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The Dynamics between Government Capital Expenditure and Revenue in Ghana: A Vector Error Correction Model Approach

Patricia Woedem Aidam

Institute of Statistical, Social and Economic Research, University of Ghana
P. O. Box LG 74, Legon, Accra, Ghana.
Email:: patwoedem@yahoo.com,
Tel: +233241313777

Abstract: *Ghana is currently faced with increasing total government expenditure that outweighs government revenue. As a result, there is low government financial liquidity, high budget deficit, and high government debt. This paper therefore analyzes the dynamics and long run relationship between government revenue and government capital expenditure in Ghana. A VECM approach is used. The results indicate that government of Ghana spends less on capital expenditure and more on recurrent expenditure as government revenue increases. The paper therefore recommends that government should increase capital expenditure for future economic growth, and reduce recurrent government expenditure to prevent further increases in government debt and budget deficit.*

Keywords: Government Capital Expenditure, Government Revenue, Fiscal Policy, Ghana and Economic Growth
JEL Classification: E62, H5, H2, H61,

1. INTRODUCTION AND BACKGROUND

Government expenditure in a country can be characterized in two different ways, either as current expenditure or capital expenditure. Current expenditure is usually expenditure made on goods and services that are used over a short period of time and are mainly recurring spending such as wages, stationary and salaries. Whilst government capital expenditure is government money spent on goods that are classified as investment goods or assets. This is an expenditure that is incurred on goods that have long run benefit to nationals, such as building of new health facilities, schools and infrastructure facilities among others (Ayinde and Ayinde, 2012).

As capital expenditure have a lasting impact on the economic growth and investment of the country and assists to provide a more efficient and productive economy, current expenditure on the other hand, doesn't have that much impact in the economic growth dynamics relatively in the long run.
Government revenue on the other hand is money received by a government as income within a given time of period. These usually comprise of taxation, sales, fines, fees, transfers and inter-governmental grants to mention but a few.
Ghana as a developing country is currently facing very serious challenges with respect to finding fiscal space for its development agenda. The expenditure of the country is increasing rapidly giving rise to low government financial liquidity. Meanwhile, the revenue of the country is also increasing alongside the expenditure but the increase in expenditure outweighs the increases in income giving rise to large budget deficit, particularly in recent times (Figure 1).
The Keynesian economic theory (Yashobanta and Smruti, 2012a), states that running a fiscal deficit and raising government debt can primarily stimulate economic activity only when a country's output (GDP) is below its potential output. But when an economy is running near or at its potential level of output, fiscal deficits can cause high inflation. At that point, fiscal deficit must be controlled and it is a matter of great concern for government and the general public. These increases have however been attributed to increases in government current expenditure resulting from increases in interest rate payments on debts, payments on judgment debts, increases in the wage bill and subsidies on agricultural inputs and utilities among others leading to fiscal policy deterioration in Ghana.
The consequence, at least post-democracy, has been fiscal policy deterioration and imbalances in the country noticed in the level of budget deficit (-3.4% of GDP), double digit inflation (15.5%) and exchange rate instability (Figure 2 and 3). Following the trends, it becomes necessary to analyze government fiscal handlings (i.e. expenditure and revenue).

It has been often proposed that, to deal with fiscal woes as this, based on the relationship of revenue and expenditure, government ought to; "spend first and tax later, or tax first and spend later, or do these simultaneously, or to have an institutional separation of the expenditures and prioritize one over the other". In addition to the focus of to examine and analyze the dynamic and long run relationship between real government revenue and real government capital expenditure, we will come up with an appropriate solution for Ghana's case at the end of the empirical analysis.

2. LITERATURE REVIEW

2.1 Introduction

The empirical findings on the relationship between government expenditure and revenue are relevant both

theoretically and also as far as policy is concerned (Narayan and Narayan 2006a). Perhaps, the single most important factor that could derail Ghana's ability to advance to high middle-income status is weak fiscal governance. A review of fiscal performance in Ghana over the past two decades shows that fiscal performance has been abysmal. The country has not been able to keep the government budget under control and fiscal consolidation has not been successful. Fiscal performance in Ghana tends to worsen during election years with concomitant increase in the debt levels (Institute of Economic Affairs, 2014).
As a result of the fiscal difficulties in Ghana in recent years, there have been a number of deliberations on the relationship between government revenue and spending in order to have the right fiscal policy in place to improve the fiscal environment and space in the country.

2.2 Theoretical Literature Review

A study by Barro in 1990 indicated that government expenditure should be geared towards productive services. This is so because empirical evidence in some of the early economic models considered government public expenditure as an engine of economic growth (Bloom 2001; Romer 1990; Barro 1990). For instance, some expenditure on research and development, public infrastructure, education and health can impact growth positively in the long run.

According to Gounder et al. (2007) (2007), there are three important reasons on the policy side why the nature of the relationship between government expenditure and government revenue must be studied. The first reason was that if government revenue results in government expenditure (as in the tax-and-spend hypothesis), the government can deal with the issue of budget deficits by formulating policies that would lead to the generation of more government revenue. Their second reason was that if government expenditure results in government revenue (spend-and-tax hypothesis), it demonstrates a government behavior where they spend first and then later on they raise taxes as means to finance the spending. This situation, according to them, could result in an outflow of capital because people are afraid of paying higher taxes in the future. Lastly, if the fiscal synchronization hypothesis that explains that spending and revenue decisions are taken simultaneously does not hold, then decisions regarding expenditure and revenue are made separately. When this happens there could be severe budget deficits in the case where government increases expenditure more than it does revenue (Narayan 2005).

Basically two types of causalities exist between government expenditure and government revenue. There is the bidirectional causality and unidirectional causality (Narayan and Narayan 2006b).According to James and Jacoby (2010), a bidirectional causal relationship is when a variable X causally influence another variable Y and that effect Y in turn, causally influence X. Thus, X causes Y and Y causes X. Contrary is a unidirectional causality, where X causes Y but Y does not cause X, which is a more common or well-known causal relationship.

Incidentally, a bi-directional causality between government expenditure and government revenue would imply that government expenditure causes government revenue and in the same instance, government revenue also causes government expenditure. Also, a unidirectional causality between government expenditure and revenue would imply that either revenue causes expenditure or expenditure causes revenue.

This means that the “spend and tax” hypothesis advanced by Peacock and Wiseman (1979a) is a unidirectional causality running from expenditure to revenue because they explained that as a result of increased government expenditure, the government increase taxes and borrowing. Conversely, the fiscal synchronization hypothesis implies a bi-directional causality between government expenditure and revenue. For the institutional separation hypothesis, revenue decisions are taken separately from government expenditure allocation. As a result, no causal relationship between government expenditure and revenue is to be expected. (Nwosu and Okafor, 2014). For the tax-and-spend hypothesis, it’s stated that the change in government revenue leads to the change in government expenditures. Friedman (1978) argued that government cannot reduce his budget deficit just by raising taxes. Government rather spend more as taxes are raised, thus increasing the deficit at its highest level ever. An alternative argument that was raised in contrast to that of Friedman was by Buchanan and Wagner (1977,1978a), stating that; actual increases in tax lead to spending cut in expenditure because taxpayers suffer from the fiscal illusion.

According to their views, a cut in taxes reduces the perceived price of government services and commodities. However, the cost incurred by the public may actually be even higher; which is a direct consequence of indirect inflation taxation that comes about if the government decides to choose to use extreme money creation combined with the fact that government financing of debt is usually related with her interest rates, which crowd out private investment. In order to reduce government expenditure Buchanan and Wagner (1977, 1978b) supports limiting the ability of government to resort to deficit financing. Hence to Buchanan and Wagner (1977, 1978c), the relationship between tax and spending are inversely related. In a nutshell, the tax–and-spend hypothesis postulates that government raises tax revenues before it undertakes new government expenditures.

The spend -and–tax hypothesis on the other hand suggests that governments should engage first in expenditures and then increase its tax revenues later to finance these expenditures (Carneiro et al. 2005; Barro (1974); Peacock

and Wiseman (1979b)). In that, changes in government expenditure drive the changes in government revenue. In an argument by Peacock and Wiseman (1979c), they stated that temporary increases in government revenue as a result of increases in government expenditure due to crisis could lead to permanent increases in government revenues which is known as the "displacement effect".

The fiscal synchronization hypothesis, which is the third hypothesis, envisages that government makes its decisions on revenue and expenditure simultaneously (Meltzer and Richard (1981); Musgrave (1966)). In their views government revenue and expenditure are usually determined using the theory of marginal benefit equal to marginal cost of government services by the country's population.

The final hypothesis, mentioned by Baghestani and McNown (1994) and emphasized by Darrat (1998), relates to the fact that there should be institutional independence of the expenditure and revenue decisions of the government. Here expenditure would be defined on the basis of requirements articulated by the nationals of the country, and revenue would depend on the maximum tax burden that the population can bear. As a result, the achievements of fiscal equilibrium would be coincidental. The dynamics between government revenue and expenditure is an issue that has been investigated for several countries and the results have been mixed.

2.3 Empirical Literature Review

Research on the relationship between government expenditure and government revenue conducted in various countries have yielded several mixed findings. Baffes and Shah (1994) as cited in Narayan and Narayan (2006a) conducted some studies on developing countries and discovered a bi-directional causality between government revenue and expenditure for Argentina and Mexico. However, for Brazil, they found a unidirectional causality between these two variables.

At the conclusion of their journal, Gounder, Narayan and Prasad (2007) stated that findings from research conducted in Fiji shows that there is causality between government expenditure and taxes which is consistent with the "Spend-and-tax" hypothesis in the short run. They added that it has been the case in Fiji when value added tax was increased from 10% to 12.5% to finance the increased government spending.

Stoian 2008 estimated the relationship between public revenue and expenditure in Romania, using a regression analysis, correlation and granger causality test for the analysis. The paper found a significant relationship between the variables. The paper found that the direction of causality (that runs from revenue to expenditure) implied that some adjustments are required in revenues to achieve desired targets of expenditures. The paper also argued that expenditure could respond to lagged values of revenue but did not provide empirical evidence in that direction. From the granger causality result, the paper stated that there could be long run equilibrium between revenue and expenditure that could be reached through short run adjustments in revenue.

Ogujiuba and Abraham (2012) also estimated the revenue – spending hypothesis for Nigeria using macro data from 1970 to 2011. Using time series techniques exhibited a high correlation between revenue and expenditure and indicated from empirical evidence that causality runs from revenue to expenditure in Nigeria. In conclusion, the paper stated that short-term shocks from crude oil prices pass through oil revenue to affect expenditure. This has led to swings in public expenditure patterns with sustained increase of recurrent expenditure over capital that has consequences for economic growth.

Yashobanta and Smruti (2012) attempted to analyze the causal relationship between central government revenue and expenditure for India using annual data over the period 1970-2008. The paper, using time series regression techniques, concluded on a long run relationship between central government revenue and expenditure. The use of the Granger causality test indicated a bi-directional causality between expenditures and central government revenues in the long run, supporting the fiscal synchronization hypothesis. Their findings indicated that the fiscal authority of India should try to raise revenue and cut expenditure simultaneously in order to control the corresponding fiscal deficit.

Nwosu and Okafor (2014) in their work on "Government revenue and expenditure in Nigeria" also mentioned the policy implication of their studies on the relationship between government revenue and expenditure. They stated that an increase in government expenditure without any corresponding revenue increase will result in an increased budget deficit. They added that when this happens, government will be left with no other option than to borrow from either internal or external sources which would then lead to a rise in indebtedness. When government borrows internally, there would be a reduction in the amount meant for capital investment in the country. From these studies it can be seen that empirical gaps exist: most of the studies focused on expenditure in general without disaggregating to know the impact of either capital expenditure or current expenditure. Hence, this paper will try to fill this empirical gap and improve upon it. The aim of this paper is to examine the relationship of revenue and capital expenditure in Ghana from 1990 to 2013. The paper contributes to the literature by updating the data that will be used and will improve on the methodological gaps found in related studies.

3. METHODOLOGICAL APPROACH:

3.1 Study Area

Ghana has been a stable democracy since 1992 and is considered a regional model for political and economic reforms. Ghana's population measured as at 2012 was 25,366,462 according to the Ghana Statistical Service (2013). Ghana is also rich in natural resources, including gold, diamonds, manganese ore, and bauxite, and oil production which began in 2010. Estimated oil reserves have jumped to almost 700 million barrels. The industrial sector (about 30 percent of GDP in 2007) is more developed than in other African countries, but agriculture accounts for 50 percent of employment and 39 percent of export. Ghana which is classified as a lower middle income country recorded a provisional GDP growth of about 7.4% in 2013, driven by oil revenues, the services sector and the strong export performance of cocoa and gold. It has had significant macroeconomic challenges in 2013 largely due to fiscal slippages in 2012 among others. The inflation rate in Ghana was recorded at 16percent by the end of 2014 according to the Ghana Statistical Service.

Ghana's top individual income and corporate tax rates are 25 percent. Other taxes include a value-added tax (VAT), a national insurance levy, and a capital gains tax. The overall tax burden equals 14.6 percent of total domestic income. Government expenditures are 24 percent of gross domestic output, and public debt remains over 55 percent of the size of the economy according to the 2014 Index of Economic Freedom.

Ghana has a 10.1 percent average tariff rate, and non-tariff barriers which further impede trade according to the 2014 Index of Economic Freedom. Foreign investment is officially welcomed, but investors may face restrictions in certain sectors of the economy. The foreign direct investment; net inflows (% of GDP) in Ghana was last measured at 8.09 in 2012, according to the World Bank. An increase in Foreign Direct Investment (FDI) inflows may result in strong upward pressure on the exchange rate and threaten prospects for industrialization. The financial sector has also undergone restructuring through privatizations, but the banking sector is undercapitalized, and access to financing remains limited.

Ghana's budget deficit has increased over the years from 8.5 % of GDP in 2008 through to 10.80% 0f GDP in 2012 hitting a record high of 12.1% of GDP in 2013.

3.2 Data Sources

Data employed in this study is collected mainly from secondary sources. Annual data on GCE (Government Capital Expenditure) such as expenditure on infrastructure purchases of computers, buses etc. and GTR (Government Total Revenue) such as income; grant etc. for Ghana over the period of 1990 to 2013 are used in the study. Data used in the study is however transformed into real terms using the consumer price index as the price deflator. This is so because inflation affects actual level of expenditure and revenue. All data in the study are obtained from the Ministry of Finance and the Bank of Ghana database.

3.3 Unit Root Test

In the study, a unit root test is performed using Augmented Dickey Fuller (ADF) test proposed by Dickey and Fuller (1979) and the Phillips-Perron (PP) tests. This is in order to avoid a spurious regression problem in the model. In order to examine the stationarity in this study the equation below is used in the Augmented Dickey Fuller (ADF) test:

$\Delta Y_t = \gamma_O + \gamma 1t + (\delta - 1)\, Y_{t-1} + \sum_{j=1}^{p} \delta \Delta Y_{t-1} + \varepsilon_t \ \ldots\ldots\ldots\ldots equation\ (1.1)$

H0: δ =0, Variable is Non-Stationary or there is unit root

H0: δ< 0, Variable is Stationary or there is no unit root

Where Δ is the symbol for first difference operator, γ is the constant and $\gamma 1$ is the coefficient on the time trend, $\varepsilon_t$is a covariance stationary random error term,δ is determined by the Akaike Information Criterion (AIC) to ensure serially uncorrelated residuals ΔY_{t-1} captures serial correlation. P is the lag order of the first- difference autoregressive process. When P<0.05, we reject the null hypothesis that the variable is not stationary and accept the alternative hypothesis of stationarity. If P > 0.05 we fail to reject the null hypothesis that the variable is non-stationary.

3.4 Johansen Cointegration Test

After determining the stationarity of the variables using the unit root test, we go ahead and check for the order of integration. For one to go ahead with a cointegration test all variables should be of the same order of Integration. Hence if the variables are non-stationary at levels, then they should all be stationary at first difference so as to proceed with the cointegration test. If the variables are integrated of the same order say I (1), and then the next step is to test if these variables are cointegrated. The cointegration test is usually used to obtain the number of cointegrating vectors or equation in the model. Using the Johansen cointegration test in this study over the Engle –Granger method due to statistical reasons, we describe the Johansen equation as below:

$$\Delta X_t = \sum_{i=1}^{p-1} \Gamma_j\, \Delta X_{t-i} + \sqcap X_{t-1} + \varepsilon_t \ \ldots\ldots equation\ 1.2$$

$\prod X_{t-1}$= Error Correction Term
X_t = 2x1 vector matrix
Δ = is a symbol of difference operator
εt = 2x1vector of residuals
Γ_j = Estimated parameter

From the equation above, if the rank of $\prod$ is equal to "n" then vector X_t is stationary. On the other hand, when the rank

of ∏ is equal to zero then the vector matrix is equal to the null meaning that X_t vector is a non-stationary process. However if the rank of ∏ is equal to one, this indicates a single cointegrating vector. When the rank of ∏ is within 0<r<n, then it is assumed that there are r cointegrating vectors and that X_t is a vector of non-stationary variables integrated of order one, then all terms in equation 1.2 which involves ΔXt-1 are integrated of order zero and ∏ X_{t-1} must be stationary for $\varepsilon t$is I(0) to be white noise. However in order to determine the number of cointegration vectors based on likelihood ratio test (LR): the study uses the trace and maximum eigenvalue test statistics.

Hypothesis:

Ho: there is no cointegration

Ha: there is cointegration

The trace test and maximum eigenvalue test are as shown in equation 1.3 and 1.4 respectively below.

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \dots\dots\dots equation\ (1.3)$$

$$J_{max} = -Tl\,n\left(1 - \hat{\lambda}_{r+1}\right) \dots\dots\dots\dots equation\ (1.4)$$

T and $\hat{\lambda}$ is the sample size and the ith largest canonical correlation respectively. The null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors is tested by the trace test. While the maximum eigenvalue test, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of r+1cointegrating vectors.

The cointegration indicates that causality exists between two series or variables but it fails to show direction of the causality. So we go ahead and use the VECM to give us the direction of causality. The VECM model gives us information about short and long run adjustment to changes in X_t via the estimated parameters.

3.5 VECM and Causality Tests

If the variables are cointegrated then there should be causality in at least one direction. The vector error correction coefficient is used to determine the direction of the causality between variables and also to measure the speed of adjustment after deviations from equilibrium for long run analysis. The equation used in the study for the VECM is as follows:

$$\Delta RGCE_t = \sum_{j=1}^{p} \beta_i\, \Delta RGCE_{t-j} + \sum_{j=1}^{p} \propto_i \Delta RGTR_{t-j} + \delta_{1t} * EC1_{t-1} + \varepsilon_{1t} \dots equation\ (1.5)$$

$$\Delta RGTR_t = \sum_{j=1}^{p} \mu_i\, \Delta RGCE_{t-j} + \sum_{j=1}^{p} \theta_i\, \Delta RGTR_{t-j} + \delta_{2t} * EC2_{t-1} + \varepsilon_{2t} \dots equation\ (1.6)$$

$\boldsymbol{\beta_i} \propto_i \boldsymbol{\mu_i}$ &$\boldsymbol{\theta_i}$ are the short run coefficients whilst $\boldsymbol{EC1}$&$\boldsymbol{EC2}$are error correction terms for long run coefficient, and ε_{1t} & ε_{2t} are residuals in the equations respectively.

$\boldsymbol{EC1_{t-1}}$ Is the lagged value of the residual derived from the cointegrating regression of RGCE on RGTR in equation 1.3, whilst $\boldsymbol{EC2_{t-1}}$is also the lagged value of the residuals derived from the cointegrating regression of RGTR on RGCE reflected in equation 1.4.

However for short run causality, the Wald test is used to determine the direction of causality in the short run. Below is the equation used:

$$RGCE_t = \delta + \gamma RGTR_t + \varepsilon_{1t} \dots equation\ (1.7)$$

$$RGTR_t = \alpha + \theta RGCE_t + \varepsilon_{2t} \dots\dots\dots\dots equation\ (1.8)$$

For the long run analysis, when EC1 and EC2 are negative and significant it is said that there exist long run causality between the variables, either uni-directional or bi-directional. And in the case of the short run analysis if the coefficients γ and θ in equation 1.5 and 1.6 respectively are non-zero, then it said that the variables have short run causality either uni-directional or bi-directional. If RGTR granger causes RGCE without RGCE granger causing RGTR then it is uni-directional but if RGTR granger causes RGCE and RGCE also granger causes RGTR then it is said to be bi-directional.

4. Empirical Results

4.1 Unit Root test

The table 1 below shows the results of the unit root test using the ADF and PP test on the individual variables in levels and at first difference. The unit root test in this study was carried out assuming both constant and linear trend in data. Table 1 indicates that the variables are non-stationary at levels, but were stationary at first difference for both the ADF test and PP test. In levels, the calculated value is less than the critical value of the test statistics for both series and this made the series non-stationary. But at first difference, the calculated value is greater than the critical value of the test statistics for both ADF and PP test and this made the series stationary.

4.2 Johansen Cointegration Results

The Johansen test statistics enables us to determine the long run relationship between the individual variables (Table 2). This result is mainly analyzed using the trace statistics and maximum eigenvalue tables. From table 1, it has been determined that all the variables are integrated of order (1), hence the Johansen test for cointegration. From the table 2, it is indicated that there is one cointegrating equation between the variables Real Government Capital Expenditure (RGCE) and Real Government Total Revenue (RGTR). This is implied from the fact that the null hypothesis indicating that there is no cointegration (that is None*) is rejected at 5 percent level given that the trace statistics of 25.17558 is greater than the critical value of 15.49471, meaning that we can reject the null hypothesis and accept the alternative hypothesis. However we do not reject the null hypothesis of at most one cointegrated equation or error term, since from the table 2, the trace statistics of 3.281001 is less than the

critical value 3.841466 at 5%(0.05) level. In this case, there is at most one cointegrating equation.

Similarly from table 3, using the maximum eigenvalues test, it indicates that there is a long run relationship between the variables with at most one cointegrating equation at 5 per cent level. The Max-Eigen statistics of 21.89458 is greater than the critical value of 14.26460 at 5%, and hence we fail to accept the null hypothesis that, there is no cointegration between the variables.

However, we do not reject the null hypothesis of at most one cointegrating variable, since the Max-Eigen statistics of 3.281001 is less than the critical value of 3.841466 at 5%(0.05) level. There is therefore a long run relationship between the variables.

Using trace statistics and maximum eigenvalue statistics, table 2 and 3 demonstrates that there is at least one cointegrating vector between the variables. Therefore, this indicates a long run relationship and causality in at least one direction between the variables.

The estimated coefficient of RGTR suggests that there is an inverse relationship between Real Government Total revenue and Real Government Capital Expenditure, in that a 1 percent change in Real Government Total revenue leads to a 0.43 percent change/decrease in Real Government Capital Expenditure. In terms of fiscal policy, the cointegration results suggest that there is lower spending on capital expenditure as government revenue increases, and thus this does not order well for future economic growth. Suggesting that as RGTR increases, Real Government Recurrent Expenditure is rather increased leading to higher fiscal deficit that does not necessitate economic growth in the long run.

4.3 VECM and Long Run Causality Test

From the VECM equation 1.5 and 1.6, it can be seen that there is an inclusion of an error term $EC1_{t-1}$ and $EC2_{t-2,}$ these are the lagged value of residuals derived from cointegrating regression of RGCE on RGTR and RGTR on RGCE respectively. It also assists us to differentiate between the long run and short-run causality.Table 4 shows the results of the VECM model, with lag 2 and also indicates the long run Granger causality test with the direction of causality. From the model result ECM (-1) is the error correction term using Eviews, the error correction coefficient is negative and significant in both equations. Therefore this indicates the existence of long run causality between the variable RGCE and RGTR. The ECM can also be known as the speed of adjustment towards long run equilibrium and a high absolute value of the error correction term indicates that the speed of adjustment is changing fast. The result from the model shows that error correction term is significant at 5% level. This means that in the long run RGCE is a function of RGTR, hence in the long-run RGTR causes RGCE, which leads to a tax and spend hypothesis. This implies any deviation of government capital expenditure from the equilibrium will be restored at the rate of 45 per cent per year this is in the case when RGCE is the dependent variable.

On the other hand, when RGTR is the dependent variable, it can be seen that the error correction term is negative and significant at 5% level. This also means that in the long run, RGTR is a function of RGCE, implying that in the long run, RGCE also causes RGTR which leads to a spend–and-tax hypothesis.
In conclusion, we can say that there is a bi directional causality between RGCE and RGTR. Meaning that with the RGTR equation, any deviation from equilibrium will be restored at 12 per cent per year. Hence this result supports the fiscal synchronization hypothesis in Ghana. Under this scenario, the government of Ghana could simultaneously try to control the rising fiscal deficit by raising revenue and cutting down on government expenditure. The Diagnostic Statistics in the study indicates that the equation and model is desirable and well specified. The Langrange Multiplier test based on Breusch-Godfrey test of the residuals serial correlation do not reject the null hypothesis of no serial correlation in the equation. Also in all equations it shows that there is no Heteroskedascity (ARCH) test in the model. Finally, the test for normality using the Jacque-Bera test also indicates that the equation is normally distributed by the acceptance of the null hypothesis. In a nutshell the model does not have serial correlation, Heteroskedascity and is normally distributed.

4.4 VECM and Short- run Causality Test

The short run Granger causality test applied in this model is based on the Wald test. Here restrictions are placed on the coefficients of the independent variables making their lag differences to be equal to zero, in both equations when RGCE and RGTR are dependent variables. The results of the Wald test is as shown in table 5. The Granger Causality test in both equations where RGCE and RGTR are dependent variables also indicates a bi-directional causality. As the null hypothesis that revenue does not causes expenditure is rejected, with a Chi-sq value of 9.089330 and a probability value of 0.0106 in the equation when RGCE is the dependent variable. Also in the equation where RGTR is the dependent variable, the null hypothesis that expenditure does not cause revenue is also rejected and the alternative hypothesis is accepted that expenditure causes revenue, with a chi-sq value of 6.552123 and a probability value of 0.0378 at 5%. These results indicate that in the short run there is also causality in both equations.

5. POLICY IMPLICATIONS AND DIRECTION

The fiscal environment in Ghana is clouded with high government fiscal deficit leading to high government debt

and high inflation, with poor performing microeconomic variable indicators. As a result of this, the government needs to cut down on its expenditure and find ways of increasing its revenue in order to improve the fiscals in the country and also increase economic growth. From the study, it is derived that there is an inverse relationship between government capital expenditure and government total revenue, in that when government revenue is increased, government capital expenditure is decreased. From literature it is ascertained that when government invest more into recurrent expenditure it reaches a point that this expenditure does not promote economic growth but rather slows growth by increasing budget deficit and increasing public debt. But if government invests in capital expenditure instead, from literature it propels future growth of the country as these capital investments pays for itself. However, from the economic situation in Ghana at the moment, it can be said that although government is investing in capital expenditure, the proportion of investment as compared to investment in recurrent expenditure is inadequate. This therefore is having a negative impact on the fiscals as well as future growth if care is not taken. So for a fiscal policy direction, it will be advised that government increases its investment in capital expenditure and reduces that of recurrent expenditure in order to propel future growth and also be able to pay for the interest on its public debt as well the debt itself. Investment into manufacturing and industrial infrastructures with the private sector in mind and generating revenue from usage is one of the ways this could be done.

Also from the results of the study, a bi- directional causality between government revenue and government expenditure in the long-run is found, supporting the "Fiscal Synchronization" hypothesis, meaning that revenue and expenditure decision can be made jointly. With this result, government can take advantage of this environment to raise revenue and reduce expenditure in order to control the fiscal deficits in the country. Government with this can also reduce non-developmental expenditure in order to reduce the country's fiscal deficit.

In the short run, results from the study also indicates a bi-directional causality, under this scenario, it is prudent for government to reduce expenditure making it a crucial instrument to control both fiscal deficit and public debt. Increasing government revenue in the short run will also be a plus but in the Ghanaian environment this will take some time as a result of structural constraints in the country.

6. Conclusions and Policy Recommendations

In conclusion, the empirical results suggest that both short and long run causality, demonstrates a bi-directional causality. This means that government can jointly make decisions or put in policies that can jointly affect both government revenue and government capital expenditure. As one of the main concerns of the fiscal environment in Ghana is reducing the fiscal deficit and public debt, it is recommended that government should increase revenue. The government can do this by expanding the tax base to include all taxable items that has been ignored over the period and not the existing tax rate.

Government on the revenue side can also increase budgetary receipt by implementing appropriate tax policies that will see to it that the right user charges are increased and appropriately charged. With the high level of corruption and inefficiencies in the tax collection machinery in Ghana, the government in order to increase revenue should also make sure that the whole tax collection machinery is overhauled in order to achieve efficiency in tax collection and compliance of the available tax laws. Finally, it is recommended that when the need arises government should increase taxes in sectors that have inelastic demand such as the mining, telecommunication, banking and oil sub sectors in order to increase government revenue.

On the expenditure front, it is recommended that government should cut down substantially on recurrent expenditure in order to decrease the fiscal deficit and government debt. In order to reduce expenditure, government should try and eliminate government subsidies and phase out any unviable and unprofitable public sector units. Government should also try and reduce the wage bill in the country, as it is one of the units causing an unreasonable increase in public expenditure. It is also recommended that government should efficiently utilize the available resources and drastically reduce corruption in the public sector offices as well as decrease expenditure in government unproductive sectors.

It is also recommended that there should be an increase investment in capital expenditure in a manner that will increase revenue to pay off public debt in the future. From the results of the study, it is observed that capital expenditure is mainly financed by mainstream government revenue. Indicating that without government revenue, capital projects in the country will be impossible to finance. Hence, it is recommended that government needs to find other source: domestic, private and international institutions to finance capital expenditure if the mainstream government is not adequate.

In a nutshell, empirical evidence indicates that in the long and short run there is interdependence between government revenue and government capital expenditure in Ghana. Hence to enable the country to re-establish a workable fiscal path without reducing critical expenditure and maintaining the economy's long run growth trajectory, recurrent expenditure will need to be reduced drastically and capital expenditure increased appropriately.

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8. TABLES

Table 1: Unit Root Test

Variables in Levels	ADF	PP	Variables in first Difference	ADF	PP
RGCE	-0.306	-0.335	RGCE	-4.408**	-4.400**
RGTR	-2.396	-3.589	RGTR	-4.529***	-4.599***

**Indicates 5 percent level of significance ***indicates 1 percent level of significance

Table 2: Johansen Cointegration Result based on Trace Statistics

Null Hypothesis	Alternative hypothesis	Trace Statistics	Critical Value at 0.05
None*(X =0)	X ≤ 1	25.17558	15.49471
At most 1(X ≤ 1)	X=2	3.281001	3.841466

Trace test indicates 1 cointegrating equation(s) at the 0.05 level

Table 3: Johansen Cointegration Result based on Maximum Eigenvalue Statistics (VAR lag=4)

Null Hypothesis	Alternative hypothesis	Max-Eigen Statistics	Critical Value at 0.05
None*(X=0)	X=1	21.89458	14.26460
At most 1(X=1)	X=2	3.281001	3.841466

*Max-eigenvalue indicates 1 cointegrating equation(s) at the 0.05 level

Table 4: VECM and Long –Run Causality Test

Independent Variable	Dependent Variable	
	ΔRGCE	ΔRGTR
ΔRGCE (-1)	0.229731 [0.88653]	0.990545 [1.98159]
Δ RGCE (-2)	0.241205	-0.284521

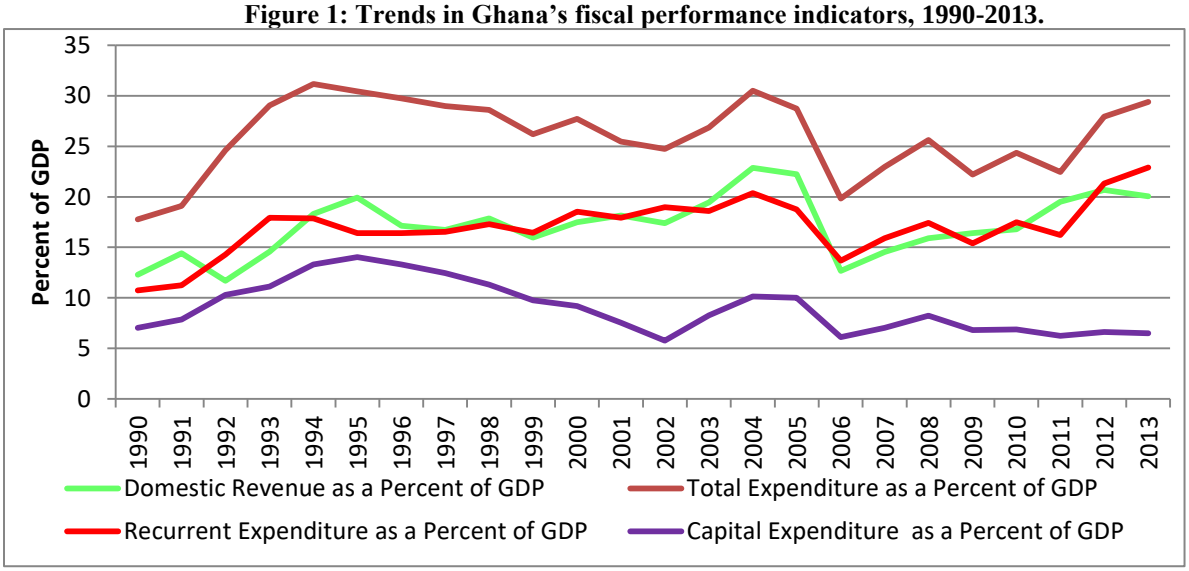
	[0.99257]	[-0.60696]
ΔRGTR (-1)	-0.179067 [-1.00975]	-0.587265 [-1.71671]
Δ RGTR (-2)	-0.460223 [-2.90884]	-1.053958 [-3.45336]
ECM (-1) (P-value)	-0.449610 {0.0079}	
ECM (-2) (P-value)		-1.198916 {0.0007}
C	4332936 [3.26463]	13735396 [5.36488]
Adj R-squared	0.577922	0.738524
F-Statistics	4.107690	8.473333
Prob (F-Statistics)	0.015020	0.000561
Diagnostic Test		
Serial Correlation LM Test (P-Chi-Square)	0.193989 (0.9076)	2.750518 (0.2528)
Jarque-Bera Normality Test (P-Chi-Square)	0.568915 (0.752422)	1.111095 (0.573758)
ARCH Test (P-Chi-Square)	0.308070 (0.8572)	1.374978 (0.5028)

Table 5: VECM and Short –Run Granger Causality Using the WALD Test

When RGCE is the Dependent Variable			
Excluded	Chi-sq	DF	Probability
RGTR	9.089330	2	0.0106
All	9.089330	2	0.0106
When RGTR is the Dependent Variable			
Excluded	Chi-sq	DF	Probability
RGCE	6.552123	2	0.0378
All	6.552123	2	0.0378

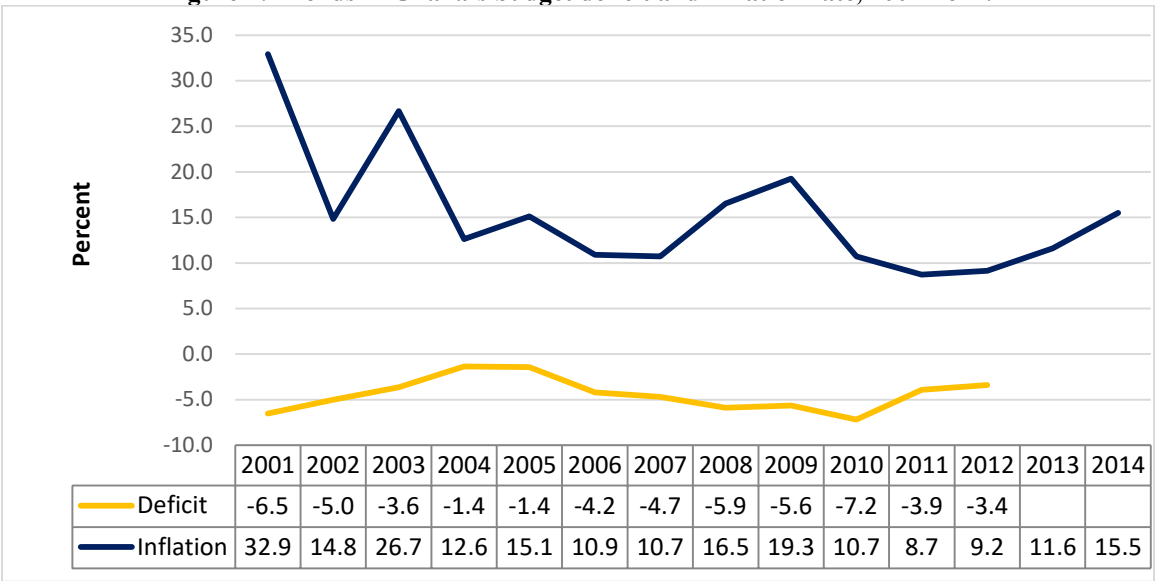
9. FIGURES

Figure 1: Trends in Ghana's fiscal performance indicators, 1990-2013.



Source: World Development Indicators (WDI), 2016

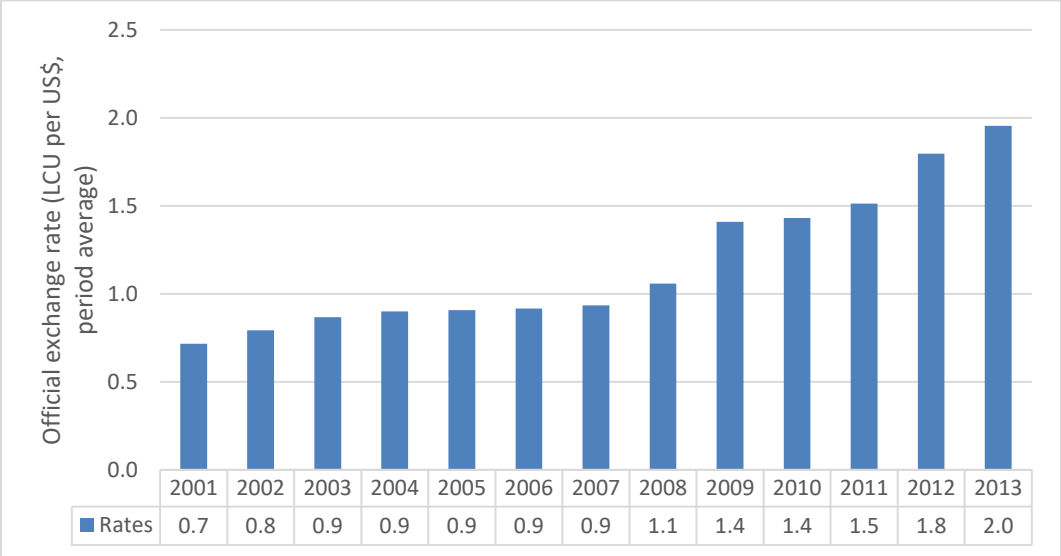
Figure 2: Trends in Ghana's budget deficit and inflation rate, 2001-2014.



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Deficit	-6.5	-5.0	-3.6	-1.4	-1.4	-4.2	-4.7	-5.9	-5.6	-7.2	-3.9	-3.4		
Inflation	32.9	14.8	26.7	12.6	15.1	10.9	10.7	16.5	19.3	10.7	8.7	9.2	11.6	15.5

Source: World Development Indicators (WDI), 2016

Figure 3: Trends in Ghana's exchange rate, 2001-2013.



Source: World Development Indicators (WDI), 2016