth, although the relationship is only marginally significant at the 10% level and not statistically robust at the conventional 5% level; also, a 1% increase in previous period net exports is associated with a 0.026% decrease in current real GDP, as well as a 1% increase in lagged money supply is associated with a 0.024% increase in GDP, though this effect is statistically insignificant; also, a 1% increase in lagged inflation is associated with a 0.016% decrease in GDP, and this effect is statistically significant at the 1% level. Government expenditure shows strong persistence, with a 1% increase in past expenditure associated with a 0.934% increase in current expenditure, significant at the 1% level, and a 1% increase in exchange rate is associated with a 0.58% increase in current real GDP. But except for the inflation rate, all other factors are statistically insignificant in explaining the variation of current real GDP. The model explains the 57.92% variation in current real GDP, with a root mean squared error of 0.176%.

Assuming other factors are constant, a 1% increase in the previous period's real GDP is associated with a 0.79% increase in current net exports; also, a 1% increase in the previous period's net exports is associated with a 0.436% decrease in current net exports; also, a 1% increase in the previous period's money supply is associated with a 1.1% increase in current net exports; also, a percentage increase in the rate of inflation is associated with a decrease in current net exports by 0.45%; a 1% increase in government expenditure is also associated with a 0.237% decrease in current net exports, and a percentage increase in the exchange rate is associated with a 0.625% increase in current net exports. But except for government expenditure and exchange rate, all other factors are statistically insignificant in explaining the variation of current net exports. The model explains a 0.3233% variation in current exports, with a root mean squared error of 0.1444%.

Assuming other factors are constant, a 1% increase in previous period real GDP is associated with a 0.521% increase in current money supply; also a 1% increase in previous period net exports is associated with a 0.228% decrease in current money supply; as well, a percent increase in previous period supply of money is associated with a 0.033% increase in current money supply; also a percent increase in the rate of inflation is associated with a decrease in current money supply by 0.006%, a 1% increase in government expenditure is also associated with a 0.161% decrease in current money supply; and a percentage increase in exchange rate is associated with a 0.38% increase in current money supply. However, all other factors, except for government expenditures and the currency conversion rate, are statistically insignificant in explaining the variation of current Money Supply. The model explains 17.98% variation in the current money supply, with a root mean squared error of 11.41%.

Assuming other factors remain constant, a 1% increase in the previous period's real GDP is associated with a 2.466% rise in the current inflation rate. Additionally, a 1% increase in previous period net exports corresponds to a 0.787% decline in the current inflation rate. Furthermore, a percentage increase in the previous period's money supply results in a 0.475% increase in the current inflation rate,

whereas a percentage increase in the previous year's inflation rate leads to a decrease of 0.209%. Moreover, a percentage increase in government expenditure is associated with a 0.282% decline in the current inflation rate, while a percentage increase in the exchange rate relates to a 0.78% rise in the current inflation rate. All other factors are statistically insignificant in explaining the variation in the current inflation rate. The model accounts for 6.67% of the variation in the current inflation rate, with a root mean squared error of 55.61%.

Assuming other factors are constant, a 1% increase in the previous period's real GDP is associated with a 0.236% increase in current government spending; additionally, a 1% increase in previous period net exports is associated with a 0.143% decrease in current government expenditure. Furthermore, a 1% increase in the previous period's money supply corresponds to a 0.116% increase in current government expenditure, while a 1% increase in the inflation rate leads to a 0.007% decrease in current government expenditure. Moreover, a 1% increase in government expenditure decreases current government expenditure by 0.934%, while an increase in the exchange rate raises current government expenditure by 0.061%. But except for the previous year's expenditure, all other factors are statistically insignificant in explaining the variation in current government expenditure. The model explains the 99.73% variation in current government expenditure, with a root mean squared error of 8.19%.

Assuming other factors remain constant, a 1% increase in the previous period's real GDP is associated with a 0.102% increase in the current real exchange rate. Additionally, a 1% increase in the previous period’s net exports correlates with a 0.049% decrease in the current real exchange rate. Furthermore, a percentage increase in the previous period's supply of money corresponds to a 0.90% increase in the current real exchange rate, while a percentage increase in the rate of inflation leads to a 0.018% decrease in the current real exchange rate. A 1% increase in government expenditure is also linked to a 0.161% decrease in the current real exchange rate. Lastly, a percentage increase in the exchange rate results in a 0.532% increase in the current real exchange rate. But except for the previous year's expenditure and exchange rate, all other factors are statistically insignificant in explaining the variation of the current real currency conversion rate. The model explains 99.49% of the variation in the current real conversion rate, with a root mean squared error of 4.5%.

In summary, Table 1's VAR estimation results indicate that past GDP growth positively influences current growth, albeit at a marginally significant level. This finding emphasizes some persistence in output, which is consistent with the notion that strong economic performance tends to generate momentum in subsequent periods. Inflation, however, has a negative and statistically significant impact on growth, highlighting the adverse effects of rising prices on economic activity. By contrast, exports, money supply, and government expenditure exhibit no significant influence on GDP in the short run. The exchange rate shows a positive effect that is nearly significant, hinting at the potential growth-enhancing role of currency depreciation. Generally, the GDP equation highlights the importance of price stability and external competitiveness in sustaining economic performance.

4.3 Estimation results

Analysing non-stationary time series variables through regression can occasionally yield inaccurate or misleading outcomes. To tackle this issue, one approach is to portray the stationarity of the time series data, as suggested by Gujarati and Porter (2009). Thus, before proceeding to estimate the Granger causality model, the initial step involves assessing the stationarity of the variables.

4.3.1 The unit root test

Numerous time series variables evince a systematic pattern marked by stochastic fluctuations in their mean over time, posing formidable hurdles in parameter estimation within regression frameworks. Such estimations, as delineated by Granger and Newbold (1974), manifest as spurious regression outcomes, characterized by elevated R-square values and t-ratios devoid of substantive economic import. Verifying the existence of unit roots is of paramount importance, given that changes to a unit root process leads to effects that do not dissipate over time, contrasting starkly with stationary processes. Thus, the Augmented Dickey-Fuller (ADF) test is deployed to ascertain the presence of a

unit root within a time series. Furthermore, the Akaike Information Criteria (AIC) are harnessed to discern the optimal number of lags in the model.

Research widely uses the VAR (Vector Autoregressive) approach because it effectively models the dynamic interrelationships among multiple time series variables. It captures how each variable in the system influences and responds to changes in the others over time without requiring strong assumptions about the underlying data-generating processes. Supporting tests like the Augmented Dickey-Fuller (ADF) test and Granger causality tests are crucial in VAR analysis for these reasons: The ADF test is used to determine if the time series data are stationary, meaning their statistical properties, such as mean and variance, remain constant over time. Stationarity is a key assumption for VAR models because non-stationary data (containing unit roots) can lead to spurious results. The ADF test helps determine if differencing or transformation of the data is needed before building the VAR model.

Granger Causality Test: This test is employed after fitting the VAR model to examine causal relationships between the variables. It tests whether the past values of one variable provide information that can help predict another variable, beyond what is available from the past values of that second variable alone. In this way, Granger causality helps establish the direction and timing of influence among variables in the VAR framework. In summary, VAR is used for its flexibility in modeling interdependent time series, and ADF and Granger causality tests are used to validate key assumptions (stationarity) and to explore causal dynamics within the data, ensuring robust and meaningful inference from the VAR model.

Table 2. Augmenting Dickie Fuller test results

Variable name	ADF- statistic	5% critical level	Stationarity status
Real GDP	1.940	-2.980	*Non-stationary*
Inflation Rate	-2.268	-2.980	*Non-stationary*
Money Supply	-1.634	-2.980	*Non-stationary*
Real Exchange Rate	-4.922	-2.983	*Stationary*
Net Exports	-2.113	-2.980	*Non-stationary*
Government Expenditure	-4.163	-2.980	*Stationary*

Source: authors' computations using STATA.

To grasp the findings laid out in Table 2 effectively, it's beneficial to understand the following explanation: If the Augmented Dickey-Fuller (ADF) statistic value is less than the critical value or significantly surpasses it, it suggests the availability of a unit root. Otherwise, it implies a series is stationary. In this context, the results indicate that real Gross Domestic Product, Rate of Inflation, Supply of Money, and Net Exports exhibit non-stationarity at their levels, while the real exchange rate and government expenditure demonstrate stationarity. Hence, employing these nonstationary variables would yield invalid or nonsensical estimations. This assertion is supported by the distinct nature of the non-stationary variables, as illustrated in Table 3, depicting the outcomes of the first-order level.

Table 3. Augmenting Dickie Fuller test results for differenced variables

Variable name	ADF statistic	5% critical level	Stationarity status
dReal GDP	-2.946	-2.983	*Stationary*
dInflation Rate	-6.294	-2.983	*Stationary*
dMoney Supply	-4.138	-2.983	*Stationary*
Exchange Rate	-4.922	-2.983	*Stationary*
dNet Exports	-3.986	-2.983	*Stationary*
Government Expenditure	-4.163	-2.980	*Stationary*

Source: authors' computations using STATA.

Table 3 displays the outcomes of the ADF-test conducted on the first-order differenced variables. The table indicates that the ADF statistic values are lower than the critical values, confirming

the stationarity of the real gross domestic product, rate of inflation, supply of money, real exchange rate, net exports, and expenditure of the government at the 5% significance level.

4.3.2 Stability condition

The eigenstability condition provides an important basis for analyzing the stability of dynamic systems, such as vector autoregression (VAR) models in econometrics. It specifically concentrates on the eigenvalues extracted from the coefficient matrix, which is constructed using past values of variables within the system. Put simply, the eigen-stability condition dictates that to ensure system stability, all eigenvalues derived from the coefficient matrix must possess an absolute value less than 1. Should any eigenvalue exceed or equal 1 in magnitude, the system risks exhibiting unstable behavior, potentially leading to divergent outcomes or unchecked oscillations. In practice, analysts compute the eigenvalues of the coefficient matrix and verify whether they adhere to this stability criterion. Meeting this condition signifies system stability, while deviations may necessitate adjustments to maintain dependable and stable model predictions. Overall, the eigen-stability condition furnishes a quantitative benchmark for assessing the stability of dynamic systems, furnishing valuable insights into their long-term dynamics and facilitating informed decision-making across diverse domains, encompassing economics.

Table 4. Eigen-stability condition

Eigenvalue	**Modulus**
.9598812	.959881
.4093022 + .2687054i	.489623
.4093022 - .2687054i	.489623
3324018	.332402
-.04807804 + .1092i	.119315
-.04807804 - .1092i	.119315

Source: authors' Computations using STATA.

Eigenvalues lie inside the unit circle. VAR Model Satisfies Stability Condition.

The model estimated in Table 1 satisfies the eigen-stability condition. And therefore, the results of the VAR model are stable.

4.4. Granger causality test (GCT)

This examination is employed to ascertain the causal nexus between macroeconomic variables and the growth of the economy in Tanzania. Clarifying the direction of influence is very important because it helps identify where the impact is coming from, making it easier to carry out policies that achieve the desired goals.

Table 5. The GCT results

NO	Causality directions	Chi-sq	Pvalue>chi-sq	Hypothesis outcome
1	Rate of Inflation → Real GDP	7.539	0.006	Fail to REJECT
	Real GDP →Rate of Inflation	0.24041	0.624	REJECT
2	Money Supply → Real GDP	0.2359	0.627	REJECT
	Real GDP → Money Supply	0.2551	0.614	REJECT
3	Exchange rate → Real GDP	3.7674	0.052	REJECT
	Real GDP → Exchange rate	0.0627	0.802	REJECT
4	Net Exports → Real GDP	0.47661	0.490	REJECT
	Real GDP→ Net Exports	0.3738	0.541	REJECT

NO	Causality directions	Chi-sq	Pvalue>chi-sq	Hypothesis outcome
5	Gov-expenditures → Real GDP	2.5961	0.107	REJECT
	Real GDP → Gov-expenditures	0.1012	0.750	REJECT

Source**:** authors' computations using STATA.

Table 5 shows the results of the Granger causality test, performed using the Wald test in Stata. The results provide strong evidence that we cannot reject the null hypothesis, meaning there is no causality between inflation and economic growth, as shown by the P-value of 0.006. On the other hand, the P-value of 0.624 suggests that economic growth does cause inflation in Tanzania. Conversely, the p-value of 0.624 indicates that the growth of the economy exerts causality on inflation within the Tanzanian context.

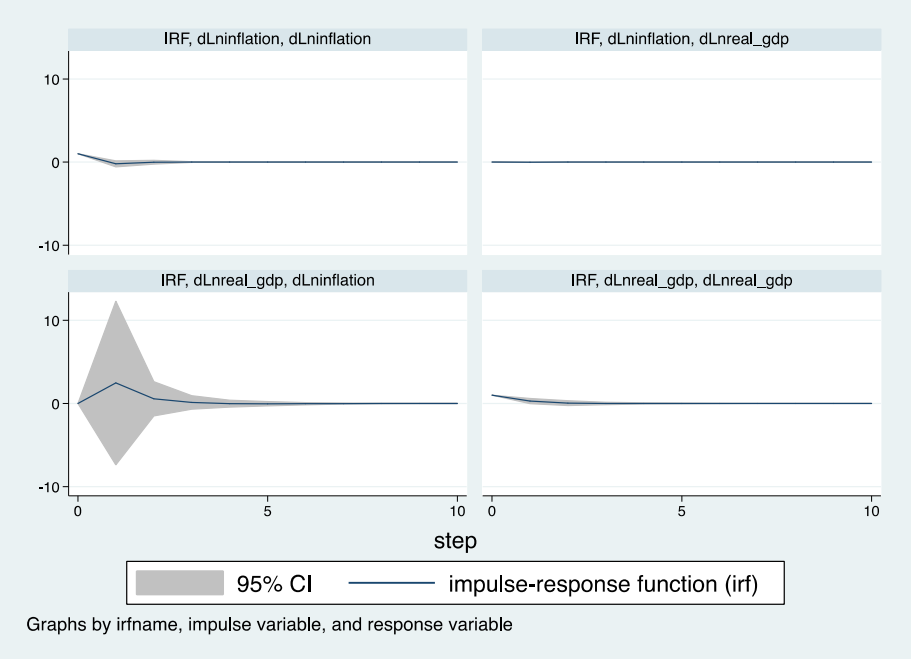
Moreover, the null hypothesis concerning the absence of Granger causality from supply of money, real exchange rate, net exports, and expenditures of government to the growth of the economy is rejected at the level of significance of 5%, indicating they do indeed influence economic growth. Additionally, the results demonstrate a bidirectional causal relationship between these variables.

4.5. Impulse response functions (IRF) results

The IRF furnishes illuminative perspectives on the manner in which individual variables react to perturbations emanating from other variables inherent in the system. Through the delineated graphs, IRF proffers a visual portrayal of variable behaviours in response to such disturbances. These delineations elucidate how a specific variable responds to a singular shock in each of the variables constituting the system. The studies advocate for the interpretation through the lens of first differencing of variables and vector error correction estimates. The forecast horizon for these responses extends over a decade, capturing both transient and enduring reactions.

Figure 8 elucidates the repercussions of inflationary shocks for the growth of the economy. The enveloped grey area is the standard error confidence bands, denoting the accuracy of model estimation, and is visible within the slender grey confines. Additionally, the economic growth response to inflationary shocks appears modest, particularly in the initial decade of the observation period, with no discernible reaction thereafter, indicating negligible effects. Nonetheless, a broader grey band illustrates the economic growth response to inflation, wherein a 1% standard deviation surge in growth of the economy aligns with a 2% standard deviation escalation in inflation.

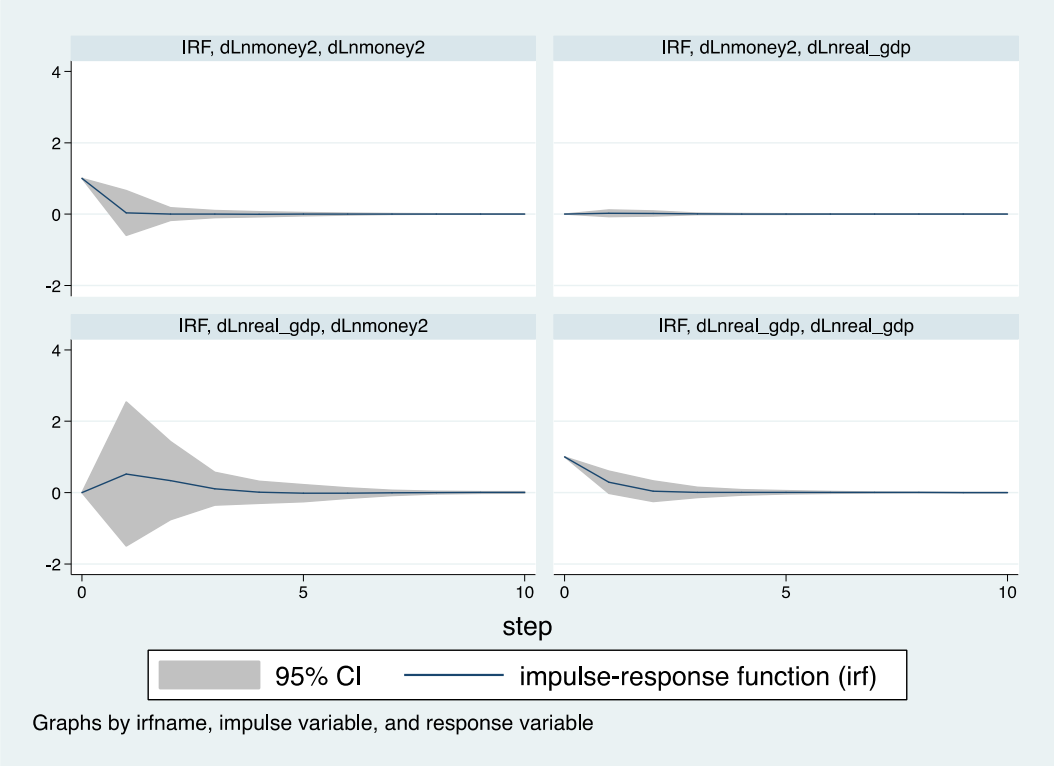
Figure 8. Visual of shock of inflation on GDP



Source: authors' computations using STATA.

Figure 9 portrays the IRF emanating from the supply of money shocks. Initially, the response of GDP to such perturbations manifests as markedly positive, gradually waning over a span of approximately two years, persisting until the culmination of the decade-long period. Subsequently, it stabilizes, showcasing no discernible further reaction until the termination of the observational window. In the same way, the reaction of money supply to shocks stemming from its own innovations unveils a deleterious impact, diminishing for approximately three years before levelling off, evincing minimal subsequent reactions.

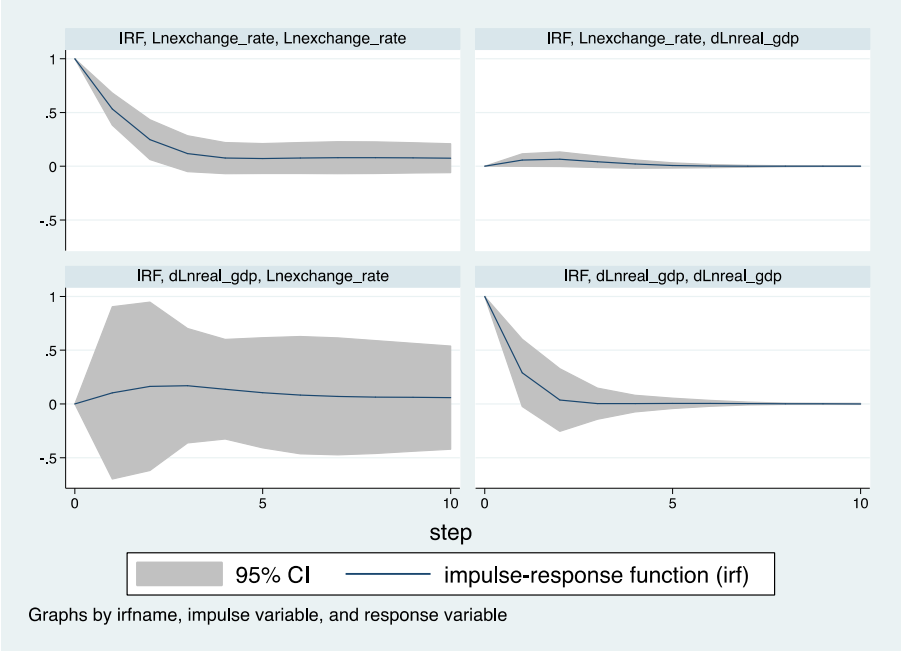
Figure 9. Visual of money supply shocks to GDP growth



Source: authors' computations using STATA.

Figure 10 shows the impulse response (IR) of GDP to shocks in the currency conversion rate. The GDP growth response to fluctuations in the currency conversion rate remains somewhat consistent, albeit marginal, particularly in the initial phases, persisting even beyond the ten-year span. Eventually, it stabilizes at a slightly adverse level and persists until the study's conclusion. Conversely, the real exchange rate's reaction to its perturbation initially showcases a relatively downward trajectory, peaking in the fourth year, then settling at a new equilibrium level until the study's conclusion. Furthermore, the response of real GDP to its own shocks, influenced by the exchange rate, undergoes a downturn until the third year before attaining stability for the ensuing decade.

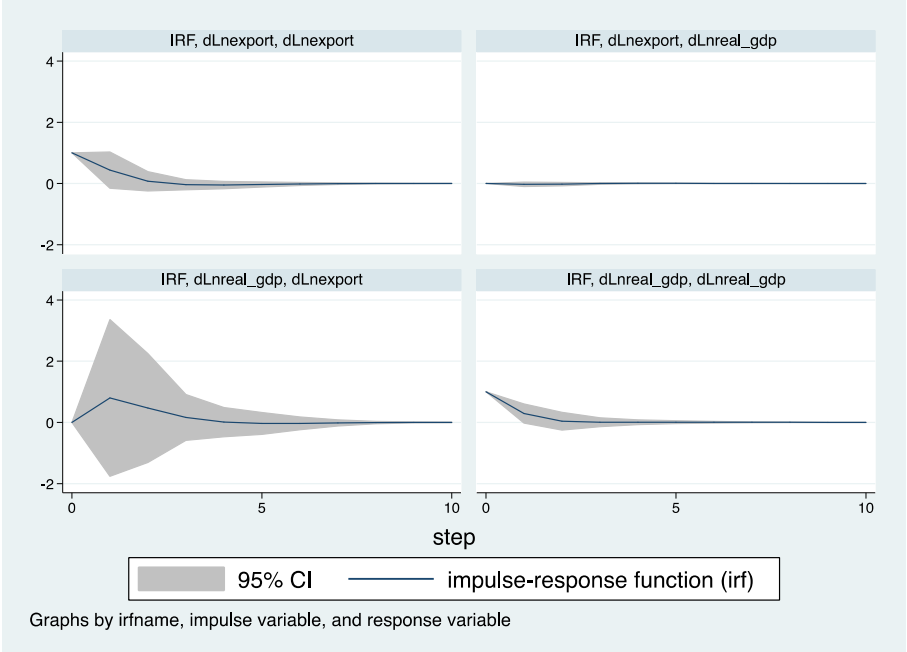
Figure 10. Visual of real exchange rate shocks to GDP



Source: authors' computations using STATA.

Figure 11 delineates the response of GDP growth to perturbations in net exports. Initially, the GDP growth response to shocks in net exports exhibits positivity, lasting until the third year, at which point it stabilizes for the ensuing decade. This trajectory endures until the study's culmination. In contrast, the response of net exports to its own innovative shocks has a negative stance, albeit with a diminishing trend throughout the ten-year period, maintaining a parallel trajectory until the study's completion.

Figure 11. Visual of net exports shocks to GDP growth

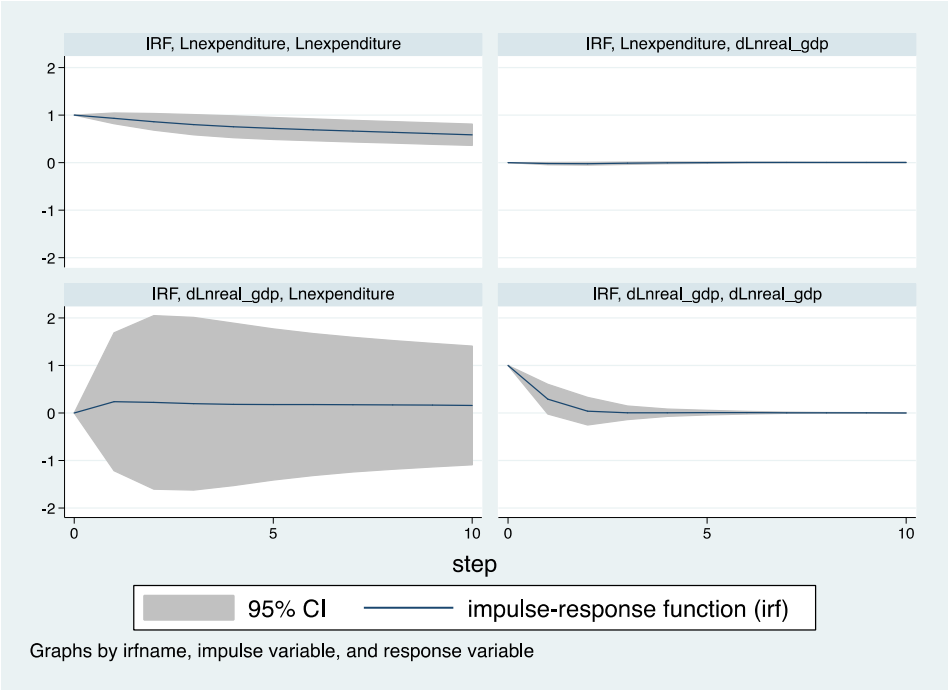


Source: authors' computations using STATA.

Figure 12 illustrates the response of GDP growth to perturbations in government spending. Initially, the reaction of GDP growth to fluctuations in government spending manifests positively,

exhibiting an ascending trajectory for approximately two years. Nonetheless, it subsequently undergoes a marginal downturn, persisting until the study's culmination. Similarly, the expenditure's response to its own shocks showcases a diminishing trend spanning the entirety of the observational period.

Figure 12. Visual of expenditures of government on GDP



Source: authors' computations using STATA.

4.6. Discussions

The utilization of vector autoregression (VAR) analysis has unveiled the intricate structure of interdependencies among pivotal macroeconomic variables in Tanzania, shedding illuminating insights into the catalysts propelling economic growth and stability. This segment of discourse delves into the ramifications of the findings and their concordance with extant literature, proffering recommendations for policymakers and avenues for prospective inquiry.

In congruence with both theoretical postulations and empirical evidence posited by scholars such as Barro (1990) and Easterly & Rebelo (1993), the scrutiny exposes a notable positive correlation between the spending of the government and growth of the economy in Tanzania. This revelation accentuates the indispensability of public investments in engendering enduring developmental strides within realms like infrastructure, education, and healthcare. Policymakers are urged to accord primacy to the judicious allocation of public finances, aiming to optimize the efficacy of governmental disbursements for fostering productivity and accumulating human capital. Thereby, the advancement of sustainable economic expansion and the amelioration of poverty can be earnestly pursued.

The findings regarding inflation dynamics highlight the challenges facing Tanzania in maintaining price stability while supporting economic growth. Although moderate inflation is often considered conducive to growth (Fischer, 1993; Yabu & Kessy, 2015; Nell, 2023), high and volatile inflation can undermine macroeconomic stability and erode purchasing power, particularly among low-income households. The observed positive correlation between inflation and economic growth warrants careful monitoring by policymakers, who must strike a balance between stimulating aggregate demand and controlling inflationary pressures through prudent monetary policy measures.

The analysis also underscores the importance of the real exchange rate (RER) in shaping Tanzania's external sector performance and trade competitiveness. A competitive RER is essential for promoting export-led growth and attracting foreign direct investment (Bahmani-Oskooee & Brooks,

1999). However, the observed fluctuations in the RER raise concerns about the country's external vulnerabilities and its ability to sustain export-oriented development strategies. Policymakers should implement measures to enhance exchange rate stability, improve export diversification, and reduce reliance on volatile commodity exports to bolster Tanzania's resilience to external shocks.

Generally, the study theoretically examines the dynamic interrelationships among key macroeconomic variables—namely the real exchange rate, net exports, government expenditure, money supply, and inflation rate—in relation to economic growth in Tanzania. It employs an integrated theoretical framework that combines neoclassical growth theory, endogenous growth theory, and Keynesian perspectives. The empirical analysis uses vector autoregression (VAR) techniques to demonstrate how these macroeconomic indicators influenced Tanzania's economic growth from 1992 to 2021. Furthermore, the research offers policymakers actionable insights regarding the significance of government expenditure, inflation control, and exchange rate management in promoting sustainable economic growth in Tanzania. It highlights the necessity for targeted public investment in infrastructure, education, and healthcare, in conjunction with monetary and exchange rate policies that aim to maintain price stability and bolster export competitiveness.

The theoretical implications of the findings underscore that inflation has a detrimental effect on economic growth, whereas government expenditure is positively associated with it. This supports Keynesian and growth theories that highlight the importance of fiscal policy and price stability. Additionally, the findings affirm the interconnected nature of macroeconomic variables, by emphasising the intricate causality that exists between economic growth, inflation, money supply, exchange rates, and government spending.

In summary, this study enhances the theoretical understanding of macroeconomic dynamics within the context of a developing country and provides practical policy recommendations aimed at improving macroeconomic stability, fostering export-led growth, and promoting inclusive economic development in Tanzania. Additionally, it proposes avenues for future research that involve the use of structural models and more detailed sectoral analysis to refine economic policy interventions.

5. Conclusion

In conclusion, the analysis of the vector autoregression (VAR) model provides valuable insights regarding the interrelationships among key macroeconomic variables in Tanzania, including government expenditure, inflation, currency conversion rate, and growth of the economy. The findings suggest that government expenditures are significant in driving the growth of the economy, highlighting the importance of strategic public investments in infrastructure, education, and healthcare. Moreover, the analysis underscores the need for policymakers to carefully manage inflation dynamics to maintain macroeconomic stability and safeguard purchasing power.

Additionally, the study emphasizes the critical role of currency conversion rates in influencing the external sector’s performance and trade competitiveness. To sustain export-led growth and enhance external resilience, policymakers should prioritize exchange rate stability, implement measures to diversify exports, and reduce reliance on volatile commodity exports.

Enhance Public Investment Efficiency: Increase transparency and accountability in public spending to ensure that government expenditure is allocated efficiently to priority sectors that contribute to long-term economic growth and human development.

Strengthen Monetary Policy Framework: Adopt a proactive monetary policy stance to maintain price stability while supporting economic growth, thereby anchoring inflation expectations and preserving the purchasing power of households.

Promote Exchange Rate Stability: Implement measures to enhance exchange rate stability, including prudent management of foreign exchange reserves, flexible exchange rate regimes, and policies to mitigate external vulnerabilities.

Diversify Export Base: Support export diversification efforts by providing targeted incentives and facilitating access to finance, technology, and markets for non-traditional export sectors with high growth potential.

Invest in Human Capital: Prioritize investments in education, skills development, and healthcare to enhance productivity, reduce poverty, and promote inclusive growth, thereby laying the foundation for sustained economic prosperity.

By implementing these recommendations, policymakers can foster an enabling environment for sustainable development, enhance macroeconomic stability, and promote inclusive growth in Tanzania, thereby improving the well-being of its citizens and positioning the country for long-term economic success.

Constraints and prospects for future research

Despite its injections, this study has several constraints that merit consideration. Firstly, the VAR analysis relies on historical time series data, which may not capture structural changes or anticipate future trends accurately. Future research could employ dynamic stochastic general equilibrium (DSGE) models or structural VAR techniques to incorporate more structural information and identify policy-relevant implications. Additionally, the analysis focuses on aggregate macroeconomic indicators and may overlook sectoral heterogeneity and regional disparities within Tanzania. Subsequent studies could examine the differential effects of government expenditure, inflation, and exchange rate movements across sectors and regions, thereby informing targeted policy interventions to address socioeconomic inequalities and promote inclusive growth.

References

Adeniran, A., Ekeruche, M. A., & Iheonu, C. O. (2022). The quality of budgetary institutions in Africa: Exploring the drivers. Economic Annals, 67(232), 127-152.

Alexianu, M. (2020). Monetary policy in Tanzania: Looking back on 10 years of BoT and IGC contributions. International Growth Center, Synthesis Paper.

Ali, I. (2024). Investigating the Inflation-Economic Growth Nexus in Pakistan from 1990 to 2020. International Journal of Economics & Business Administration (IJEBA), 12(2), 71-90.

Arieff, A. (2010). Global economic crisis: Impact on sub-Saharan Africa and global policy responses. Diane Publishing

Aragie, E. A., Benfica, R., Pauw, K., Randriamamonjy, J., & Thurlow, J. (2024). Assessing investment priorities for inclusive agricultural transformation in Tanzania. Development Policy Review, 42(6), e12812.

Bahmani-Oskooee, M., & Brooks, T. J. (1999). Bilateral J-curve between US and her trading partners. Weltwirtschaftliches Archiv, (H. 1), 156-165.

Bahmani-Oskooee, M., & Brooks, T. J. (2006). The purchasing power parity puzzle in developing countries. International Macroeconomics: Recent Developments, 53-61.

Bank of Tanzania. (2020). Annual report. Retrieved from https://www.bot.go.tz/Publications/Regular/Annual%20Report/en/2021122922483700.pdf

Barro, R. J. (1990). Government spending in a simple model of endogeneous growth. Journal of political economy, 98(5, Part 2), S103-S125.

Ben-David, D., & Loewy, M. B. (2003). Trade and the neoclassical growth model. Journal of economic integration, 1-16.

Boujelbene, T. (2021). Nonlinearity relationship of inflation and economic growth: Role of institutions quality. Romanian Journal of Economic Forecasting, 24(1), 166.

Braiton, N., & Odhiambo, N. M. (2023). Capital flows to low-income sub-Saharan Africa: An exploratory review. International Trade, Politics and Development, 7(1), 36-53.

Bunje, M. Y., Abendin, S., & Wang, Y. (2022). The multidimensional effect of financial development on trade in Africa: The role of the digital economy. Telecommunications Policy, 46(10), 102444.

Bwana, K., & Moharuma, M. (2025). Financial determinants of economic growth: The Tanzanian perspective. Modern Finance, 3(1), 38-49.

Byaro, M., Pelizzo, R., & Kinyondo, A. (2023). What are the Main Drivers Behind the Acceleration of Tanzania's Economic Growth Over the Past Three Decades? African Journal of Economic Review, 11(4), 85-107.

Dauda, R. O., & Abdulkareem, M. (2023). Impact of monetary policy on economic growth in Nigeria (1990-2020). Journal of Emerging Economies & Islamic Research, 11(1), 71-90.

Devarajan, S., Swaroop, V., & Zou, H. F. (1996). The composition of public expenditure and economic growth. Journal of monetary economics, 37(2), 313-344.

Dunning, J., & Narula, R. (2003). Foreign direct investment and governments: Catalysts for economic restructuring. Routledge.

Dvoskin, A., Feldman, G. D., & Ianni, G. (2020). On the role of the exchange rate as a tool for industrial competitiveness. Brazilian Journal of Political Economy, 40, 310-331.

Easterly, W., & Rebelo, S. (1993). Fiscal policy and economic growth. Journal of monetary economics, 32(3), 417-458.

Eggoh, J. C., & Khan, M. (2014). On the nonlinear relationship between inflation and economic growth. Research in Economics, 68(2), 133-143.

Epaphra, M. (2016). Determinants of export performance in Tanzania. Journal of Economics Library, 3(3), 470-487.

Fischer, S. (1993). The role of macroeconomic factors in growth. Journal of Monetary Economics, 32(3), 485-512.

Friedman, M. (1968). The role of monetary policy. The American Economic Review, 58(1), 1-17.

Galih, A., & Safuan, S. (2018). On Nonlinear Relationship between Inflation and Economic Growth: A Study of ASEAN-5 Countries Period 2000-2016. Economics and Finance in Indonesia, 63(1), 1.

Gereffi, G., & Sturgeon, T. (2013). Global value chain-oriented industrial policy: the role of emerging economies. In: Global value chains in a changing world (pp. 329-360). WTO iLibrary.

Githanga, B. (2015). Trade Liberalization and Economic Growth in Kenya: An Empirical Investigation (1975-2013).

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics, 2*(2), 111–120.

Grossman, G. M., & Helpman, E. (1991). Trade, knowledge spillovers, and growth. European economic review, 35(2-3), 517-526.

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics* (5th ed.). McGraw-Hill Irwin.

Guzman, M., Ocampo, J. A., & Stiglitz, J. E. (2018). Real exchange rate policies for economic development. World development, 110, 51-62.

Haile, F. (2017). Global shocks and their impact on the Tanzanian economy. Economics, 11(1), 20170009.

Hamad, M. M., Mtengwa, B. A., & Babiker, S. A. (2014). The impact of trade liberalization on economic growth in Tanzania. International Journal of Academic Research in Business and Social Sciences, 4(5), 514

Hasan, M. M., & Adnan, A. T. M. (2025). Nexus between environmental sustainability, energy intensity and food security: evidence from emerging economies. Journal of Business and Socio-economic development, 5(2), 139-154.

Haavelmo, T. (1944). The probability approach in econometrics. Econometrica: Journal of the Econometric Society, iii-115.

Idike, A. N., Ukeje, I. O., Ogbulu, U., Aloh, J. N., Obasi, V. U., Nwachukwu, K., ... & Ejem, E. N. (2021). The practice of human capital development process and poverty reduction: Consequences for sustainable development goals in Ebonyi State, Nigeria. Public Organization Review, 21(2), 263-280.

International Monetary Fund (IMF). (2020). Tanzania: Staff report for the 2020 Article IV Consultation. Retrieved from https://www.imf.org//media/Files/Publications/CR/2022/English/1TZAEA2022001.ashx

Iqbal, N., & Nawaz, S. (2009). Investment, inflation and economic growth nexus. The Pakistan Development Review, 863-874.

Jackson, E. A. (2024). Economic Theory of Inflation (No. 280999). ZBW-Leibniz Information Centre for Economics.

Juma, C., & Clark, N. (1995). Policy research in sub-Saharan Africa: An exploration. Public administration and development, 15(2), 121-137.

Juselius, K. (1999). Models and relations in economics and econometrics. Journal of Economic Methodology, 6(2), 259-290.

Kasidi, F., & Mwakanemela, K. (2013). Impact of Inflation on Economic Growth: A Case Study of Tanzania. Asian Journal of Empirical Research, 3(4), 363-380.

Kazungu, K. G., & Cheyo, M. B. (2014). Government expenditure on growth strategies and poverty reduction in Tanzania. What have we learned? African Journal of Economic Review, 2(1), 38-47.

Kearney, C. (2012). Emerging markets research: Trends, issues and future directions. Emerging Markets Review, 13(2), 159-183.

Keita, L. (2016). Models of economic growth and development in the context of human capital investment–The way forward for Africa. Africa Development, 41(1), 23-48.

Kessy, P. J., Nyella, J., & O'Connell, S. A. (2016). Monetary policy in Tanzania. Tanzania: The Path to Prosperity, 241.

Keynes, J. M. (1936). William Stanley Jevons. In: Essays in biography (pp. 109-160). London: Palgrave Macmillan UK.

Keynes, J. (1964). M. 1936. The general theory of employment, interest and money, 154-6.

Khan, M. S., & Senhadji, A. S. (2001). Threshold effects in the relationship between inflation and growth. IMF Staff Papers, 48(1), 1-21.

Kimolo, D., Odhiambo, N., & Nyasha, S. (2024). Inflation Dynamics in Tanzania: An Exploratory Review of Reforms, Trends and Challenges. Timisoara Journal of Economics and Business, 17(2), 165-186.

Kirui, V. C., & Sang, P. K. (2020). The quest for socioeconomic development in Kenya: a review of the impact of public infrastructure on the voyage. International Journal of Research and Innovation in Social Science, 4(11), 145-158.

Kitole, F. A., Msoma, L. J., & Sesabo, J. K. (2025). Navigating the economic landscape: a comprehensive analysis of government spending, economic growth, and poverty reduction nexus in Tanzania. Applied Economics Letters, 32(9), 1306-1310.

Lin, J. Y., & Monga, C. (2010). Growth identification and facilitation. World Bank Policy Research Working Paper, 5313.

Luiz, J. (2010). Infrastructure investment and its performance in Africa over the course of the twentieth century. International Journal of Social Economics, 37(7), 512-536.

Lulu, L. L. (2025). The Influence of Exchange Rate Unpredictability and Trade Balance on Tanzania's Economic Performance. The Accountancy and Business Review, 17(1).

Lütkepohl, H. (2005). New introduction to multiple time series analysis. Springer Science & Business Media.

Lütkepohl, H. (2013). Vector autoregressive models. In Handbook of research methods and applications in empirical macroeconomics (pp. 139-164). Edward Elgar Publishing.

Mbodj, A., & Laye, S. (2025). Reducing Poverty Through Financial Growth: The Impact of Financial Inclusion and Development in Emerging Economies. Journal of Business and Economic Options, 8(1), 61-76.

Mbongo, J. E., Mutasa, F., & Msigwa, R. E. (2014). The effects of money supply on inflation in Tanzania. Economics, 3(2), 19-26.

Michalopoulos, C., & Jay, K. (1973). Growth of exports and income in the developing world: A neoclassical view (No. 28). Department of State, Agency for International Development.

Milanzi, M., & Sanga, H. (2019). Inflation, Exchange Rate, and Money Supply Nexus in Tanzania. Uongozi Journal of Management and Development Dynamics, 29(2).

Mordecai, U., & Akinsola, A. (2021). Navigating Economic Dynamics: Trade Liberalization and Demographic Trends in Nigeria. Journal of Business and Economic Options, 4(4), 30-36.

Mordi, C.N. (2006). Challenges of exchange rate volatility in economic management in Nigeria. Central Bank of Nigeria Bullion, 30(3), 17-25.

Moshi, H. P. B., & Kilindo, A. A. L. (1999). The impact of government policy on macroeconomic variables: A case study of private investment in Tanzania. African Economic Research Consortium.

Mtui, J. M. (2024). Inflation Dynamics in Tanzania's Post-reform Period. Tanzania Journal of Development Studies, 22(2), 133-152.

Muhammad, A. A. (2023). Examining the relationship among unemployment, inflation, and economic growth. Journal of Business and Economic Options, 6(2), 23-31.

Nasir, I., & Saima, N. (2010). Investment, inflation and economic growth nexus (No. 27163). University Library of Munich, Germany.

Ndanshau, M. (2011). Budget deficit, money supply and inflation in Tanzania: A Granger causality test, 1967-2010. University of Dar es Salaam.

Nell, K. S. (2023). Inflation and growth in developing economies: A tribute to professor Thirlwall. Investigación económica, 82(326), 41-95.

Ndulu, B. J., & O'Connell, S. A. (1999). Governance and growth in sub-Saharan Africa. Journal of Economic Perspectives, 13(3), 41-66.

Nkoro, E., & Uko, A. K. (2016). Exchange rate and inflation volatility and stock prices volatility: Evidence from Nigeria, 1986-2012. Journal of Applied Finance and Banking, 6(6), 57.

Nord, R., Sobolev, Y., Dunn, D. G., Hajdenberg, A., Hobdari, N., Maziad, S., & Roudet, S. (2009). Tanzania: the story of an African transition.

Nteegah, A., Nelson, M., & Owede, V. M. (2017). Trade liberalization and economic growth in Nigeria. International Journal of Social Science and Economics Invention, 3(2), 120-132.

Nyonzo, F. (2025). Denominational inflation: Limited currency divisibility in cash payment systems–Tanzania as a case study. Advanced Research in Economics and Business Strategy Journal, 6(1), 200-214.

Odionye, J. C., Odo, A. C., Orji, A., Agoh, N., Ihezukwu, V. A., Ojike, R. O., & Okpara, R. M. (2024). Threshold-based influence of currency devaluation on external debt sustainability: Insights from smooth transition regression and multiple thresholds nonlinear ARDL approaches. The Journal of International Trade & Economic Development, 1-34.

Okafor, S. N., Ekesiobi, C., Ifebi, O., Dimnwobi, S. K., & Asongu, S. A. (2022). Testing the triple deficit hypothesis for sub-Saharan Africa: Implications for the African Continental Free Trade Area. African development review, 34(1), 142-153

Olamide, E., Ogujiuba, K., & Maredza, A. (2022). Exchange rate volatility, inflation and economic growth in developing countries: Panel data approach for SADC. Economies, 10(3), 67

Olukayode, M. E. (2009). Does government spending spur economic growth in Nigeria? MPRA Paper No. 17941.

Omar Bakar, H., Sulong, Z., & Chowdhury, M. A. F. (2022). The role of financial development on economic growth in the emerging market countries of the sub-Saharan African (SSA) region. International Journal of Emerging Markets, 17(3), 789-811.

Onafowora, O. A., & Owoye, O. (1998). Can trade liberalization stimulate economic growth in Africa? World Development, 26(3), 497-506.

Prince, A. I., Ehi, O. E., Brown-Ofoeme, M. N., Collins, O., & Alobele, I. A. (2023). Social policies and poverty reduction in Africa: A Nigeria-centered perspective. IIARD Journal of Humanities and Social Policy, 9(1), 49-77.

Qayyum, A. (2006). Money, inflation, and growth in Pakistan. The Pakistan Development Review, 45(2), 203-212.

Rammelt, C. (2018). Infrastructures as catalysts: Precipitating uneven patterns of development from large-scale infrastructure investments. Sustainability, 10(4), 1286.

Rapetti, M. (2013). Macroeconomic policy coordination in a competitive real exchange rate strategy for development. Journal of Globalization and Development, 3(2), 1-31.

Razazadehkarsalari, A., Haghir, F., & Behrooznia, A. (2011). The effect of exchange rate fluctuations on real GDP in Iran. American Journal of Scientific Research, 26, 6-18.

Rodrik, D. (1998). Why do more open economies have bigger governments? Journal of Political Economy, 106(5).

Romer, P. M. (1990). Endogenous technological change. Journal of Political Economy, 98(1), S71-S102.

Romer, D. (1993). Openness and inflation: theory and evidence. The quarterly journal of economics, 108(4), 869-903.

Romer, P. M. (1986). Increasing returns and long-run growth. Journal of political economy, 94(5), 1002-1037.

Saungweme, T., & Odhiambo, N. M. (2022). Does Public Debt Granger-Cause Inflation In Tanzania? A Multivariate Analysis. International Economics/Economia Internazionale, 75(1).

Sen, K. (2013). The political dynamics of economic growth. World Development, 47, 71-86.

Senadza, B., & Diaba, D. D. (2017). Effect of exchange rate volatility on trade in Sub-Saharan Africa. Journal of African Trade, 4(1), 20-36.

Sidek, N. Z. M., & Asutay, M. (2021). Do government expenditures and institutions drive growth? Evidence from developed and developing economies. Studies in Economics and Finance, 38(2), 400-440.

Silvia, E., Sihotang, N. V., & Sihotang, D. (2023). Causality Analysis of Inflation and Economic Growth Using the Error Correction Model (ECM). Indonesia Accounting Research Journal, 11(1), 23-36.

Solow, R. M. (1956). A contribution to the theory of economic growth. The quarterly journal of economics, 70(1), 65-94.

Tarawalie, A. B., & Kamara, F. (2022). Inflation and growth nexus: An estimate of the threshold level of inflation in Sierra Leone. Applied Economics and Finance, 9(2), 1-12.

Tarschys, D. (1975). The growth of public expenditures nine modes of explanation. Scandinavian political studies.

World Bank (2019). The World Bank Annual Report 2019. Ending Poverty, Investing in Opportunity (Vol. 1 of 3) (English). Washington, D.C.: World Bank Group.

Toh, K. (2016). Emerging growth economies in sub-Saharan Africa. The American Economist, 61(2), 229-244.

Touzani, A., & Brahim, A. (2025). Empirical Analysis of the Impact of Exchange Rates on Economic Growth in Emerging Countries: Case of Morocco. International Journal of Economics and *Financial Issues*, *15*(2), 411.

Utouh, H. (2024). The impact of trade liberalization on the performance of Tanzania's export sector–a time series analysis from 1980 to 2019. Acta Scientiarum Polonorum. Oeconomia, 23(1), 25-42.

Utouh, H. M. (2025). The dynamics of trade liberalization, export performance, and economic growth in Tanzania: a time series analysis 1980–2020. Journal of Social and Economic Development, 27(3), 957-983.

Utouh, H. M., & Kitole, F. A. (2024). Forecasting effects of foreign direct investment on industrialization towards realization of the Tanzania development vision 2025. Cogent Economics & Finance, 12(1), 2376947.

Utouh, H. M., & Kitole, F. A. (2025). The impact of fiscal and monetary policy on economic growth and structural transformation in Tanzania. Cogent Economics & Finance, 13(1), 2499013.

Wondemu, K. A., & Potts, D. J. (2016). The impact of the real exchange rate changes on export performance in Tanzania and Ethiopia. African Development Bank Group Working Paper Series. No 240. http://www.afdb.org/en/documents/publications/working-paper-series/

Yabu, N., & Kessy, N. J. (2015). Appropriate threshold level of inflation for economic growth: evidence from the three founding EAC countries. Applied Economics and Finance, 2(3), 127-144.

Yaghmaian, B. (1994). An empirical investigation of exports, development, and growth in developing countries: Challenging the neoclassical theory of export-led growth. World Development, 22(12), 1977-1995.

Zellner, A. (1979). Statistical analysis of econometric models. Journal of the American Statistical Association, 74(367), 628-643.

Zhu, A., & Pollin, R. (2005). Inflation and economic growth: A cross-country non-linear analysis. Beyond inflation targeting: Assessing the impacts and policy alternatives.

Zouhar, Y., Jellema, J., Trabelsi, M., & Lustig, N. (2021). Public expenditure and inclusive growth-a survey (No. 2021/083). International Monetary Fund.