International Journal of Business Management and Economic Review

Vol. 1, No. 04; 2018

ISSN: 2581-4664

THE CAUSALITY EFFECTS OF MACROECONOMIC FACTORS ON ECONOMIC GROWTH IN TANZANIA

Vicent Stanslaus[1] and Gwahula Raphael[2]

[1](BA-Economics, MIB, MSc Economics)-Assistant Lecturer, The Open University of Tanzania, Faculty of Business Management, Department of Marketing and Entrepreneurship

[2]Lecturer, The Open University of Tanzania, Faculty of Business Management, Department of Accounting and Finance.

ABSTRACT

This study assessed the causal effects of macroeconomic factors of economic growth in Tanzania. The factors under study include GDP, inflation, money supply (M3) and government expenditure. The study was motivated by the Granger-causality method which unlike other methods on similar studies underscores the importance of multiple causations of economic variables over and above normal relationships modeling; it combines the four macro-economic variables in a multiple vausation modeling through Vector Auto Regressive (VAR) models. The study used STATA software to analyse the data. It also used VAR, Unit root test, OLS, multivariate co integration test and the Granger causality test.

The main findings of the study reveal that inflation rate has a significant effect on the economic growth in Tanzania. This effect was shown to be negative, thus inflation has ill effects on the economic growth. Money supply has a significant effect on economic growth, this effect was shown to be declining, and as money supply declined so did economic growth decline. Government expenditures decline leads to economic growth increase. The effect is inversely proportional. This finding was as well statistically significant. The study was also able to statistically measure and establishes that inflation rate; money supply, government expenditure and economic growth granger cause each other as indicated in the analysis. All the results were statistically significant.

The government through its financial and economic policy planning organs such as the central bank using monetary and fiscal policies need to take into account the effects and causes of each of these variables.

Keyword: Economic growth, inflation, Money supply (M3), Government expenditure

1. INTRODUCTION

Economic growth refers to the quantitative increase in the Gross domestic product, or gross national product of a country. The formula formula for GDP comprises of consumption expenditure, investment expenditure, government expenditure, and the net factor income from abroad, that is the difference between export and import(Mbulawa, 2015).Therefore GDP=C+I+G+(X- M).Several factors may affect this relationship. Such factors may include inflation rate, interest rate, government expenditure, and or money supply. The discussion on the key drivers of economic growth had been ongoing and it is still far from over. Several researches on economic growth had been undertaken in both theoretical and applied work. The primary

Vol. 1, No. 04; 2018
ISSN: 2581-4664

objective of macroeconomic policy among others is to ensure economic stability and growth (Mbulawa, 2015).

Also the argument on what fundamentally determines economic growth is also rising. Different authors have figured out different macroeconomic determinants of economic growth. The neoclassical economists for example, focused on the growth model by Solow which assigns importance to investment and the theory of endogenous growth which assigns importance on human capital and innovation. Noting Ghosh and Phillips (1998) who hypothesizes that high inflation positively affects the economic growth note that the relationship between inflation and economic growth remains inconclusive, several empirical studies confirm the existence of either a positive or negative relationship between these two macroeconomic variables.

Mubarik (2005) found that low and stable inflation promotes economic growth and vice versa. Shitundu and Luvanda, (2000)concluded that inflation has been harmful to economic growth in Tanzania. Fischer (1993) institute a significant negative association between rising prices and economic growth.Written reports on growth have suffered from model uncertainty as theory fails to present a proper empirical model.Also, there is no vigorous conclusion on whether the determinants have negative or positive effects on economic growth.

2. THEORETICAL AND EMPIRICAL EVIDENCE

Classical Growth Theory

The Classical economist championed by the works of Adam Smith, David Ricardo, and Karl Marx among others as cited in Sindano (2014). They considered a supply side driven growth model. Supply is specified as a function of land, labor, and capital. As a result, output growth is driven by population growth, investment growth, and land growth, as well as the increase in the overall productivity. Smith assumed a self-reinforcing growth (increasing return to scale) and that savings creates investment, hence growth, therefore, he saw income distribution as being one of the most important determinants of how fast (or slow) a nation should grow.

The Neoclassical Growth Theory

The theory was introduced by Ramsey (1928) but it was Solow (1956) who put forth its most popular model. Assuming exogenous technological change, constant returns to scale, substitutability between capital and labour and diminishing marginal productivity of capital, the neoclassical growth models have made three important stances. The fist stance is that increase in the capital-to-labour ratio which is investment and savings ratio is the key source of economic growth. The second stance is that economies will eventually reach a state at which no new increase in capital will create economic growth, also referred to as steady state, unless there are technological improvements to enable production with fewer resources.

Keynesian Theory

This is another theory linking inflation, interest rate, money supply and economic growth. Keynesian theory provided the AD-AS framework which is a more comprehensive model for linking inflation to growth. The theory also states that money supply increases affect inflation through interest rate movements(Yabu1 andKessy, 2015).Sindano (2014) Keynesians attributed inflation more to demand pressures within an economy. This affect model of AD=AS inflation initially tend to positively affect economic growth but eventually turns negative.

Monetarism Theory

Vol. 1, No. 04; 2018
ISSN: 2581-4664

Milton Friedman is the founder of the monetary theory. Thetheory tends to concentrate on the importance of (domestic or international) money supply and on policies to control money supply growth. The monetarist argueargue that money is a close substitute for real assets (houses, land, etc.) and financial assets (bank deposits, treasury bills, bonds, etc.) and that any extra cash balances realized from increased money supply will be spent on those assets rather than held as idle money balances. This situation will give rise to excess demand for assets, which will cause prices to rise, thereby ultimately leading to increased inflation (Mamo, 2012; Yabu1and Kessy, 2015).

Empirical Literature Review

This part presents the different studies related to the topic under study. These studies are derived both from the world and from Tanzania.Mbulawa S, (2015) conducted a study on Macroeconomic Determinants of Economic Growth in Zimbabwe. The study used a Vector error correction approach and the finding of the study indicated that inflation and openness had a significant negative and positive impact on economic growth respectively. Inflation converges to long run equilibrium with growth and causal relationships were found among other variables in the short term.Another study was carried out by Denbel et al (2016). The study was conducted to find out the relationship between inflation, money supply and economic growth in Ethiopia. The study used Cointergration and causality analysis, as well as Johansen co integration test. The key findings of the study revealed that inflation is a monetary phenomenon in Ethiopia and inflation is negatively and significantly affected by economic growth. This means that economic growth affect inflation and not inflation affecting economic growth.

Hossain (2012) conducted a study in Bangladesh which aimed at finding out the long run relationship between inflation and economic growth over the period starting from 1978 to 2010. A stationarity test was carried out using the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests and The result of the Co-integration test showed that for the periods, 1978-2010, there was no co-integrating relationship between inflation and economic growth for Bangladeshi data. The author made further efforts to check the causality relationship that exists between the two variables by employing the VAR-Granger causality at two different lag periods and results showed the same at different lags.

Also Kari et al (2015) conducted a study in Bangladesh to find out the Impact of key Macroeconomic factors on Economic Growth. The study used VAR Co-integration Analysis and the findings suggested that market capitalization, foreign direct investment and real interest rate have impact on economic growth in the long run, but in short run it does not have any predictable behavior.Mbulawa(2015)also conducted a study in Botswana to find out the Effects of Macroeconomic Variables on Economic Growth. The study usedVector error correction model and Vector Autoregression techniques and the findings revealed that Foreign Direct Investment (FDI) and inflation had a positive effect on economic growth but the key drivers of economic growth was its previous performance and FDI flows explaining 89% and 8% of variations respectively.

Yabu et al (2015) investigated the appropriate threshold level of for economic growth: evidence from the three founding EAC countries. The study used the non-linear quadratic model and regression. The finding of the study showed that the averagerate of inflation beyond 8.46 percent

Vol. 1, No. 04; 2018
ISSN: 2581-4664

has negative and significant impact on economic growth. For individual countries, findings from the Seemingly Unrelated Regression (SUR), which treats each country separately, showed that the optimal levels of inflation for Kenya, Tanzania and Uganda are 6.77 percent, 8.80 percent and 8.41 percent, respectively, beyond which inflation starts exerting cost on economic growth.

Carter et al (2013) did a study on Government Expenditure and Economic Growth in a Small Open Economy. The study used Dynamic Ordinary Least Squares and the Unrestricted Error Correction Model and the findings revealed that total government spending produces a drag on economic growth, particularly in the short-run. Another study was conducted by Oluluet al (2014) on Government Expenditures and Economic Growth: The Nigerian Experience. The study used ordinary least square (OLS), Augmented Dickey Fuller (ADF) and the findings indicated that there is an inverse relationship between government expenditures on health and economic growth; while government expenditure on education sector, is seen to be insufficient to cater for the expending sector in Nigeria. The study also discovered that government expenditure in Nigeria could increase foreign and local investments.

Agalega and Antwi(2013) did their study on the Impact of Macroeconomic Variables on Gross Domestic Product: Empirical Evidence from Ghana. The study used multiple linear regressions to the method of analysis. It was found out that there exists a fairly strong and positive correlation between GDP, Interest rate and Inflation, but Inflation and Interest rate could only explain movement in GDP by only 44 percent. The study further established that, there existed positive relationship between inflation and GDP and a negative relationship between interest rate and GDP.

Taiwo (2011), conducted a study on Government Expenditure and Economic Development: Empirical Evidence from Nigeria. The study used Ordinary Least Square (OLS) technique and Durbin Watson unit root test as the method for data analysis and the findings indicated the absence of serial correlation and that all variables incorporated in the model were non-stationary at their levels. In an attempt to establish long-run relationship between public expenditure and economic growth, the result reveals that the variables are co integrated at 5% and 10% critical level. The findings show that there is a positive relationship between real GDP as against the recurrent and capital expenditure.

Olorunfemi and Adeleke (2013) studied Money Supply and Inflation in Nigeria: Implications for National Development. The study used Vector Auto Regressive (VAR) model and causality test. The findings revealed that money supply and exchange rate were stationary at the level while oil revenue and interest rate were stationary at the first difference. Results from the causality test indicated that there exists a unidirectional causality between money supply and inflation rate as well as interest rate and inflation rate. The causality test indicated that it runs from money supply to inflation, from the interest rate to inflation and from interest rate to money supply.

Ume et al, (2016) conducted a study in Nigeria which aimed at Modelling the Long Run Relationship between Inflation and Economic Growth Using the Engel and Granger Approach for the data staring From Nigeria 1985 To 2013. The findings revealed evidence in favour of co integration between inflation and economic growth. Likewise, estimates from the error correction model provide evidence to show that the proxy for inflation and GDP series converge to a long-run equilibrium at a reasonably fast rate. The result points to the fact that the moderate inflation in the system can accelerate economic growth. Kapunda and Topera(2013) conducted a

Vol. 1, No. 04; 2018
ISSN: 2581-4664

study on public expenditure composition and economic growth in Tanzania: Socio-economic Policy Implications. The study used Ordinary Least Square method using 1965-2010 data. The findings of the study indicated that the factors which contribute positively and significantly to economic growth are capital expenditure and terms of trade.

Kasidi F&Mwakanemela K, (2013) did a study on the impact of inflation on economic growth, a case study of Tanzania. The study used Correlation coefficient and co-integration technique Coefficient of elasticity. The results suggest that inflation has a negative impact on economic growth. The study also revealed that there was no co-integration between inflation and economic growth during the period of study. No long-run relationship between inflation and economic growth in Tanzania.

Equally Odhiambo, (2012) analyzed the short-run and long-run causal relationship between Economic growth, investment and inflation in Tanzania. He used the ARDL-bounds testing approach to analyse the data. The findings of the study indicate the unidirectional causal flow from inflation to economic growth without any feedback response.

3. METHODOLOGY

Model Specification

Following existing studies on the effects of macroeconomic factors on economic growth(e.g. Mbulawa, 2015; Denbel et al., 2016) and several others**,** the study employed the Granger causality test and the VAR model. The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. A time series *X* is said to Granger-cause *Y* if it can be shown, usually through a series of t-tests and F-tests on lagged values of *X* (and with lagged values of *Y* also included), that those *X* values provide statistically significant information about future values of *Y*.

Granger defined the causality relationship based on two principles: The cause happens prior to its effect and the cause has *unique* information about the future values of its effect.

Given these two assumptions about causality, Granger proposed to test the following hypothesis for identification of a causal effect of X on Y:

$$\mathbb{P}[Y(t+1) \in A \mid \mathcal{I}(t)] \neq \mathbb{P}[Y(t+1) \in A \mid \mathcal{I}_{-X}(t)], \quad \ldots\ldots. (1)$$

where $\mathbb{P}$ refers to probability, A is an arbitrary non-empty set, and $I(t)$and $\boldsymbol{I_{-X}(t)}$ respectively denote the information available as of time ***t***in the entire universe, and that in the modified universe in which **X** is excluded. If the above hypothesis is accepted, we say that **X**Granger-causes **Y.** The multiple linear regression models in this study is used to study the relationship between a dependent variable and one or more independent variables**.**

The model was formulated in the following form;

Vol. 1, No. 04; 2018
ISSN: 2581-4664

$$\Delta LRGDP_t += \alpha + \sum_{i=1}^{n} \beta_i \Delta LRGDP_{t-i} + \sum_{i=0}^{n} \delta_{1i}$$

$$\Delta LM3_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta LINF_{t-i} + \sum_{i=0}^{n} \delta_{3i} \Delta LGEXP_{t-i} + \theta_1 LRGDP_{t-1} + \theta_2 LMs_{t-1} + \theta_3 LINF_{t-1} + \theta_4 LGE$$

$$XP_{t-1} \ldots\ldots (1)$$

Where,

$\boldsymbol{\Theta s}$ are parameters of the long run relationship variables, $\boldsymbol{\beta i}$ and $\boldsymbol{\delta i}$ are matrices of parameters

LRGDP Natural Logarithm of Real Gross Domestic Product (Economic Growth)

LM3 Natural Logarithm of Money Supply

LINF Natural Logarithm of Inflation

LGEXP Natural Logarithm of Government Expenditure

α is the vector of constants/trend, n represents maximum lags. Thus the first part of the equation with βi and δi represents the short run dynamics of the model whereas the parameters θ_1 and θ_2 represents the long run relationship. The null hypothesis of the model was;

H_1: $LRGDPt = LM3t = LINFt = LGEXPt = 0$ there is no long run relationship against

H_0: $LRGDPt \neq LM3t \neq LINFt \neq LGEXPt \neq 0$ there is a long run relationship.

4. FINDINGS AND DISCUSSION

Unit Root Tests/ Stationarithy Test

It is argued that, the majority of economic and financial series contain a single unit root, although some are stationary and consumer prices have been argued to have 2 unit roots. In the process we use the ADF tests to assess:

H0: Series contains a unit root (not stationary),H1: Series is stationary

Gross Domestic Product (GDP)

The variable Gross Domestic Product (GDP) was assessed for stationarity and found to be non-stationarity. Two methods were used, the ADF test was applied and the graphical method was employed. The first graph on the left indicated that the series was non-stationary. The variable was transformed by first differencing (middle graph) but could not be stationary. So the next transformation was done, which involved a second differencing (graph on the right).

Vol. 1, No. 04; 2018

ISSN: 2581-4664

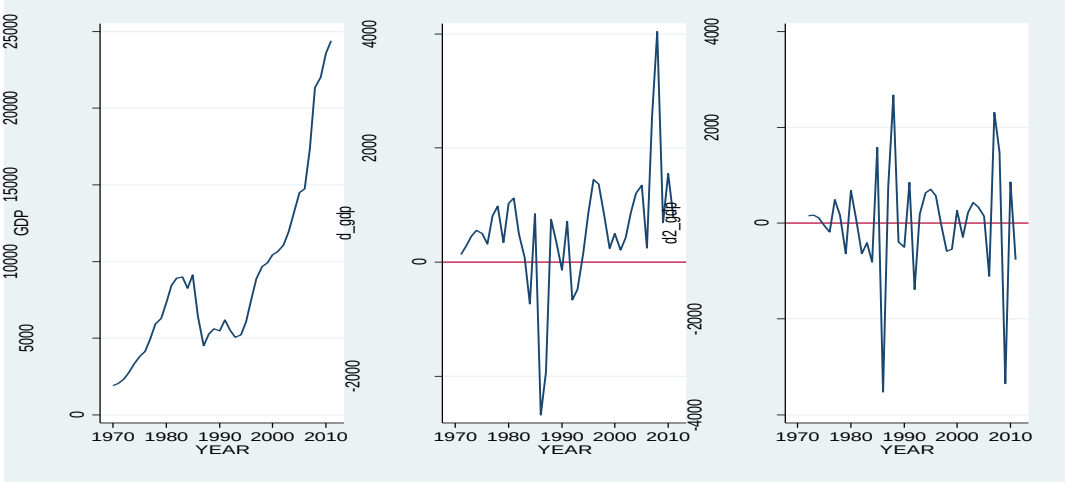

Figure 4.1: Gross Domestic Product

Source: Data Analysis (2017)

When the last transformed series (d2_gdp) was tested forstationarity (ADF test) (Table 4.1) it was found to be stationary at 0.0091 level of statistically significance.

Table 4.1: ADF-Test for GDP

Augmented Dickey-Fuller test for unit root — Number of obs = 37

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.988	-4.270	-3.552	-3.211

MacKinnon approximate p-value for Z(t) = 0.0091

D.d2_gdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d2_gdp						
L1.	-1.917494	.480825	-3.99	0.000	-2.896902	-.9380853
LD.	.4511405	.3455538	1.31	0.201	-.2527296	1.155011
L2D.	.0262596	.2177328	0.12	0.905	-.4172477	.4697668
_trend	3.026396	17.26186	0.18	0.862	-32.13486	38.18765
_cons	-35.81736	400.8675	-0.09	0.929	-852.3577	780.723

Source: Data Analysis (2017)

Government Expenditure (GEXP)

The variable Government expenditure (GEXP) was assessed for stationarity and found to be non-stationarity. As previously, two methods were used to assess it, the ADF test was applied and the graphical method was employed. The first graph on the left indicated the series was non-stationary. The variable was transformed by first differencing (middle graph) but could not be stationary. So the next transformation was done, which involved a second differencing (graph on the right). The last graph indicated that the series was stationary.

Vol. 1, No. 04; 2018

ISSN: 2581-4664

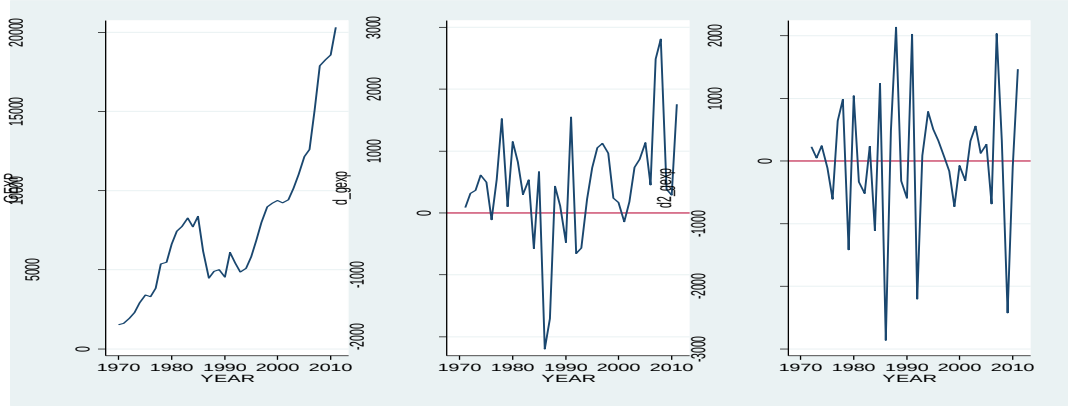

Figure 4.2: Government Expenditure

Source: Data analysis (2017).

When the last transformed series (d2_gexp) was tested forstationarity (ADF test) (Table 4.2) it was found to be stationary at 0.0009 level of statistically significance.

Table 4.2: ADF-Test for GEXP

Augmented Dickey-Fuller test for unit root — Number of obs = 37

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.650	-4.270	-3.552	-3.211

MacKinnon approximate p-value for Z(t) = 0.0009

D.d2_gexp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d2_gexp						
L1.	-2.077549	.446811	-4.65	0.000	-2.987673	-1.167425
LD.	.5411844	.3297086	1.64	0.111	-.1304101	1.212779
L2D.	.0477107	.1936902	0.25	0.807	-.3468233	.4422447
_trend	5.890109	15.31269	0.38	0.703	-25.30082	37.08104
_cons	-89.38135	359.2415	-0.25	0.805	-821.1323	642.3696

Source: Data Analysis (2017)

Inflation (INF)

The variable inflation rate (INF) was examined for stationarity and it was non-stationarity. As before, two methods were used to assess it, the ADF test was applied and the graphical method was employed. The first graph on the left indicated the series was non-stationary. The variable was transformed by first differencing (graph on the right) and the graph indicated that the series was stationary.

Vol. 1, No. 04; 2018
ISSN: 2581-4664

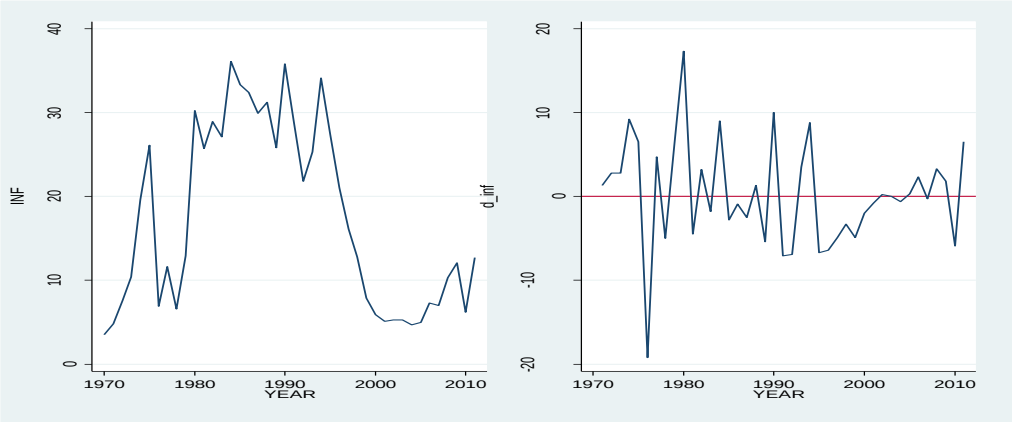

Figure 4.3: Inflation Rate

Source: Data analysis (2017).

When the last transformed series (d_inf) was tested forstationarity (ADF test) (Table 4.3) it was found to be stationary at 0.0065 level of statistically significance.

Table 4.3: ADF-Test for INF

Augmented Dickey-Fuller test for unit root — Number of obs = 38

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.091	-4.260	-3.548	-3.209

MacKinnon approximate p-value for Z(t) = 0.0065

D.d_inf	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d_inf						
L1.	-1.457693	.3563567	-4.09	0.000	-2.182706	-.7326795
LD.	.2265752	.2754804	0.82	0.417	-.3338939	.7870443
L2D.	.0995554	.1778508	0.56	0.579	-.2622849	.4613956
_trend	-.0993117	.1038866	-0.96	0.346	-.3106706	.1120472
_cons	2.22943	2.493718	0.89	0.378	-2.844077	7.302938

Source: Data analysis (2017).

Money Supply (M3)

Money supply was assessed for stationarity. It was found to be non-stationary. The graph on the top left corner indicated that series behavior. The graph on the top right was at the first transformation through first differencing. The graph at the lower left was the second transformation and then the graph at the lower right was the third transformation through third differencing which was able to make the series stationary.

Vol. 1, No. 04; 2018

ISSN: 2581-4664

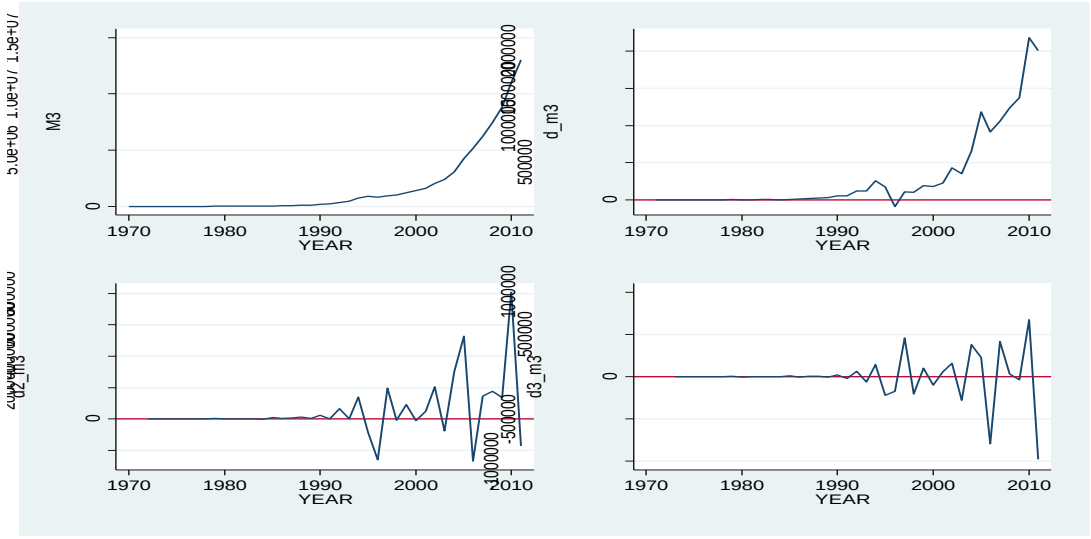

Figure 4.4:Money Supply
Source: Data Analysis (2017).

The ADF test (table 4.3) indicated that the series was stationary at third transformation. The test was significant at 0.0002. Thus it was able to use this series for further analysis as were the other three mentioned above.

Table 4.4: ADF-Test for M3

Augmented Dickey-Fuller test for unit root — Number of obs = 36

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-5.011	-4.279	-3.556	-3.214

MacKinnon approximate p-value for Z(t) = 0.0002

D.d3_m3	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
d3_m3						
L1.	-2.944569	.5876751	-5.01	0.000	-4.14314	-1.745997
LD.	.8393296	.4397894	1.91	0.066	-.0576269	1.736286
L2D.	.0641861	.2250923	0.29	0.777	-.3948926	.5232648
_trend	2567.439	3239.779	0.79	0.434	-4040.133	9175.011
_cons	-29341.13	73014.35	-0.40	0.691	-178254.9	119572.6

Source: Data Analysis (2017).

This set of graphs summarizes the transformed series or variables which are namely “d2_gdp” for GDP, “d2_gexp” for GEXP, “d_inf” for INF and “d3_m3” for M3. These are respective transformed series for Gross Domestic Product, Government Expenditure, Inflation rate and Money Supply.

Vol. 1, No. 04; 2018

ISSN: 2581-4664

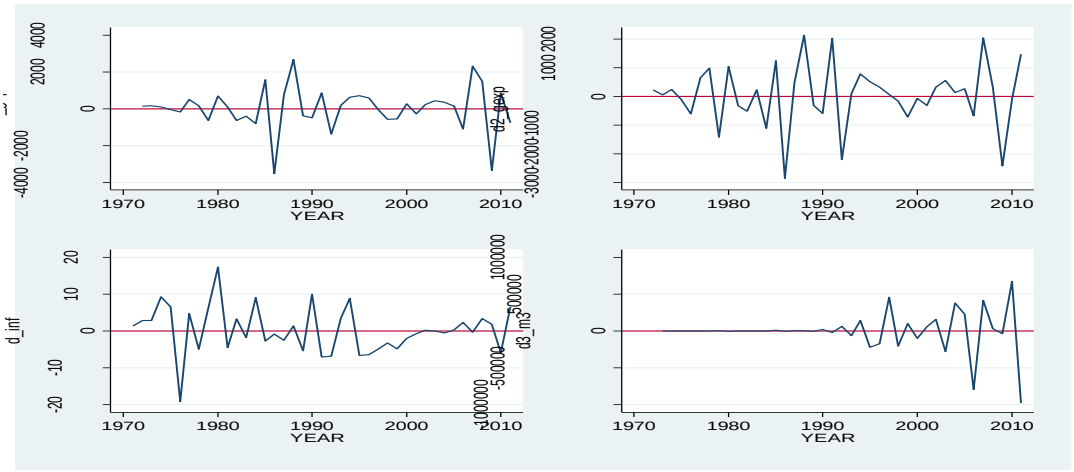

Figure 4.5: Transformed Variables

4.3.3 VAR Lag Order Selection

The analysis employed a STATA special command to help select the orders, VAR (P). Too many lags could increase the error in the forecasts; too few could leave out relevant information. Experience, knowledge and theory are usually the best way to determine the number of lags needed. There are, however, information criterion procedures to help one come up with a proper number. Three commonly used are: Schwarz's Bayesian Information Criterion (SBIC), the Akaike's Information Criterion (AIC), and the Hannan and Quinn Information Criterion (HQIC). All these are reported by the command 'varsoc' in Stata. The selection criteria requires that we select the number of order which have the lowest AIC/BIC in this case referring to the table below, the number of order/ lags are supposed to be 8 as indicated by lines with stars (-180.659). But based on FPE we select 7 lags. The later criterion was taken due to data limitations.

Table 4.5: Order Selection

Selection-order criteria
Sample: 1983 - 2011 Number of obs = 29

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-963.366				1.1e+24	66.7149	66.774	66.9035
1	-946.854	33.024	16	0.007	1.1e+24	66.6796	66.9749	67.6226
2	-920.389	52.931	16	0.000	5.6e+23	65.9579	66.4894	67.6552
3	-903.916	32.946	16	0.008	6.6e+23	65.9252	66.6931	68.3769
4	-869.405	69.022	16	0.000	2.8e+23	64.6486	65.6527	67.8547
5	-849.394	40.021	16	0.001	4.9e+23	64.372	65.6124	68.3325
6	-742.288	214.21	16	0.000	6.7e+21*	58.0888	59.5655	62.8036
7	2586.86	6658.3	16	0.000	.	-170.404	-168.691	-164.935
8	2735.56	297.4	16	0.000	.	-180.659*	-178.946*	-175.19*
9	2644.67	-181.78	16	.	.	-174.391	-172.678	-168.922
10	2717.14	144.93*	16	0.000	.	-179.389	-177.676	-173.92

Endogenous: d2_gdp d2_gexp d_inf d3_m3
Exogenous: _cons

Source: Data Analysis (2017).

4.3.4 Models Selection

VAR-Models themselves do not allow us to make statements about causal relationships. This holds especially when VAR-Models are only approximately adjusted to an unknown time series

Vol. 1, No. 04; 2018
ISSN: 2581-4664

process, while a causal interpretation requires an underlying economic model. However, VAR-Models allow interpretations about the dynamic relationship between the indicated variables.
VAR is one of the most commonly used models for applied macro econometric analysis and forecasting in central banks. Our analysis adopted an unrestricted VAR includes all variables in each equation. Note that a restricted VAR might include some variables in one equation, other variables in another equation. Sims argued that the conventional models were restricted VARs, and the restrictions had no substantive justification. Based on incomplete and/or non-rigorous theory or intuition Sims argued that economists should instead use unrestricted models, e.g. VARs. He proposed a set of tools for use and evaluation of VARs in practice. In my case each equation was estimated by Ordinary Least Squares (OLS). The VAR model can be represented as follows through a system of equations:

$$y_t = u_1 + a_{11}y_{t-1} + a_{12}y_{t-2} + \cdots + a_{1p}y_{t-p} + b_{11}x_{t-1} + b_{12}x_{t-2} + \cdots + b_{1p}x_{t-p} + c_{11}v_{t-1} + c_{12}v_{t-2} + \cdots + c_{1p}v_{t-p} + d_{11}w_{t-1} + d_{12}w_{t-2} + \cdots + d_{1p}w_{t-p} + e_{1t}$$

$$x_t = u_2 + a_{21}y_{t-1} + a_{22}y_{t-2} + \cdots + a_{2p}y_{t-p} + b_{21}x_{t-1} + b_{22}x_{t-2} + \cdots + b_{1p}x_{t-p} + c_{21}v_{t-1} + c_{22}v_{t-2} + \cdots + c_{1p}v_{t-p} + d_{21}w_{t-1} + d_{22}w_{t-2} + \cdots + d_{2p}w_{t-p} + e_{2t}$$

$$v_t = u_3 + a_{31}y_{t-1} + a_{32}y_{t-2} + \cdots + a_{3p}y_{t-p} + b_{31}x_{t-1} + b_{32}x_{t-2} + \cdots + b_{3p}x_{t-p} + c_{31}v_{t-1} + c_{32}v_{t-2} + \cdots + c_{3p}v_{t-p} + d_{31}w_{t-1} + d_{32}w_{t-2} + \cdots + d_{3p}w_{t-p} + e_{3t}$$

$$w_t = u_4 + a_{41}y_{t-1} + a_{42}y_{t-2} + \cdots + a_{4p}y_{t-p} + b_{41}x_{t-1} + b_{42}x_{t-2} + \cdots + b_{4p}x_{t-p} + c_{41}v_{t-1} + c_{42}v_{t-2} + \cdots + c_{4p}v_{t-p} + d_{41}w_{t-1} + d_{42}w_{t-2} + \cdots + d_{4p}w_{t-p} + e_{4t}$$

Where; y, x, v and w are variable series for GDP, GEXP, INF and M3 respectively. While; a, b, c, and d are respective coefficients for the variables. And u and e are constants and error terms respectively. The variables are lagged for a total of p periods.

4.3.5 Estimation for the Model

The models demanded that we select 8 lags, but we were limited by the data so we have to select only seven (7) lags.After running VAR the following were the results: the model summary is presented first below which indicated that the model fitted our data well because the AIC and other related statistics were small.

Table 4.6 VAR summary

```
Vector autoregression

Sample:  1980 - 2011                    No. of obs      =        32
Log likelihood = -295.9894              AIC             =  25.74934
FPE            =  2.17e+08              HQIC            =  27.51054
Det(Sigma_ml)  =  1271.343              SBIC            =  31.06263
```

Source: Data Analysis (2017).

The table 4.7 summarizes statistics for each model. The GDP, GEXP and M3 models had the greatest explanatory power. The r-squared were well above 95% which indicated that these

Vol. 1, No. 04; 2018
ISSN: 2581-4664

models factors were powerful in explaining these series.

Table 4.7:Models and Equations Summary Statistics

Equation	Parms	RMSE	R-sq	chi2	P>chi2
d2_gdp	29	592.486	0.9794	1520.947	0.0000
d2_gexp	29	656.3	0.9689	995.3621	0.0000
d_inf	29	8.46101	0.7839	116.0963	0.0000
d3_m3	29	162974	0.9725	1132.98	0.0000

Source: Data Analysis (2017).

Table 4.8: VAR Outputs

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
d2_gdp						
d2_gdp						
L1.	-.6429433	.2082427	-3.09	0.002	-1.051091	-.2347952
L2.	-1.950603	.3037224	-6.42	0.000	-2.545888	-1.355318
L3.	-.9939287	.6649544	-1.49	0.135	-2.297215	.309358
L4.	-2.102684	.9134372	-2.30	0.021	-3.892988	-.3123804
L5.	-2.744412	.7794194	-3.52	0.000	-4.272046	-1.216778
L6.	-1.374161	.7222332	-1.90	0.057	-2.789712	.0413899
L7.	-1.319778	.5991217	-2.20	0.028	-2.494035	-.1455211
d2_gexp						
L1.	1.483757	.3265898	4.54	0.000	.8436527	2.123861
L2.	1.749004	.3188164	5.49	0.000	1.124135	2.373873
L3.	1.472123	.7623908	1.93	0.053	-.0221353	2.966382
L4.	1.791378	1.04826	1.71	0.087	-.2631743	3.84593
L5.	3.319947	.6383702	5.20	0.000	2.068764	4.571129
L6.	1.229204	.6733775	1.83	0.068	-.0905912	2.549
L7.	1.50803	.4981864	3.03	0.002	.5316029	2.484458
d_inf						
L1.	70.0162	18.3737	3.81	0.000	34.00442	106.028
L2.	-164.0325	19.82537	-8.27	0.000	-202.8895	-125.1755
L3.	26.83814	26.41373	1.02	0.310	-24.93182	78.6081
L4.	-10.57496	24.17577	-0.44	0.662	-57.95859	36.80867
L5.	23.0339	9.048611	2.55	0.011	5.298945	40.76885
L6.	-77.3601	13.24905	-5.84	0.000	-103.3277	-51.39244
L7.	97.40566	33.2348	2.93	0.003	32.26665	162.5447
d3_m3						
L1.	.000793	.0005905	1.34	0.179	-.0003644	.0019504
L2.	.0030066	.0007893	3.81	0.000	.0014596	.0045535
L3.	.0055094	.0010165	5.42	0.000	.003517	.0075017
L4.	.0004289	.0008882	0.48	0.629	-.0013119	.0021697
L5.	.0026579	.0012009	2.21	0.027	.0003042	.0050116
L6.	.0019299	.0008632	2.24	0.025	.000238	.0036218
L7.	.0013838	.0006323	2.19	0.029	.0001446	.002623
_cons	12.22524	43.94419	0.28	0.781	-73.90379	98.35426

Source: Data Analysis (2017)

The analysis indicated that most of the coefficients in the models were statistically significant. GDP lags have a negative effect on GDP. Prior years GDP causes a decline in future years GDP. GEXP is positively related to GDP all lags indicated the same effects. On the other hand inflation rates had mixed effects indicating a cyclical effect over time on GDP. M3 was positively influencing GDP but the magnitude of effect was very small.

GDP showed a negative effect on GEXP indicating that declines in GDP contributes to an in increase in GEXP. However, GEXP lags has a positive effect on GEXP. The effects of INF and

Vol. 1, No. 04; 2018
ISSN: 2581-4664

M3 were mixed. The effects sometimes were positive or negative as indicated in table 4.9

Table 4.9:VAR Outputs

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
d2_gexp						
d2_gdp						
L1.	.2075353	.2306714	0.90	0.368	-.2445724	.659643
L2.	-1.283075	.3364348	-3.81	0.000	-1.942475	-.6236747
L3.	-.8562998	.7365733	-1.16	0.245	-2.299957	.5873573
L4.	-2.422678	1.011819	-2.39	0.017	-4.405806	-.4395493
L5.	-2.768213	.8633667	-3.21	0.001	-4.460381	-1.076045
L6.	-1.206141	.8000213	-1.51	0.132	-2.774154	.3618716
L7.	-1.552835	.66365	-2.34	0.019	-2.853565	-.2521046
d2_gexp						
L1.	.0756263	.3617651	0.21	0.834	-.6334203	.7846729
L2.	1.032444	.3531546	2.92	0.003	.3402741	1.724615
L3.	1.259803	.8445041	1.49	0.136	-.3953945	2.915001
L4.	2.459769	1.161163	2.12	0.034	.183931	4.735606
L5.	2.516782	.7071259	3.56	0.000	1.130841	3.902723
L6.	.9928293	.7459036	1.33	0.183	-.4691149	2.454774
L7.	1.527651	.5518436	2.77	0.006	.4460575	2.609245
d_inf						
L1.	28.08797	20.35264	1.38	0.168	-11.80247	67.9784
L2.	-108.3049	21.96066	-4.93	0.000	-151.347	-65.2628
L3.	24.14501	29.25862	0.83	0.409	-33.20083	81.49085
L4.	-30.26746	26.77962	-1.13	0.258	-82.75454	22.21962
L5.	2.350273	10.02319	0.23	0.815	-17.29482	21.99537
L6.	-25.52206	14.67603	-1.74	0.082	-54.28656	3.242439
L7.	-10.0852	36.81435	-0.27	0.784	-82.24001	62.06961
d3_m3						
L1.	-.0007505	.0006541	-1.15	0.251	-.0020325	.0005315
L2.	.0019393	.0008743	2.22	0.027	.0002257	.0036528
L3.	.0034607	.001126	3.07	0.002	.0012538	.0056676
L4.	.0006927	.0009838	0.70	0.481	-.0012356	.002621
L5.	-.0001515	.0013302	-0.11	0.909	-.0027587	.0024557
L6.	.0002879	.0009562	0.30	0.763	-.0015862	.002162
L7.	-.000428	.0007004	-0.61	0.541	-.0018008	.0009447
_cons	17.08192	48.67719	0.35	0.726	-78.32363	112.4875

GDP has a negative relationship with INF. GEXP was mostly positively related to INF. INF lags and M3 had mixed relationship on INF. Most of these results were statistically significant. (Please refer table 4.10).

Table 4.10: VAR Outputs

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]

Vol. 1, No. 04; 2018

ISSN: 2581-4664

d_inf						
d2_gdp						
L1.	.0015177	.0029738	0.51	0.610	-.0043109	.0073463
L2.	-.0077672	.0043373	-1.79	0.073	-.0162682	.0007338
L3.	-.0324951	.0094959	-3.42	0.001	-.0511067	-.0138835
L4.	-.0363232	.0130444	-2.78	0.005	-.0618897	-.0107568
L5.	-.0273618	.0111305	-2.46	0.014	-.0491772	-.0055464
L6.	-.0354512	.0103139	-3.44	0.001	-.055666	-.0152364
L7.	-.0147907	.0085558	-1.73	0.084	-.0315597	.0019783
d2_gexp						
L1.	-.0147925	.0046639	-3.17	0.002	-.0239335	-.0056515
L2.	.0086076	.0045529	1.89	0.059	-.0003159	.017531
L3.	.0380389	.0108873	3.49	0.000	.0167001	.0593777
L4.	.0387169	.0149697	2.59	0.010	.0093768	.0680569
L5.	.0199145	.0091163	2.18	0.029	.002047	.037782
L6.	.0321984	.0096162	3.35	0.001	.013351	.0510457
L7.	.0094914	.0071144	1.33	0.182	-.0044525	.0234353
d_inf						
L1.	-.3868744	.2623858	-1.47	0.140	-.9011412	.1273924
L2.	1.151364	.2831165	4.07	0.000	.5964661	1.706262
L3.	-1.398952	.3772017	-3.71	0.000	-2.138253	-.65965
L4.	-.464209	.3452424	-1.34	0.179	-1.140872	.2124536
L5.	.4371412	.1292188	3.38	0.001	.183877	.6904054
L6.	.0366632	.1892032	0.19	0.846	-.3341682	.4074947
L7.	-1.534366	.47461	-3.23	0.001	-2.464585	-.6041476
d3_m3						
L1.	-9.67e-06	8.43e-06	-1.15	0.251	-.0000262	6.86e-06
L2.	-.0000135	.0000113	-1.19	0.233	-.0000355	8.64e-06
L3.	-3.18e-06	.0000145	-0.22	0.826	-.0000316	.0000253
L4.	.0000328	.0000127	2.58	0.010	7.90e-06	.0000576
L5.	-.0000177	.0000171	-1.03	0.303	-.0000513	.0000159
L6.	-.0000111	.0000123	-0.90	0.370	-.0000352	.0000131
L7.	2.28e-07	9.03e-06	0.03	0.980	-.0000175	.0000179
_cons	.0651234	.6275456	0.10	0.917	-1.164843	1.29509

GDP was positively related to M3. GEXP was negatively related to M3. INF and M3 lags had mixed relationship with M3. Most of these results were statistically significant (please refer table 4.11).

Table 4.11: VAR Outputs

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]

Vol. 1, No. 04; 2018
ISSN: 2581-4664

d3_m3						
d2_gdp						
L1.	395.6885	57.28082	6.91	0.000	283.4201	507.9568
L2.	597.7027	83.54421	7.15	0.000	433.959	761.4463
L3.	252.2253	182.9075	1.38	0.168	-106.2667	610.7173
L4.	836.7964	251.257	3.33	0.001	344.3416	1329.251
L5.	518.2234	214.3931	2.42	0.016	98.02067	938.4261
L6.	-29.00979	198.663	-0.15	0.884	-418.3821	360.3625
L7.	607.2635	164.799	3.68	0.000	284.2634	930.2636
d2_gexp						
L1.	-696.9718	89.83429	-7.76	0.000	-873.0437	-520.8998
L2.	-553.4082	87.69609	-6.31	0.000	-725.2894	-381.527
L3.	-319.6978	209.7091	-1.52	0.127	-730.72	91.32435
L4.	-985.4106	288.3425	-3.42	0.001	-1550.551	-420.2698
L5.	-437.9301	175.595	-2.49	0.013	-782.09	-93.77023
L6.	-160.3456	185.2244	-0.87	0.387	-523.3787	202.6875
L7.	-681.348	137.035	-4.97	0.000	-949.9316	-412.7644
d_inf						
L1.	24393.26	5054.01	4.83	0.000	14487.58	34298.94
L2.	8834.051	5453.319	1.62	0.105	-1854.258	19522.36
L3.	-39061.37	7265.563	-5.38	0.000	-53301.61	-24821.12
L4.	20484.46	6649.972	3.08	0.002	7450.757	33518.17
L5.	9433.422	2488.98	3.79	0.000	4555.11	14311.73
L6.	-30081.54	3644.384	-8.25	0.000	-37224.4	-22938.67
L7.	9249.39	9141.819	1.01	0.312	-8668.246	27167.03
d3_m3						
L1.	-.954032	.1624292	-5.87	0.000	-1.272387	-.6356767
L2.	-1.762578	.2171008	-8.12	0.000	-2.188088	-1.337068
L3.	-.4720731	.2796136	-1.69	0.091	-1.020106	.0759595
L4.	-.48968	.2443097	-2.00	0.045	-.9685183	-.0108417
L5.	-.1864624	.3303264	-0.56	0.572	-.8338902	.4609654
L6.	-.222313	.2374469	-0.94	0.349	-.6877003	.2430743
L7.	.5287009	.1739194	3.04	0.002	.1878252	.8695766
_cons	18390.3	12087.62	1.52	0.128	-5301.009	42081.61

4.4. Impulse Response Function

It is normally noted that it is difficult to interpret the large number of coefficients in the VAR model. The main tools for interpretation are normally the "Impulse responses functions". The impulse responses are the time path of in this case GDP, GEXP, INF and M3 in response to shocks emanating from the error terms. They are functions of the VAR estimated coefficients. Generally speaking in k-variable system there are k^2impulse response functions. Thus with 4-variables we have 16 response functions as indicated below through graphs. "Impulse variable" means the sources of the shock. "Response variable" means the variable being affected. For

Vol. 1, No. 04; 2018

ISSN: 2581-4664

instance from the graphs: upper left is the impact of GDP shocks on time-path of GDP, upper right is the impact of GDP shocks on the time path of GEXP.

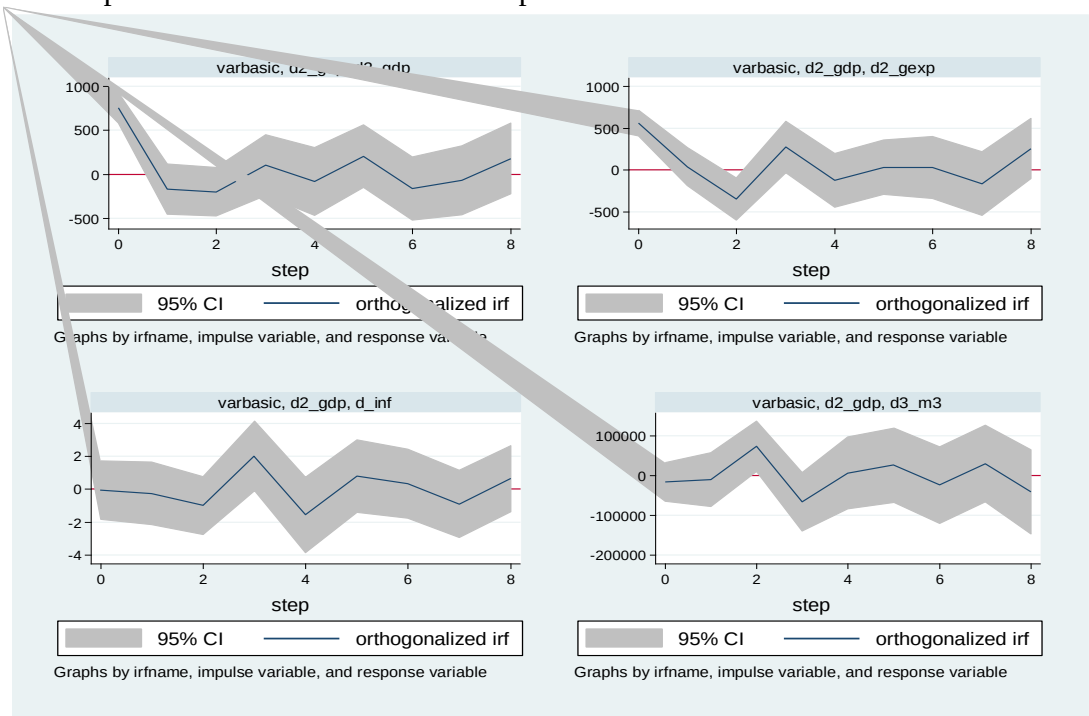

Figure 4.6:GDP Impulse-Response

Source: Data Analysis (2017).

The graphs above indicate the shocks from GDP on itself and other variables: GEXP, INF and M3. The analysis indicated that the responses are similar for INF and GEXP, that is whenever GDP is negative INF and GEXP are also negative. Declines in GDP leads to declines in INF and GEXP. However, M3 presents a reversed response pattern, when GDP is positive M3 is negative. Generally the shocks produce a modulated response on all four variables without peaks and troughs.

Vol. 1, No. 04; 2018
ISSN: 2581-4664

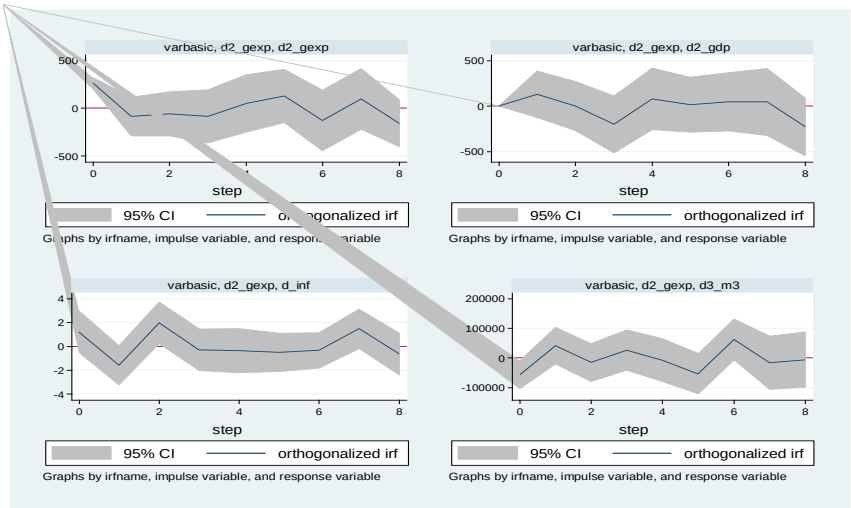

Figure 4.7:GEXP Impulse-Response

Source: Data Analysis (2017).

The variable GEXP, when taken as the impulse variable indicated some differentiated effects on the response variables, namely GDP, INF, M3 and on GEXP itself. For inflation and GDP the effect at step 4 to 6 is almost nonexistent as indicated by the flat lines at those segments. However, M3 indicated a reversed pattern, when GEXP is positive M3 is negative and vice versa. The decline in GEXP leads to a decline in INF but a rise in M3 and GDP.

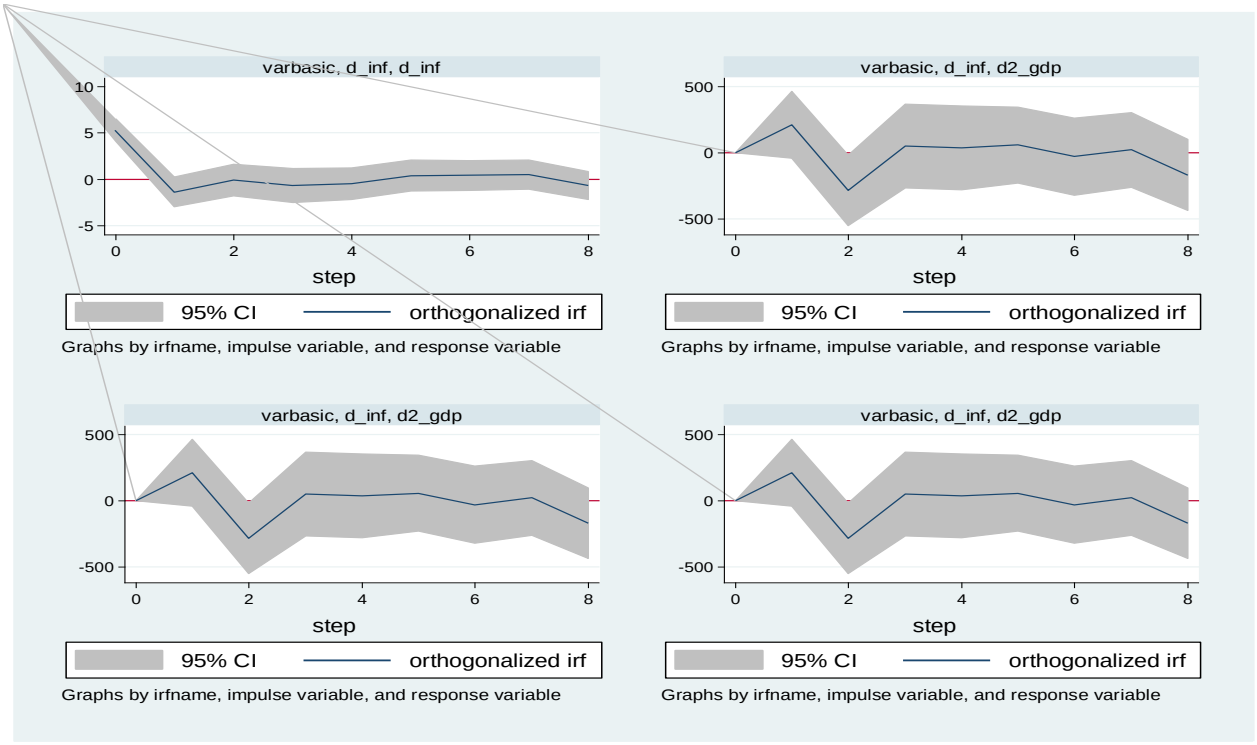

Figure 4.8:INF Impulse-Response

Vol. 1, No. 04; 2018
ISSN: 2581-4664

Source: Data Analysis (2017).

The shocks of INF on INF are almost zero for the most part on its time-path. The first two steps in the time path of the variables and the last step are the only ones that seem to vary. The INF shock is pronounced at the beginning of each series. The effect on the response variables is the same for all four variables, indicating that INF has a uniform effect/shock on these variables. As indicated by the pattern of the sock from INF, as INF declines (negative) all the other three response variables, namely GDP, GEXP and M3 are rising (positive).

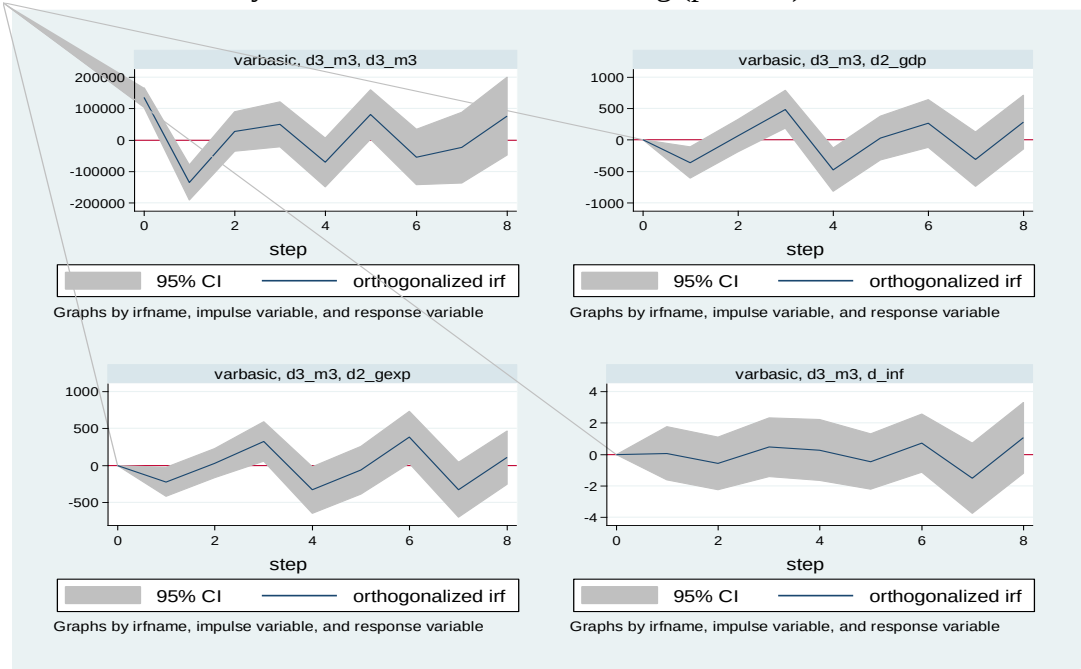

Figure 4.9: M3 Impulse-Response
Source: Data analysis (2017).

The pattern for M3 is interesting, when M3 is negative GDP and GEXP are also negative. These shocks seem to be cyclical over time paths of these variables, they are never stable they keep on rising and falling. However, the shocks in M3 do not have pronounced effect on INF. INF seems to stable and flat over a long time path and then fluctuates.

4.5. Testing Procedures

4.5.1 Granger Causality Test

In time series analysis, sometimes, we would like to know whether changes in a variable will have an impact on changes on other variables. Granger causality test is a technique for determining whether one time series is useful in forecasting another. It can determine whether there is causality relationship between variables.

Table 4.12:Granger- Causality Test

Vol. 1, No. 04; 2018

ISSN: 2581-4664

Equation	Excluded	chi2	df	Prob > chi2
d2_gdp	d2_gexp	217.19	7	0.000
d2_gdp	d_inf	297.55	7	0.000
d2_gdp	d3_m3	200.37	7	0.000
d2_gdp	ALL	997.43	21	0.000
d2_gexp	d2_gdp	171.08	7	0.000
d2_gexp	d_inf	150.5	7	0.000
d2_gexp	d3_m3	141.5	7	0.000
d2_gexp	ALL	631.43	21	0.000
d_inf	d2_gdp	49.031	7	0.000
d_inf	d2_gexp	50.692	7	0.000
d_inf	d3_m3	31.91	7	0.000
d_inf	ALL	108.45	21	0.000
d3_m3	d2_gdp	124.54	7	0.000
d3_m3	d2_gexp	128.41	7	0.000
d3_m3	d_inf	104.83	7	0.000
d3_m3	ALL	173.03	21	0.000

Source: Data Analysis (2017)

The analysis indicated that GDP was granger causing GEXP, INF and M3. Similarly, GEXP was granger causing GDP, INF and M3. Also, INF was granger causing GDP, GEXP and M3. Lastly, it also indicated that M3 was granger causing GDP, INF and GEXP. This indicated that as each variable changed it has an effect on other variables. These results are important and crucial because of their statistical significance. (Refer table above).

4.5.2 Multivariate Cointegration Test

The order of integration of the variables,it is noted that all the variables used have to be of the same order of integration. We have the following cases: All the variables are I(0) (stationary): one is in the standard case, that is VAR in level.If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series are said to be cointegrated. In many time series, integrated processes are considered together and they form equilibrium relationships.

Table 4.13: ADF-CointegrationTest

Augmented Dickey-Fuller test for unit root — Number of obs = 31

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.233	-3.709	-2.983	-2.623

MacKinnon approximate p-value for Z(t) = 0.0182

Source: Data analysis (2017).

Before the vector error correction model (VECM) can be formed and used, there first has to be evidence of cointegration, given that cointegration implies a significant error correction term, cointegration can be viewed as an indirect test of long-run causality. It is possible to have evidence of long-run causality, Cointegration refers to the fact that two or more series share a stochastic trend (Stock & Watson). Engle and Granger (1987) suggested a two step process to test for cointegration (an OLS regression and a unit root test), the EG-ADF test. Based on this suggestion this study's test indicated that multiple integration of the four variables does exist.

Vol. 1, No. 04; 2018
ISSN: 2581-4664

(Refer to table 4.10).
Rejecting the null hypothesis of non-stationarity concludes "cointegration relationship" does exist. Thus, our four variables, namely: GDP, GEXP, INFL and M3 are integrated of order zero, I(0).Based on the ADF test we are able to establish that the four series are integrated because the test was statistically significant (0.0182).

4.6.2 Discussion of Findings

The analysis indicated that most of the coefficients in the models were statistically significant. GDP showed a negative effect on GEXP indicating that declines in GDP contributes to an in increase in GEXP. However, GEXP lags have a positive effect on GEXP. The effects of INF andM3 were mixed. The effects sometimes were positive or negative as indicated in table 4.9 bellow. GDP has a negative relationship with INF. GEXP was mostly positively related to INF. INF lags and M3 had mixed relationship on INF. Most of these results were statistically significant. (Please refer table 4.10 below). GDP was positively related to M3. GEXP was negatively related to M3. INF and M3 lags had mixed relationship with M3. Most of these results were statistically significant (please refer table 4.11 above).
The analysis indicated that the responses are similar for INF and GEXP, that is whenever GDP is negative INF and GEXP are also negative. Declines in GDP leads to declines in INF and GEXP. However, M3 presents a reversed response pattern, when GDP is positive M3 is negative. Generally the shocks produce a modulated response on all four variables without peaks and troughs.The variable GEXP, when taken as the impulse variable indicated some differentiated effects on the response variables, namely GDP, INF, M3 and on GEXP itself. For inflation and GDP the effect at step 4 to 6 is almost nonexistent as indicated by the flat lines at those segments. However, M3 indicated a reversed pattern, when GEXP is positive M3 is negative and vice versa. The decline in GEXP leads to a decline in INF but a rise in M3 and GDP.
The shocks of INF on INF are almost zero for the most part on its time-path. The first two steps in the time path of the variables and the last step are the only ones that seem to vary. The INF shock is pronounced at the beginning of each series. The effect on the response variables is the same for all four variables, indicating that INF has a uniform effect/shock on these variables. As indicated by the pattern of the sock from INF, as INF declines (negative) all the other three response variables, namely GDP, GEXP and M3 are rising (positive).
The pattern for M3 is interesting, when M3 is negative GDP and GEXP are also negative. These shocks seem to be cyclical over time paths of these variables, they are never stable they keep on rising and falling. However, the shocks in M3 do not have pronounced effect on INF. INF seems to be stable and flat over a long time path and then fluctuates.
The current study indicated that inflation rates had mixed effects indicating a cyclical effect over time on GDP. These results are comparable to many other mixed results from different contexts. Madhukar and Nagarjuna (2011) confirms our findings where he found that inflation had a positive impact on the economic growth. Noting Ghosh and Phillips (1998) who hypothesizes that high inflation positively affects the economic growth note that relationship between inflation and economic growth remains inconclusive, several empirical studies confirm the existence of either a positive or negative relationship between these two macroeconomic variables. Mubarik (2005) found that low and stable inflation promotes economic growth and vice versa. Shitundu

Vol. 1, No. 04; 2018
ISSN: 2581-4664

and Luvanda, (2000)concluded that inflation has been harmful to economic growth in Tanzania. Fischer (1993) found a significant negative association between inflation and economic growth.
On the other hand out results indicated that, GDP caused GDP over time, compared to Umaru and Zubairu, (2012), their results suggested that all the variables in the unit root model were stationary and the results of causality revealed that GDP caused inflation and not inflation causing GDP. The results also revealed that inflation possessed a positive impact oneconomic growth through encouraging productivity and output level. Mallik and Chowdhury, (2001) found two results: First, the relationship between inflation and economic growth is positive and statistically significant for Bangladesh, Pakistan, India and Sri Lanka.
Ghosh and Phillips, (1998) maintain that while there is no doubt about the fact that high inflation is bad for growth, there is less agreement about the effect of moderate inflation, they found a statistically and economically significant inverse relationship between inflation and economic growth which holds robustly at all but the least inflation rates. Quartey, (2010) using the Johansen co-integration methodology, he found that there is a negative impact of inflation on growth. Barro, (1995) results suggested that an increase in average inflation of 10 percent per annum reduces the growth rate of real GDP by 0.2 to 0.3 percent perannum. Hasanov, (2010) indicated that there was non-linear relationship between inflation and economic growth in the Azerbaijani economy
Kasidi and Mwankanemela (2013) results showed that there was negative relationship between inflation and economic growth in Tanzanian economy. The results implied that as the general level of prices increases, the GDP decreases. This means that an increase in the general price level (inflation rate)by 1% results in a decrease of GDP by 18.305%. This could imply that an increase in the generalprice level was harmful to economic growth

The results in the current study, when compared to Shitundu and Luvanda (2000) findings who used the Least Trimmed Squares (LTS) method, which detects regression outliers and produces robust regression, to examine the impact of inflation on economic growth in Tanzania. The empirical results obtained suggest that inflation has been harmful to economic growth in Tanzania. Thus it is worth noting that the combined evidence point to the fact that inflation is detrimental to the Tanzania economy and has had controversial effects on GDP.

Rashid and Sara (2010) contend that many studies show that government expenditure is positively related with economic growth, but due to high expenditure most of the developing countries are facing the problem of fiscal deficit. Zafar and Mustafa (1998) found increase in government expenditures is negatively correlated with the economic growth. On the other hand, Barro (1996)in another study found that the growth rate is enhanced by lower inflation, lower government consumption
Other related studies indicate the mixed, contrasting and comparable results, for instances; Metin (1991) analyzes the empirical relationship between inflation and budget deficit for Turkish economy through multivariate co integration analysis. He found that the scaled increase in government expenditure significantly effects the inflation in Turkey. Catao and Terrones (2003) examined the relationship between fiscal deficit and inflation. A strong positive relationship between fiscal deficit and inflation among high-inflation and developing country group were studied. Soloman and Wet (2004) examined the effect of budget deficit on inflation in Tanzania and found hat economy experienced a high inflation rate accompanied by high fiscal deficit.

Vol. 1, No. 04; 2018
ISSN: 2581-4664

The current study indicated that GEXP is positively related to GDP all lags indicated the same effects. These results are comparable to the results of Benneth (2007) who showed that government expenditures are the important in increasing GDP. Jamshaid, (2010) examined the relationship between economic growth and government expenditure, both at bivariate (aggregate) and multivariate (disaggregate) systems and concluded that economic growth causes government expenditure at bivariate level and also supported that increase in GDP causes growth in government expenditure.

Compared to these comparable studies the current study results indicated that GDP was granger causing GEXP, INF and M3. Similarly, GEXP was granger causing GDP, INF and M3. Also, INF was granger causing GDP, GEXP and M3. Lastly, it also indicated that M3 was granger causing GDP, INF and GEXP. This indicated that as each variable changed it has an effect on other variables. These results are important and crucial because of their statistical significance.

5.0 CONCLUSIONS AND POLICY RECOMMENDATIONS

The conclusions are drawn based on the research objectives which are accordingly listed below: The general objective of the study was to find out the effects of macroeconomic factors on economic growth in Tanzania**.**In order to achieve the main objective, the following specific objectives guided the study and these are the results summaries in terms of how the objectives were attained or failed to be attained:

The study found that inflation rate has a significant effect on the economic growth in Tanzania. This effect was shown to be negative, thus inflation has ill effects on the economic growth.Money supply has a significant effect on economic growth, this effect was shown to be declining, as money supply declined so did economic growth decline. To find out the effects of government expenditure on economic growth in Tanzania The study found that government expenditure decline leads to economic growth increase. The effect is inversely proportional. This finding was as well statistically significant.

5.1 Policy Recommendations

The government through its financial and economic policy planning organs such as the central bank need to take into account the effects and causation of each of these variables namely: inflation rate, government expenditure, money supply and economic growth on each other for a proper planning of the economy. Inflation rates seem to have uniform impacts on the rest of the variables. Thus, its effects need to be monitored for and regulated to avoid the effects it might cause to the economy particularly economic growth. There should be a plan to reduce government expenditures. The results indicated that as government expenditure declined economic growth increased. Critical policy issues need to be addressed to take into account of this effect.

5.2 Areas for Future Research

Studies need to analyze government expenditure by analyzing their categories separately to assess independent effects on economic growth. The effects of money supply and inflation on other aspects and variables of the economy such as investments and interest rates need to be studied.

Vol. 1, No. 04; 2018

ISSN: 2581-4664

REFERENCES

Ali A, Saifullah K, &Binti Kari F (2015), The Impact of key Macroeconomic factors on Economic Growth of Bangladesh: A VAR Co-integration Analysis, International Journal of Management Excellence Volume 6 No. 1

Antwi S &Agalega E (2013). The Impact of Macroeconomic Variables on Gross Domestic Product: Empirical Evidence from Ghana. International Business Research; Vol. 6, No. 5. Published by Canadian Center of Science and Education

Antwi Samuel, E. F. E., Mills, A., & Zhao, X. (2013). The impact of macroeconomic factors on economic growth in Ghana. A cointegration Analysis. *International Journal of Academic Research in Accounting,Finance and Management Science, 3*(1), 35-45.

Ayyoub M, Chaudhry I.S and Imran F (2011). Does inflation matter for sectoralGrowth in Pakistan? An empirical analysis.

Bank of Tanzania (Annual Report), Various Issues

Barro R J (2013), Inflation and economic growth, Annals of economics and finance 14-1, 85-109 (2013).

Barro, R. (1990). Government Spending in a Simple Model of Endogenous Growth, Journal of Political Economy. 98, 103-125.

Barro, R. (1995). Inflation and economic growth: NBER Working Paper Vol. 53, No. 26, pp. 166-176.

Barro, R. J. (1995), "Inflation and Economic Growth", National Bureau of Economic Research (NBER) Working Paper No. 5326 (October).

Carter J, Craigwell R & Lowe S (2013), Government Expenditure and Economic Growth in a Small Open Economy: A Disaggregated Approach. JEL Classification No: E62, E210, H50

Catao, L.; Terrones, M. 2003. Fiscal deficits and Inflation, IMF working paper series, wp/03/65

Denbel F.S, Ayen Y.W, and Regasa T.A (2016), The Relationship between Inflation, Money Supply and Economic Growth in Ethiopia: Co integration and Causality Analysis.

Dickey, D.A. and Fuller, W.A. (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", Econometrica, Vol. 49, pp. 1057-1072.Economics 70: 65–94.

Fischer, S. (1993). The Role of Macroeconomic Factors in Growth. *Journal of MonetaryEconomics*, Vol. 47, No. 5, pp. 485-512.

Ghosh, A. and Phillips, S. (1998). Warning: Inflation May Be Harmful to Your Growth, IMF StaffPapers, Vol. 45, No. 4, pp. 672-710.

Hasanov, F. (2010). Relationship between Inflation and Economic Growth in Azerbaijani Economy. Is there any Threshold Effect? *Asian Journal of Business and ManagementSciences*, Vol. 1, No. 1, pp. 6-7.

Hossain E, (2012), Inflation and economic growth in Bangladesh, Journal of Arts, Science & Commerce, Vol.– III, Issue–4(2)

International Journal of Scientific and Research Publications, Volume 6, Issue 1

Isfahani R. D, Sameti M &Haghighi H. K (2012). The Effect of Macroeconomic Instability on Economic Growth in Iran. Research in Applied Economics, Vol. 4, No. 3.

Vol. 1, No. 04; 2018

ISSN: 2581-4664

Kapunda S. M ndTopera J. S, (2013). Public expenditure composition and economic growth in Tanzania: Socio-economic Policy Implications

Kasidi F &MwakanemelaK (2013). Impact of inflation on economic growth: a case study of Tanzania. Asian Journal of Empirical Research

Kasidi F and Mwakanemela K (2013), Impact of inflation on economic growth: A case study of Tanzania, Asian Journal of empirical research, 3(4) 2013: 363-380.

Kweka J.P and Morrissey O (2000). Government Spending and Economic Growth in Tanzania, 1965-1996.

Madhukar, S. and Nagarjuna, B. (2011). Inflation and Growth Rates in India and China: APerspective of Transition Economies, *International Conference on Economics and FinanceResearch*, Vol. 4, No. 97 pp. 489-490.

Mallik, G. and Chowdhury, A. (2001). Inflation and Economic Growth: Evidence from Four SouthAsian Countries, *Asian Pacific Development Journal*, Vol. 8, No. 1, pp. 123-135.

Mbulawa S, (2015), Macroeconomic Determinants of Economic Growth in Zimbabwe

Mubarik, A. (2005). Inflation and Growth. An Estimate of the Threshold Level of Inflation inPakistan. SBP- Research Bulletin, Vol. 1, No. 1 pp. 35-43.

Odhiambo N.M (2012). Inflation Dynamics and Economic Growth in Tanzania: A Multivariate Time Series Model. *The Journal of Applied Business Research,* Volume *28, Number 3*

Olorunfemi&Adeleke P (2013). Money Supply and Inflation in Nigeria: Implications for National Development.

Olulu R.M, Erhieyovwe E. K & Andrew (2014). Government Expenditures and Economic Growth: The Nigerian Experience. *Mediterranean Journal of Social Sciences, Vol 5 No 10.*

Quartey, P. (2010). Price Stability and the Growth Maximizing rate of inflation for Ghana,*Business and Economic Journal*, Vol. 1, No. 1, pp. 180-194.

Saunders N.K. M, Lewis P (2012) Research Methods for Business Students

Shitundu, L. and Luvanda, G. (2000). The Effect of Inflation on Economic Growth in Tanzania,*African Journal of Finance and Management*, Vol. 9 No. 1, pp. 70-77.

Solomon, M.; Wet,A., 2004. The Effect of a Budget Deficit on Inflation: The Case of Tanzania, SAJEMS NS, Vol 7, No 1

Solow, R. (1956), A contribution to the theory of economic growth. Quarterly Journal of

Taiwo M &Abayomi T (2011). Government Expenditure and Economic Development: Empirical Evidence from Nigeria. European Journal of Business and Management, Vol 3, No.9

Umaru, A. and Zubairu, J. (2012). The Effect of Inflation on the Growth and Development of theNigerian Economy: An Empirical Analysis, *International Journal of Business and SocialScience*, Vol. 3, No. 10, pp. 187-188.

Ume K. E, Okechukwu C. O, Raph O. M &Izuchukwu O (2016). Modelling the Long Run Relationship between Inflation and Economic Growth Using the Engel and Granger Approach (Evidence From Nigeria 1985 To 2013). *IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 21, Issue 4, Ver. 04*

Yabu N &Kessy N.J (2015), Appropriate threshold level of for economic growth: evidence from the three founding EAC countries. Applied Economics and Finance Vol. 2, No. 3