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IMPLICATIONS OF MACROECONOMIC CONTROLS IN GHANA

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ABSTRACT

Ghana's desire to achieve sustainable economic growth with relatively stable price level pursue both monetary and fiscal policies that could lead to macroeconomic. This study examines the effects of fiscal and monetary policy on economic growth and determine the level of convergence of growth for Ghana by applying structural equation modeling (SEM) using time series data from 2008 to 2017. Both short run and long-run results revealed that the ratio of government spending to private investment was statistically significant and it exerted a positive impact on economic growth, an indication that government expenditure is a key channel through which economic growth can be achieved. It was also revealed that real interest rate which is a monetary policy tool have a negative effect on economic growth in Ghana. The study also revealed that government spending shocks decreases private investment in Ghana, which results in crowding out in the economy. It was recommended that to achieve higher and sustainable economic growth, government must embark on expansionary fiscal policies through investment in infrastructure development to create jobs and generate income tax to finance other developmental projects. Also, the Bank of Ghana must reduce its lending rates to encourage private sector development to enhance growth and development of the economy

1. INTRODUCTION

1.1 Background to the Study

Macroeconomic policy indisputably plays a fundamental role in maintaining sustainable and satisfactory economic atmosphere to achieve faster, stable and sustainable growth. Both developed and developing countries utilize fiscal and monetary policy as tools in promoting growth and macroeconomic stabilization in an economy. Fiscal policy involves the use of government spending and taxes to promote economic growth. According to Adefeso and Mobolaji (2010), fiscal policy helps in decreasing unemployment by creating an enabling environment where all available resources are fully utilized to increase productivity. Also, during periods of economic slowdown, fiscal authorities spur growth by either increasing government spending or reducing taxes and its outcomes are usually described in the context of the budget balance.

Monetary policy on the other hand involves the use of money supply and cost of money in influencing the expected level of economic activity. The main objectives of any monetary policy may include price stability, maintenance of balance of payments equilibrium, creation of employment, output growth, exchange rate stability and sustainable development (Quartey & Afful-Mensah, 2014; Quartey, 2010). To achieve the objective of price stability, Bank of Ghana was granted operational independence to employ policy tools appropriate to stabilize inflation around the medium-term target. The Bank of Ghana's framework for conducting monetary policy is Inflation Targeting (IT), in which the central bank uses the Monetary Policy Rate (MPR) as the primary policy tool to set the monetary policy stance and anchor inflation expectations in the economy (Bank of

Ghana, 2007). Each MPR decision provides a signal of tightening (increase), loosening (decrease) or maintaining (no change) the monetary policy stance.

Nevertheless, these two objectives are not mutually exclusive because the realization of one has implications for the other. Monetarists are of the view that monetary policy is more powerful in promoting macroeconomic stabilization (Friedman & Meiselman, 1963: Elliot, 1975; Rahman, 2005 & Senbet, 2011). This contradicts the Keynesian view (fiscalists) about achieving macroeconomic stability. This contradiction led to several studies on the effect of monetary and fiscal policies on the level of economic growth and the results have remained debatable among economists. Inconclusive results were obtained by bulk of empirical research relating to the relative effectiveness of the two policies which limits the generalization of the results.

1.2 Problem Statement

Ghana in its quest to achieve sustainable economic growth with relatively stable price level pursued both monetary and fiscal policies that could lead to macroeconomic convergence since these policies indisputably play a fundamental role in maintaining sustainable and satisfactory economic atmosphere. However, there is evidence of macroeconomic non-convergence resulting from the relative ineffectiveness of domestic monetary and fiscal policy coordination, which led to Ghana recording persistently high budget deficits, inflation and interest rates. According to Sargent and Wallace (1981), financing budgets through monetization will result in inflation in the economy.

Even though revenue collection improved considerably in the ensuing years, robust expenditure growth meant the budget deficit remained widened (Loloh, 2011). The fiscal

problems were compounded by the collapse of commodity prices and the resulting worsened terms of trade coupled with significant shortfall in donor budgetary support. Although, there are several studies examining the relative effectiveness of monetary and fiscal policies, the empirical findings of these studies are highly mixed. Ali et al., (2008), Adesefo (2010), Senbet (2011), Havi and Enu (2014), found that monetary policy is more effective in promoting economic growth than fiscal policy. However, Chowdury (1986a), Olaloye and Ikhide (1995), found opposite result. In addition, cross-country studies yielded mixed results which this does not allow a generalization about the relative effectiveness of monetary and fiscal policies in influencing economic growth. Some of the differences on the results are much attributed to variable choice and methodology approach employed in the analyses (Senbet, 2011). Despite the demonstrated efficacy of macroeconomic policy in other economies, both policies have not been sufficiently investigated in Ghana to determine the relative effectiveness of these policies on real output. Serious economic distortions can occur if proper investigation of the behavior of these policies in influencing growth is conducted.

To address this issue, the study investigates the effects of fiscal policies and monetary policy on economic growth, this study introduces the ratio of government spending to private investment as a fiscal policy variable and interest rate as a monetary policy variable to investigate the impact of these policy instruments on economic growth to illustrate which policy variable is relatively more effective in promoting growth in Ghana. The study used structural equation modeling (SEM) such as the Vector Autoregressive (VAR)/Vector Error Correction Model (VECM) and co-integration analyses on the selected data. The VAR/VECM model is appropriate for analyzing this

study because its estimates are reliable and superior than time series when analyzing structural relationships. The cointegration analyses provide both short run and long run effects of policy variables on economic growth. The VECM helps determine the speed of adjustment when there is a shock to the system (time required to restore equilibrium). The vector autoregressive (VAR) modeling technique provides impulse response functions of policy shocks to demonstrate convergence of output. Variance decomposition is also conducted to determine the relative contributions of each endogenous variable to the forecast error variance in the model. The rest of the paper is organized as follows. In chapter 2, we present model and estimation methods. In chapter 3, results from empirical analysis of our model is presented, and finally, conclusions of results are presented in chapter 4.

2. MODEL AND ESTIMATION METHODS

2.1 Model

Following Blanchard and Perotti (2002), our basic VAR model is specified as:

$$Z_t = A\left(L,q\right)Z_{t-1} + U_t \tag{1}$$

Where $Z_t \equiv [Y_t, GTI_t, IR_t, IG_t, RP_t]'$ is a six-dimensional vector in logarithm terms of economic growth (Y_t), government spending to private investment ratio (GTI_t), real interest rate (IR_t), inflation gap (IG_t) and risk premium (RP_t) . $U_t \equiv [y_t, gti_t, ir_t, ig_t, rp_t]$ is the corresponding vector of reduced-form errors which in general will have non-zero cross-correlation and $A(L,q)$ is distribute lag polynomial of the coefficients in the model.

In this study, VAR/VECM is adopted rather than SVAR, because a) the model could be correctly specified and exactly identified, b) VECM allows for both short run and long run analysis and c) interpretation of results are simple, yet intuitive. Not adding co-

integrating term would result in loss of efficiency. With VAR/VECM, cointegration restrictions need not be enforced unlike SVAR, which will only be valid if the cointegration restrictions are enforced. In SVARs, theory is used to place restrictions on the contemporaneous correlations and identification is obtain by placing restrictions on the matrices. The VAR model is exactly identified; if we impose additional restrictions on the parameters, it would be an overidentified model.

Consistent with the objectives of the study and in accordance with the literature, the explicit VAR model can be expressed as:

$$Y_t = \beta_0 + \beta_1 Y_{t-k} + \beta_2 GTI_{t-k} + \beta_3 IR_{t-k} + \beta_4 IG_{t-k} + \beta_5 RP_{t-k} + \varepsilon_t \tag{2}$$

The corresponding short-run model for this study is given as:

$$\Delta Y_t = \beta_0 + \sum_{p=1}^{p} \beta_1 \Delta Y_{t-p} + \sum_{p=1}^{q} \beta_2 \Delta GTI_{t-p} + \sum_{p=1}^{r} \beta_3 \Delta IR_{t-p} + \sum_{p=1}^{s} \beta_4 \Delta IG_{t-p} + \sum_{p=1}^{t} \beta_5 \Delta RP_{t-p} + \psi ECT_{t-1} + \nu_t \tag{3}$$

Where Y_t is economic growth, GTI_t is ratio of government spending to private investment, IR_t is interest rate, I_t is inflation gap (US inflation minus Ghana Inflation), RP_t is the log of risk premium of Nigeria, Δ is difference operator and ECT_{t-1} is error correction term lagged one period. Since the focus off the study is on effects of fiscal and monetary policy on growth, we will present long run estimate for equation (5) and its corresponding short run model, equation (6). The coefficients $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the elasticities of the respective variables, with ψ showing the speed of adjustment, β_0 is the drift component, *t* denotes time and ν_t is the stochastic error term.

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3. RESULTS AND DISCUSSIONS

3.1 Results of Unit Root Test

The study employed the Johansen's multivariate approach to co-integration and unit root test to investigate the stationarity properties of the variables. All the variables in the model appear to be non-stationary at levels but became stationary after first differencing and this was verified by the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests. Vector Autoregressive (VAR) models requires the selection of an appropriate lag length because lag length plays a vital role in diagnostic tests as well as in the estimation of VAR models for co-integration, impulse response and variance decomposition. Based on lag length criterion test, the appropriate lag length chosen is 2, which was determined using Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC).

3.2 Granger Causality Test

In investigating the direction of causality between economic growth and the selected macroeconomic variables, the study conducted pair wise Granger causality test using lag 2 and the results are presented in Table 1.

Table 1: Granger Causality Wald Tests

Equation	Excluded	Chi-square	Df	Prob > chi2
Economic growth	Real interest rate	8.8108	2	0.012
Economic growth	All	8.8108	2	0.012
Real interest rate	Economic growth	7.8577	2	0.020
Real interest rate	All	7.8577	2	0.020

Source: Conducted using Stata 13 package.
***, **represent significance at the 1% and 5% respectively.

The results of the Granger causality test in Table 1 shows that interest rate Granger causes economic growth at 5 % level of significance. This means that that real interest rate predicts economic growth in Ghana, implying the existence of a causality through real interest rate to economic growth. This indicates that real interest rate is a critical variable in achieving economic growth. Also, the result revealed evidence of causality between economic growth and real interest rate. It can be seen from the table that economic growth granger cause interest rate at 5 % level of significances and it passes from interest rate to economic growth.

3.3 Test for Cointegration of Economic Growth and Interest rate

For a non-stationary series with a unit root, first differencing appears to provide the appropriate solution to the problem of non-stationarity. But, first differencing will eliminate all the long-run information which is of interest to economists. Johansen (1991) asserted that cointegration can be used to establish the existence of a linear long-term economic relationship among variables and allows us to specify a process of dynamic adjustment among the cointegrated variables in disequilibrated markets. Our results based on both the trace and maximum-Eigen value statistic test revealed that there exists two cointegrating equations in the model. The results of both cointegration relationship are presented in Table 2 and Table 3 below.

Table 2: Long Run VAR Estimates of Economic Growth

Variables	Coefficient	Standard Error	T-statistics	Prob
Real interest rate	-0.055	0.019	-2.94	0.029**
Government spending/private investment	0.448	0.219	2.04	0.027**
Inflation gap	0.043	0.022	1.99	0.042**
Risk Premium	0.191	0.051	3.73	0.008***
Constant	0.024	0.006	3.70	0.005***

Source: Computed Using Stata 13 Package.

The result from economic growth equation shows that the ratio of government spending to private investment which served as a fiscal policy variable was statistically significant and it exerted a positive impact on economic growth. This implies that 1 % increase in the ratio of government spending to private investment would lead to approximately 0.448 % increase in economic growth in the long-run. This is an indication that government expenditure is a key channel through which we can achieve sustained economic growth in Ghana.

Interest rate, a monetary policy variable exerted a negative and significant impact on economic growth. The result shows that a percentage increase in interest rate will decrease economic growth by 0.05 % in the long run. A higher level of interest rate represents distortion of any economy and a sign of financial instability. Inflation gap exert a negative and statistically significant effect on economic growth. The results show that, 1% increase in inflation gap will cause economic growth to increase by 0.043%. The Risk Premium of Nigeria is significant and exert a positive effect on Ghana's economic growth. From the result, 1% increase in Nigeria's risk premium leads to 0.191 % increase in

Ghana's economic growth. This is because a high risk-premium will deter investors from coming to Nigeria and rather choose Ghana, which have a lower risk premium.

Table 3: Long Run VAR Estimates of Real Interest Rate

Variables	Coefficient	Standard Error	T-statistics	Prob
Economic growth	-1.209	1.174	-1.03	0.164
Government spending/private investment	2.373	0.985	2.41	0.021**
Inflation gap	-0.263	0.164	-1.60	0.149
Risk Premium	0.083	0.026	3.25	0.012**
Constant	-0.142	0.947	-0.15	0.185

Source: Computed Using Stata 13 Package

The result from interest rate equation shows that the ratio of government spending to private investment was statistically significant at 0.05 level of significance and it exerted a positive impact on interest rate. This implies that 1 % increase in the ratio of government spending to private investment would lead to approximately 2.373 % increase in interest rate in the long-run. This implies that government spending raises interest rate, a phenomenon that results in crowding out of private investment and low economic growth. High interest rate also causes distortions of the financial sector of the economy.

The Risk Premium is significant and exert a positive effect on Ghana's economic growth. From the result above, 1% increase in Nigeria's risk premium leads to 0.083 % increase in Ghana's economic growth. This is in line with theory, where a high risk-premium raises interest rate levels in the Ghanaian economy.

3.4 Short Run Dynamics (Vector Error Correction Model)

Engle and Granger (1991) argued that when variables are cointegrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be combined to capture both the short-run and long-run relationships. It is expected to be statistically significant with a negative sign. The negative sign implies that any shock that occurs in the short-run will be corrected in the long-run. If the error correction term is greater in absolute value, the rate of convergence to equilibrium will be faster.

Given that our variables are non-stationary but cointegrated, the estimation of the VECM, which included a first differenced VAR with one period, lagged error correction term yielded an over-parameterized model. As the values of the variables are stationary, the model was estimated using the ordinary least squares (OLS). The approach of general-to-specific (GTS) modeling was employed to arrive at a more parsimonious model, where insignificant lagged variables were deleted using the t-ratios. Rutayisire (2010) argued that this process of moving from the general to the specific brings about a simplification of the model that makes estimations more reliable and increases the power of the tests. The results from the vector error correction model are displayed in Table 4 and suggest that the ultimate effect of the previous period's values of economic growth on current values of economic growth in the short-run is positive and significant at lag 2.

Table 4: Results of Vector Error-Correction Model (VECM) of Economic Growth

Variables	Coefficient	Standard Error	T-statistics	Prob
ECT (-1)	-0.338	0.076	-4.41	0.001***
D (Economic growth (-2))	0.272	0.106	2.56	0.020**
D (Real interest rate (-2))	-0.076	0.017	-4.54	0.005**
D Government spending private investment (-1)	0.568	0.233	2.40	0.027**
D (Inflation Gap (-2))	-0.025	0.029	-0.85	0.621
D (Risk Premium (-2))	-0.255	0.122	-2.09	0.038**
Constant	-0.022	0.009	-2.30	0.034**

Source: Conducted using Stata 13 package.

From the economic growth equation, the result shows that the estimated coefficient of the error correction term (ECT) has the expected sign and it is significant. This is an indication of joint significance of the long-run coefficients. According to Kremers et al. (1992) and Bahmani-Oskooee (2001), a relatively more efficient way of establishing cointegration is through the error correction term. From the results in Table 8, the estimated coefficient of the error correction term is -0.338 which implies that that the speed of adjustment is approximately 33.8 % per quarter.

This negative and significant coefficient is an indication that cointegrating relationship exists among the variables. The coefficient on the error correction term (ECT) shows that about 33.8 % of the disequilibrium in economic growth caused by previous years' shocks converges back to the long-run equilibrium in the next quarter. From the study, the variables in the model show evidence of moderate response to equilibrium when shocked in the short-run. It is theoretically argued that a genuine error correction

mechanism exists whenever there is a cointegrating relationship among two or more variables. The rule of thumb is that, the larger the error correction coefficient (in absolute term), the faster the variables equilibrate in the long-run when shocked (Acheampong, 2007). However, the magnitude of the coefficient in this study suggests that the speed of adjusting to long-run changes is slow.

The current value of economic growth is affected by the past quarter values of economic growth. Specifically, economic growth at lag one is significant with a coefficient of 0.272. This is expected because previous year growth and expansion of the economy serves as an indication of prosperity and may attract more investment leading to more growth. Also, the ratio of government spending to private investment exert a positive and significant effect on economic growth at lag 1. Thus, 1% increase in the ratio of government spending to private investment in the previous year will cause growth in economic growth to rise by 0.568 %.

Furthermore, real interest rate exerts a negative and significant effect on economic growth, which confirms the results from the long-run estimation. One % increase in real interest rate in the short run would decrease economic growth by 0.076 %. This result concurs with findings by Jalil and Ma (2008). The risk premium of Nigeria is significant and exert a positive effect on Ghana's economic growth in the short run. The inflation gap, which is the difference between US inflation rate and Ghana's inflation rate show a statistical an insignificance effect on Ghana's economic growth in the short run. This implies that inflation gap does not influence economic growth of Ghana in the short run.

Table 5: Results of Error-Correction Model (VECM) of Real Interest Rate

Variables	Coefficient	Standard Error	T-statistics	Prob
ECT (-1)	-0.280	0.105	-2.65	0.013**
D (Economic growth (-2))	0.713	0.492	0.69	0.259
D (Real interest rate (-1))	0.410	0.167	2.46	0.024**
D Government spending/private investment (-1)	-2.980	1.307	-2.28	0.027**
D (Inflation Gap (-2))	-0.077	0.285	-0.27	0.621
D (Risk Premium (-2))	0.687	0.150	4.58	0.038**
Constant	0.020	0.087	0.23	0.794

Source: Conducted using Stata 13 package.

From the interest rate equation in Table 5, the estimated coefficient of the error correction term is -0.28 which implies that that the speed of adjustment is approximately 28 % per quarter. This is an indication that cointegrating relationship exists among the variables and denotes that about 28% of the disequilibrium in interest rate caused by previous years' shocks converges back to the long-run equilibrium in the next quarter. This is a moderate response to equilibrium when shocked in the short-run.

From the analysis, the previous period interest rate helps in predicting the current value of real interest rate value. Specifically, real interest rate lag 1 exerts a positive effect on the current real interest rate with a coefficient of 0.410. The ratio of government spending to private investment exerts a negative and significant effect on economic growth at lag 1. Thus, one % increase in the ratio of government spending to private investment in the previous year will cause economic growth to fall by 0.298 %. This confirms crowding out in the Ghanaian economy, where excessive government spending increases interest

rates, which decreases private investment and economic growth. Risk Premium of Nigeria and inflation gap are insignificant in the real interest rate equation

3.5 Impulse response functions

It is generally argued that unanticipated shocks in the real sector that arise from fiscal and monetary policies or other sources can lead to disturbances in the real sector of the economy. Considering the response of economic growth to government spending, it is evident from Figure 1 below that any unanticipated increase in government spending will increase the deviation between the short-run equilibrium values of the economic growth and its long-run equilibrium values in the short-term horizon and after the tenth period. The deviation seems to be closing, implying there will be adjustment to equilibrium after government spending shock.

Figure 1: Impulse Response Analysis of Economic Growth

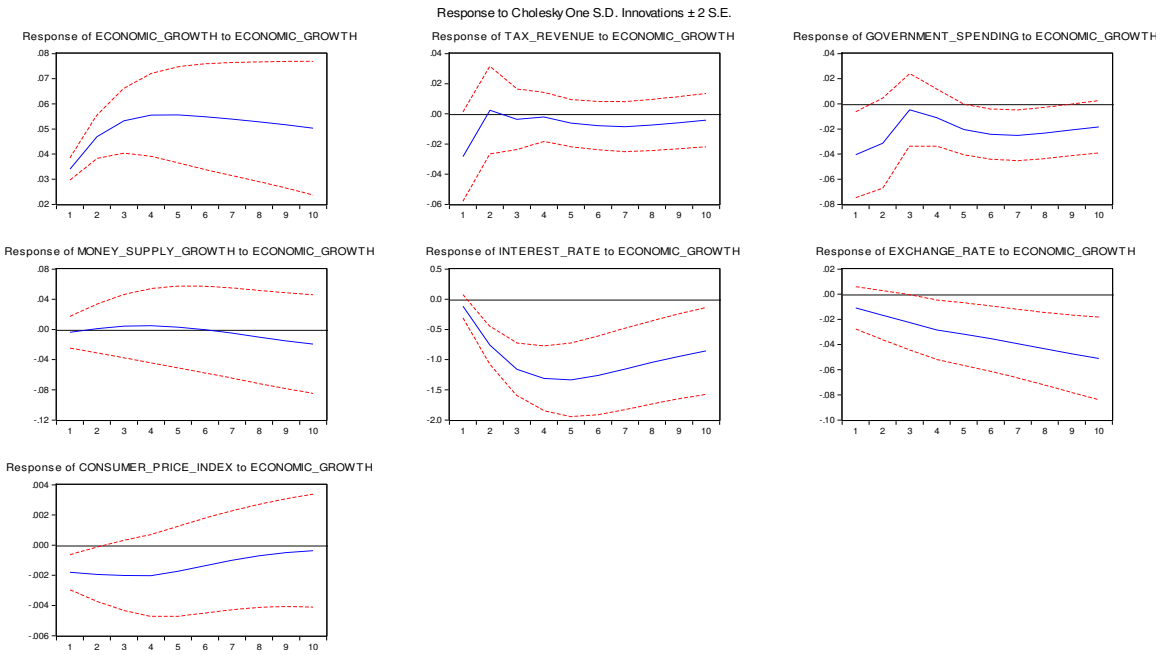
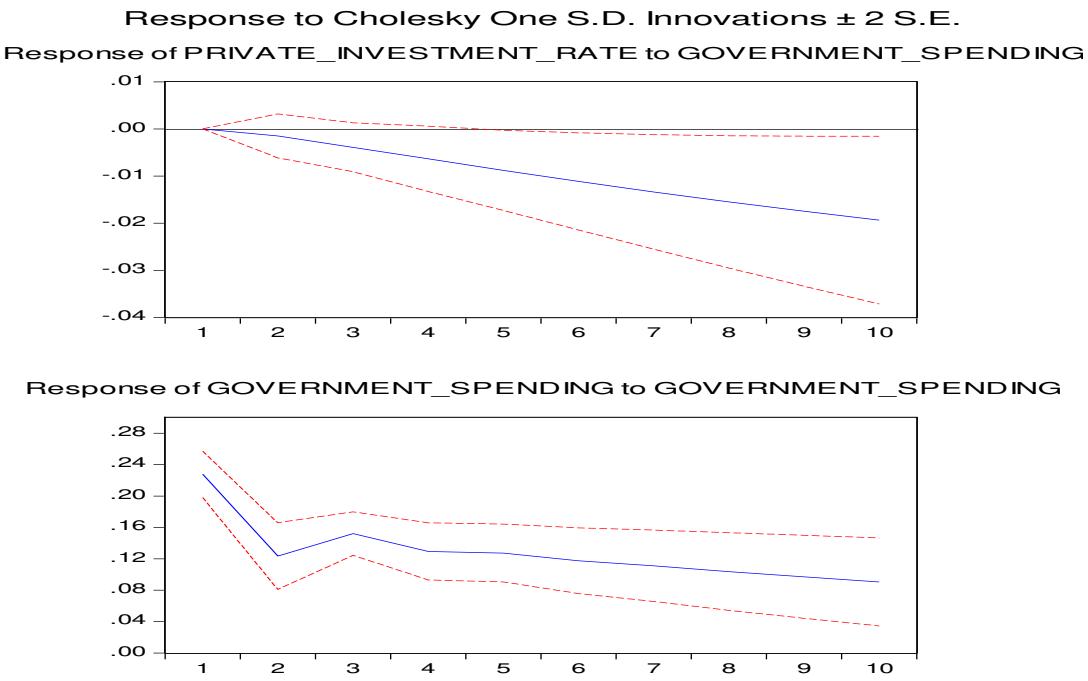


Figure 2: Impulse Response Analysis of Private Investment



In Figure 2 above, the study presented impulse response analysis of investment (GFCF). This is necessary to determine whether government spending crowds out or crowds in investment in Ghana. It can be observed from Figure 4 that unanticipated increase in government spending initially increases the deviation between the short-run equilibrium values of the economic growth and its long-run equilibrium values between the first and second period, but the deviation decreases from third to tenth period and there is no sign of adjustment to equilibrium afterwards. This phenomenon implies that government spending shocks decreases investment, a situation which results in crowding out of investment since increase in government spending means more borrow from domestic economy to finance it expenditure. This results in increase in interest rate and subsequently reduction in investment.

3.6 Variance Decomposition Analysis

Following the VAR estimation, the study decomposed the forecast error variance by employing Sim's Recursive Cholesky decomposition method. The forecast error variance decomposition provides complementary information for a better understanding of the relationships between the variables of a VAR model. It tells us the proportion of the movements in a sequence due to its own shock, and other identified shocks (Enders, 2004). Thus, the variance decomposition analysis will enable us to identify the most effective instrument for each targeted variable based on the share of the variables to the forecast error variance of a targeted variable. The results of the forecast error variance decomposition of the endogenous variables, at various quarters are shown in Table 6.

Table 6: Result of Variance Decomposition of Economic Growth

Period	Economic Growth	Tax Revenue	Government Spending	Private Investment	Exchange Rate	Interest Rate	Risk Premium
2	97.87909	0.735238	0.626092	0.016530	0.290009	0.078020	0.075995
4	91.85011	2.369703	2.652989	0.230349	1.411201	0.227256	0.139486
6	86.70337	3.453401	3.028248	0.327343	3.214313	0.288254	1.177969
8	81.14025	3.925608	2.919542	0.273061	5.248830	0.313659	3.749906
10	74.92364	4.107468	2.682669	0.297409	7.142416	0.310906	7.553521
12	68.52864	4.159772	2.433060	0.369699	8.687634	0.291529	12.12623
14	62.48295	4.151119	2.207116	0.427425	9.756436	0.265643	17.03985
16	57.18548	4.105470	2.017217	0.454836	10.30182	0.242334	21.88221
18	52.87551	4.031321	1.865090	0.456463	10.37361	0.233229	26.28209
20	49.64336	3.932132	1.745285	0.441027	10.09679	0.252271	29.94824

Source: Computed Using Eviews 8.0 Package

The results in Table 6 shows that the largest source of variations in economic growth forecast error is attributed to its own shocks. The innovations of government spending, tax revenue, interest rate, money supply, CPI and exchange rate and risk premium are important sources of forecast error variance in economic growth. Interest rate, CPI, and investment contributed least to the forecast error variance of Ghana's economic growth. The decomposition suggests that all the variables play important part in economic growth with the most effective variable being tax revenue and government spending. The least important variable from the forecast error variance is real interest rate.

4. CONCLUSIONS

From the long-run model, the ratio of government spending to private investment, which served as a fiscal policy variable was statistically significant and it exerted a positive impact on economic growth, an indication that government expenditure is a key channel through which we can achieve sustained economic growth. It was revealed that real interest rate which is a monetary policy tool have a negative effect on economic growth in Ghana.

The short-run results revealed that model the ratio of government spending to private investment has a positive effect on economic growth. Short run estimates of both real interest rate have a negative impact on economic growth. The study found the existence of a long-run relationship among economic growth, the ratio of government spending to private investment, real interest rate, inflation gap and risk premium of Nigeria. This was further confirmed by a negative and statistically significant coefficient on the lagged error correction term.

Impulse response analyses show that any unanticipated increase in government spending will increase the deviation between the short-run equilibrium values of the real GDP and its long-run equilibrium. Also, any unanticipated increase in the investment initially decrease deviation of the short-run equilibrium value of the real GDP and its long-run equilibrium, but later increase and thereafter remains constant with no signs of convergence to equilibrium. But the deviation of money supply seems to be closing up, hence there is a sign of adjustment to equilibrium (convergence) after money supply shock. Similarly, interest rate shock initially increases deviations but converges later. The impulse response of government spending on investment shows that government spending shocks decreases investment in Ghana, which results in crowding out of investment.

The evidence from the forecast error variance decomposition suggests that the most important variable that influenced economic growth was tax revenue and the least important variable was interest rate. The results of the Granger-causality test suggested there is causality between economic growth and real interest rate. The study also found causality between economic growth and all the variables included in the model. Same was realized for the real interest rate equation.

It can be concluded from the study that both the long-run and short-run results found statistically significant positive effects of the ratio of government spending to private investment on economic growth. Similarly, both the long-run and short-run results shows real interest rate is significant in both models. Thus, the study found that the modern endogenous growth model which argued that the ratio of government spending to private investment and real interest rate affects economic growth is valid in both the long-run and short-run in Ghana.

The results of the forecast error variance decomposition show that the most important variable is government expenditure and the least important variable is interest rate. This implies that fiscal policy is relatively more effective in achieving economic growth than monetary policy in Ghana. The Granger causality test results revealed causality between real interest rate and economic growth. Also, impulse response analysis revealed that government spending crowds out investment in Ghana.

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