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# A Causality Test of the Revenue-Expenditure Nexus in Ghana.

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## Abstract

The paper investigates the revenue-expenditure nexus for Ghana. The study covers the period 1980-2013. It examines whether increases in government revenue cause increases in government expenditure or increases in government expenditure cause increases in government revenue. It also examines if changes in government expenditure and revenue have feedback effects on each other. The stationarity test indicates that both variables are stationary at the levels when the test is done with a constant and a trend, and are first difference stationary when the test is done with a constant but no trend. The paper analyses the long-run relationship between government expenditure and government revenue using the Ordinary Least Squares (OLS) method. The short-run relationships between the two variables are tested in a Vector Autoregressive (VAR) framework. The results show a very strong long-and short-run relationship between the variables. The second period lag of the revenue variable shows a negative relationship between government revenue and government expenditure. This indicates the possibility of the absence of Fiscal illusion in every two years of increased government expenditure. Granger causality test is done to determine the direction of the causal relationship between government expenditure and government revenue. The test gives a unidirectional causality running from revenue to expenditure. This implies government revenue causes government expenditure. Therefore, evidence of Tax-spend hypothesis is found. The implication is that, government must improve its revenue generation efforts in order for it to fund its ever increasing expenditure and to control the frequent fiscal slippages.

**Keywords:** government revenue, government expenditure, OLS, VAR, Granger-causality

## INTRODUCTION

Government revenue and expenditure issues are fiscal policy issues. For example, government expenditure reflects the policy choice of government. That is, a government's decision to construct a road (which is a policy choice) is reflected by the amount spent to make the decision "real". This expenditure can only be done when there is revenue. Fiscal policies mainly encompass the use of revenue and expenditure decisions to affect macroeconomic variables and to stimulate growth.

Governments in most developing countries rely on tariffs, trade receipts and direct taxes as their major sources of revenue. However, such sources of revenue generation are hugely inconsistent (except direct taxes) and are affected by such factors as terms of trade volatility. The inconsistency in revenue generation has the potential to cause lingering fiscal deficits. Fiscal deficits arise from two main sources; revenue shortages and excess expenditure. Fiscal deficits in developing countries (with Ghana not an exception) are caused by expenditures exceeding revenue receipts. Fiscal deficits have the potential to cause mounting inflation and interest rates. The increase in interest rates raises the costs of doing business within the private sector and this may discourage investment. If fiscal deficits are caused by growing government spending, it leads to exchange rate depreciation, trade deficits and eventually slows economic growth.

Fiscal deficits have been "normal" for Ghana (at least for over 15 fiscal years) and it has been caused by expenditures exceeding revenues generated. The low levels of revenue generated compared to the levels of expenditure may be attributed to the narrow tax base which leaves a large proportion of the informal sector untaxed. Moreover, revenue mobilization efforts are inefficient. Besides, the major source of government domestic revenue in Ghana is direct taxes (ISSER, 2013), which unfortunately, can potentially be a disincentive to work and may also result in tax evasion where the tax administration is weak. Potentially, increases in revenues may also be causing expenditure increases which create the lingering fiscal deficits Ghana is battling with. For example, both foreign and domestic borrowing receipts augment local revenues and therefore incite increased government expenditure (Barua, 2005). Moreover, other sources of government revenue such as aid has the potential to increase government expenditure as they shore up the amount of revenue available to fund government expenditure (see Heller, 1975; McGillivray and Morissey, 2000; Remmer, 2004; Osei et al. 2005; Sakyi, 2013).

Fiscal deficits may however not be necessarily negative since they can be used to stimulate growth in important areas of the economy. For instance, a fiscal deficit of less than or equal to 1.5 percent of GDP enhances growth but a fiscal deficit greater than 1.5 percent of GDP inhibits growth (Adam and Bevan, 2005). The worrying trend however is that Ghana's government expenditure patterns currently favour

recurrent expenditure as against capital expenditure (ISSER, 2013). This is particularly a "negative" trend as such expenditure is not growth enhancing.

Fiscal deficits can be addressed from either expenditure or revenue angles or both. In other words, expenditures may be reduced or revenues increased or both may be done concurrently to address fiscal deficits. Which of these approaches will be appropriate and effective in Ghana's case needs to be investigated. Hence, an empirical investigation of the revenue-expenditure nexus will be necessary to inform policy choice.

Eita and Mbazimba (2008) indicate that the causal relationship between government expenditure and government revenue has been unclear. The results even conflict in some cases. Therefore, policy recommendations differ depending on the direction of causality obtained (Mehrara et. al, 2011). This paper investigates whether government revenues generated from both domestic and foreign sources stimulate government expenditure. Furthermore, it determines if government expenditure decisions cause increases in revenue generation. Government revenue and expenditure; what causes what? Is the causality unidirectional, bidirectional or no causality exists at all?

The rest of the paper is organized as follows: Section two discusses the theoretical and empirical literature on the revenue-expenditure nexus. Section three presents the methodology used in this study. The empirical results are stated and discussed in Section four while Section five concludes and makes policy recommendations based on the findings.

## LITERATURE REVIEW

### Theoretical Literature

Four main hypotheses explain the government revenue and expenditure nexus. These are the Tax and Spend, Spend-and-Tax, Fiscal Synchronization and Fiscal Neutrality hypotheses.

Friedman (1978) states the Tax-and-Spend hypothesis. The argument follows that, changes in government revenue cause changes in government expenditure. Stated differently, raising taxes leads to more expenditure (Narayan, 2005). This is because, governments desire to spend and they will spend whatever becomes available (Young, 2009). Moreover, tax cuts reduce revenue levels and therefore result in higher deficits. This must cause governments to be sensitive to how much they spend (Moalusi, 2004). Buchanan and Wagner (1978) however argue contrarily. They state that, taxes have a rather negative effect on government spending. This is because, the citizenry tend to believe the cost of government services has reduced when taxes are cut. They will therefore "vote for" higher government expenditure.

Revenues fall and expenditures rise, resulting in fiscal deficits. Hence, taxes must rather increase in order to solve fiscal deficits (Moulasi, 2004).

Spend-and-Tax hypothesis argues that expenditure causes revenue. In other words, increases in expenditure necessitate increases in revenue. Peacock and Wiseman (1961) posit that a tolerable level of taxation exist which sets a constraint on government expenditure. They state further that, government expenditure increases with GNP as an economy grows. This is because, income levels rise, leading to increases in tax revenues collected from taxes which have constant tax rates. Therefore, public expenditure trends upwards in normal times. The trend would however be disturbed during periods of social upheavals such as war, famine and large-scale social disaster that require a rapid increase in public expenditure. Taxation levels would therefore have to rise in order to finance such increased levels of government expenditure. The high taxation levels will be regarded as acceptable by the citizens during such crisis periods. This is what Peacock and Wiseman referred to as the "Displacement Effect". Stated differently, public expenditure is displaced upwards and for the crisis period displaces private expenditure for public expenditure. Public expenditure does not fall to the original levels even after the crisis. Moreover, the citizenry become aware of the social problems during the period of the crisis. An "inspection effect" may therefore arise, making higher government expenditure possible in order to solve the social problems. This is possible because the levels of taxation tolerated by the citizenry do not return to former levels. Hence, the increases in taxes as a result of the crisis will now become permanent tax policies (Narayan, 2005).

According to the Fiscal synchronization hypothesis (Musgrave, 1966; Meltzer and Richard, 1981), there exists a bidirectional causal relationship (see Chang, 2009) between government expenditure and government revenue. That is government expenditure causes government revenue which in-turn causes government expenditure. Stated differently, government expenditure causes government revenue with a feedback effect. This is so because expenditure and revenue decisions are made concurrently. The result is that, changes in them occur simultaneously. Policy makers decide on the revenue and expenditure levels by comparing the marginal costs and marginal benefits of government activities (Narayan, 2005). This view is supported by the tax smoothing model (see Barro, 1979) which is based on the Ricardian Equivalence argument. Fiscal surplus or deficit may still occur under this circumstance because governments mostly have different economic policy targets, even though expenditure and revenue decisions move together.

The final hypothesis is the Fiscal neutrality hypothesis stated by Baghestani and McNown (1994). The argument follows that, revenue and expenditure decisions are made independent of each other. Therefore, no causal relationship exists between

government expenditure and government revenue. Expenditures are determined by the requirement of the citizenry and revenue will depend on the maximum amount of tax the citizenry can support. Hence, it is only by a matter of coincidence that fiscal equilibrium can be achieved. This is possible because, economic growth ensures that in the long-run, institutions become more separate and independent. This therefore makes it possible for expenditure and revenue decisions to be made separately.

**Empirical Literature**

We begin by analysing empirical literature from individual country studies. The section concludes with an analysis of empirical panel data results.

Li (2001), finds evidence of Tax-spend hypothesis in China. The paper covers the period 1950-1997. The error correction method was employed to test the direction of causality between government revenue and expenditure. The results give evidence to a unidirectional causality running from revenue to expenditure, implying the Tax-spend hypothesis. Eita and Mbazima (2008) test the revenue expenditure nexus for Namibia. Their results validate the Tax-spend hypothesis for Namibia for the period 1977-2007. They adopt Vector Autoregression (VAR), Johansen cointegration test and a Granger causality test. Amoah and Loloh (2008) employ the Engel Granger bivariate cointegration and an error correction model to examine the revenue-expenditure nexus in Ghana for the period 1983-2007. Evidence for the Tax-spend hypothesis is found in the short-run. In a Granger causality test of US federal data for the period 1953:3 to 2007:4 under an error correction model framework, Young (2009) finds evidence for Tax-spend hypothesis. The paper further shows that fiscal illusion is largely absent over the period considered by the study. Obioma and Ozughalu (2010) uses Engel-Granger two-step cointegration technique, the Johansen cointegration method and the Granger causality test within the error correction model framework to investigate the nexus in Nigeria for the period 1970-2007. Causality is seen to run unidirectional from revenue to expenditure, providing evidence for the Tax-spend hypothesis. Nanthakumar et al. (2011) find support for Tax-spend hypothesis in Malaysia over the period 1970-2009. The Autoregressive Distributed Lag (ARDL) method and Toda-Yamamoto MWALD Granger causality tests are employed to determine the direction of causality, which turns out to be unidirectional, running from revenue to expenditure. Under Engel-Granger cointegration and Granger causality tests, Al-Khulaifi (2012) finds support for the Tax-spend hypothesis in Qatar for the period 1980-2011.

Carneiro et al. (2005) investigates the nexus for Guinea-Bissau over the period 1981-2002 and find evidence for Spend-tax hypothesis. The study is done using a Granger causality test in an error correction model (ECM) framework. Amoah and Loloh (2008) gives evidence for the validity of the Spend-tax hypothesis in Ghana in the

long-run. Dogan (2013) employs Johansen cointegration and Granger causality test in a vector error correction model (VECM) framework to test the nexus for Turkey for the period 1924-2011. The paper finds a unidirectional causality running from government expenditure to government revenue, implying the validity of the Spend-tax hypothesis. Evidence for the Spend-tax hypothesis is also found for Greece for the period 1833-2009, by Richter and Dimitrios (2013). The paper uses the Johansen cointegration approach and the Granger causality test.

For the period 1977-1999 in China, Chang and Ho (2002) find evidence for Fiscal synchronization. GDP is used as a control variable. The research is done in a Multivariate error correction model (MVECM) framework and using a Granger causality test. The Johansen cointegration approach is also adopted. Al-Zeaud (2012) undertakes a Granger causality test in a VECM framework to investigate the nexus in Jordan for the period 1990-2011, and finds evidence for the Fiscal synchronization hypothesis. Elyasi and Rahimi (2012) find similar results for Iran over the period 1963-2007, using the Autoregressive Distributed Lag (ARDL) approach and a Granger causality test. Doh-Nani and Awunyo-Vitor (2012) finds bidirectional causality between revenue and expenditure for Ghana for the period 1960-2007. The paper uses the Granger causality test. Aregbeyen and Insah (2013) find similar results for Ghana and Nigeria for 1980-2010. They use the Dynamic Ordinary Least Squares (DOLS) method, the Johansen cointegration approach and a Granger causality test in an ECM framework.

Nyamongo et al. (2004) provides evidence for Fiscal neutrality in the short-run and Tax-spend hypothesis in the long-run, in South Africa. The paper uses monthly data for the period October 1994 to June 2004. The methods employed are Seasonal unit root tests, Johansen cointegration and VECM causality tests. Ndoricimpa (2013) adopts Threshold cointegration test with Asymmetric ECM and finds support for the Fiscal neutrality hypothesis for Burundi using monthly data from 1997:1-2013:5.

The results for multi-country studies are also mixed. Cashin et al. (1999) find evidence for tax-smoothing for Pakistan over the period 1956 to 1995. This lends support to the Fiscal synchronization hypothesis. However, in the same study, there is no such evidence for Sri Lanka for 1964-1997. Fasano and Wang (2002) support Tax-spend hypothesis in 6 Gulf Cooperation Council (GCC) countries. They use the Johansen cointegration approach and causality is examined in an ECM framework. AbuAI-Foul and Baghestani (2004) employing VAR and an ECM approach find support for Tax-spend hypothesis in Egypt (1977-1998) and evidence for Fiscal synchronization in Jordan (1975-2001). Narayan (2005) examines the nexus for 9 Asian countries. The paper uses the ARDL bounds testing approach and a VECM to test the direction of causality. The results support Tax-spend hypothesis in Singapore, Indonesia, Sri Lanka in the short-run and for Nepal both in the long-and

short-run. Evidence of Spend-tax hypothesis is found for Indonesia and Sri Lanka. The findings provide evidence for Fiscal neutrality for India, Malaysia, Pakistan, Philippines, Thailand and Singapore. Narayan and Narayan (2006) investigates the relationship for 12 developing countries, adopting the Toda and Yamamoto non-causality test. Fiscal neutrality is found for Ecuador, Guatemala, Guyana, Peru, South Africa and Uruguay. The results for Haiti indicates Fiscal synchronization hypothesis, while Tax-spend hypothesis is evident for Chile, El Salvador, Mauritius, Paraguay and Venezuela. Wolde-Rufael (2008) employs the same Toda and Yamamoto causality test for 13 African countries. The results give evidence for the Tax-spend hypothesis for Ghana, Ethiopia, Kenya, Nigeria, Mali and Zambia. Support for the Spend-Tax hypothesis is found for Burkina Faso, Fiscal synchronization hypothesis is found for Mauritius, Swaziland and Zimbabwe, while Fiscal neutrality exists for Botswana, Burundi and Rwanda. Afonso and Rault (2009) adopt Bootstrap Panel Analysis for 25 European countries. Tax-spend hypothesis is supported for Germany, Belgium, Austria, Finland, UK and many new European Union (EU) member states. Evidence for Spend-tax hypothesis is found for Italy, France, Spain, Greece and Portugal. Vamvoukas (2011) employs two-variable and three-variable panel model estimations, using the Two-Stage Least Squares (TSLS) and the Generalized Moments Method (GMM) techniques and a Granger causality test to determine the relationship for 15 EU countries. The results provide support for the Fiscal synchronization hypothesis. Magazzino (2012) finds a weak long-run relationship between government expenditure and government revenue in WAMZ countries. The paper investigates the relationship for 15 ECOWAS countries. Tax-spend hypothesis is supported by the results from Gambia, Liberia, Nigeria and Sierra Leone; support for Fiscal synchronization is found for Mali; Spend-tax hypothesis is evident Burkina Faso, Senegal. Togo, Cape Verde and Guinea; and Fiscal neutrality is evident in Benin, Cote d'Ivoire, Guinea Bissau and Ghana. The study is done in a Panel data analysis framework and using a Panel cointegration test. Finally, Hamdi and Sbia (2013) undertakes a Panel data analysis of 6 GCC countries. They use GDP as a control variable. The paper employs Toda and Yamamoto procedure and a modified standard VAR method for the period 1990-2010. Evidence is found for Spend-tax hypothesis in Qatar and United Arab Emirates (UAE) while Tax-spend is valid for Saudi Arabia.

## METHODOLOGY

A bivariate regression equation is used to investigate the relationship between government expenditure and government revenue. The relationship is determined in both ways. Therefore, the equations are given as:

$$\ln E_t = \alpha_0 + \alpha_1 \ln R_t + \varepsilon_t \quad (1)$$

$$\ln R_t = \beta_0 + \beta_1 \ln E_t + \mu_t \quad (2)$$

Where $E_t$ and $R_t$ represent real government expenditure and government revenue respectively. $\alpha_1$ and $\beta_1$ are the coefficients of government revenue and government expenditure respectively in their respective equations. $\ln$ is the logarithm operator. The use of logarithms allows the coefficients to be interpreted as elasticities. $\varepsilon_t$ and $\mu_t$ are the error terms in their respective equations.

The researcher's source of data is the International Monetary Fund (IMF) International Financial Statistics (IFS, 2014). Government expenditure and revenue are given in real terms. They are deflated using the Consumer Price Index (CPI). Data used covers the period 1980-2013.

**Estimation strategy**

We test for stationarity in the series. The null hypothesis of the existence of a unit-root and hence, non-stationarity is tested against the alternative hypothesis of stationarity and hence, no unit root. If the mean, variance and covariance of a time series are invariance with respect to time, then the series is integrated of order zero, *I*(0). If stationarity occurs only after first differencing, then the series is integrated of order one, *I*(1). The test is done using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests for unit root. The test is done for both the levels and the first differences of the series. We consider a unit root test with a constant and a constant and a trend. The Akaike Information Criterion (AIC) is employed to determine the maximum lag length. The maximum lag length is two (2).

In the face of *I*(0) series, the existence and validity of a long-run relationship will be tested by employing the Ordinary Least Squares (OLS) method. Given this, a vector autoregressive (VAR) model will be used to determine the short-run properties of the model. If the coefficients of the variables in the VAR model are jointly significant, then they imply the possible existence of a causal relationship between the variables. Finally, a Granger causality test will be done within the VAR framework, to determine the causal relationship between the variables in the model. We test the null hypothesis of no Granger causality against the alternative hypothesis of the presence of Granger causality. The rejection of the null hypothesis implies the existence of Granger causality.

**RESULTS AND DISCUSSIONS**

The empirical results and findings are presented and discussed here. We begin with the discussion of the unit root results. We then move on to discuss the long-run and short-run results estimated by the OLS and VAR approaches respectively. We conclude by discussing the Granger causality test results.

**Unit Root Test Results**

The ADF and PP unit root test results are similar. They both indicate that the series are *I*(0) when the test is done with a constant and a trend and *I*(1) when the test is done with a constant but without a trend. Government expenditure and government revenue are *I*(0) at 1 percent level of statistical significance when the test is done with a constant and a trend under the ADF unit root test. They are however respectively *I*(0) at 5 percent and 1 percent levels of statistical significance under the PP unit root test with a constant and a trend. Moreover, they are both *I*(1) at 1 percent level of significance when the test is done under the ADF and PP framework with a constant but without a trend. Since, government expenditure and government revenue are both highly trending variables, we go with the results for the unit root test with a constant and trend. The results are presented in Tables 1 and 2.

**Table 1: ADF Unit Root Test Results**

| | Level | | First Difference | |
|---|---|---|---|---|
| Variable | Trend | No Trend | Trend | No Trend |
| LOGE | -5.112*** | -0.924 | _ | -5.150*** |
| LOGR | -4.727*** | -0.241 | _ | -6.115*** |

**Source**: Author.
**Note**: *** (**) indicates that the null hypothesis of unit root is rejected at the 1% and 5% levels of statistical significance.

**Table 2: PP Unit Root Test Results**

| | Level | | First Difference | |
|---|---|---|---|---|
| Variable | Trend | No Trend | Trend | No Trend |
| LOGE | -3.664** | -1.291 | _ | -10.531*** |
| LOGR | -4.758*** | 0.378 | _ | -13.489*** |

**Source**: Author.
**Note**: *** (**) indicates that the null hypothesis of unit root is rejected at the 1% and 5% levels of statistical significance.

**Estimated Regression Results**

The regression results indicate that in the long-run, for equation (1), a percentage increase in government revenue leads to a 0.97 percent increase in government expenditure. It is statistically significant at 1 percent level of significance. This is almost a one-for-one percentage change. Therefore, government expenditure is elastic to changes in government revenue in the long-run. The short-run results for

the same equation indicate that, a percentage increase in government revenue leads to a 0.83 percent increase in government expenditure when the first period lag is considered. This is statistically significant at 5 percent level of significance. However, in the second period lag, a percent increase in government revenue leads to a 0.69 percent fall in government expenditure. This may be caused by the absence of fiscal illusion (see Buchanan, 1967; Young, 2009). In other words, the citizenry become aware of the tax incidence of government expenditure in the second period lag in the short-run and therefore, do not support high levels of government expenditure. Therefore, in the second period lag, increases in taxes reduce government expenditures. The long- and short-run results for this equation are given in Tables 3 and 4 respectively.

**Table 3: Estimated Long-Run Coefficients Using the OLS Approach- Dependent Variable lnE**

| VARIABLE | COEFFICIENT |
|---|---|
| **Const** | 0.869540 |
| | (0.546583) |
| **lnR** | 0.972399*** |
| | (0.0324269) |
| **R-Bar-Squared** | 0.994081 |
| **F-Statistic** | 899.2446*** |
| **DW-Statistic** | 2.039661 |

**Source**: Author

**Note:** lnE is the dependent variable. ***(**) implies the null hypothesis is rejected at 1% (5%) level of statistical significance

**Table 4: VAR EQUATION-Dependent Variable lnE**

| VARIABLE | COEFFICIENT |
|---|---|
| **Const** | 1.69840*** |
| | (0.537475) |
| **lnE_1** | -0.160602 |
| | (0.380030) |
| **lnE_2** | 0.952524*** |
| | (0.309121) |

| | |
|---|---|
| **lnR_1** | 0.832629** |
| | (0.385574) |
| **lnR_2** | -0.693882** |
| | (0.294871) |
| **R-Bar-Squared** | 0.970639 |
| **F-Statistic** | 257.2098*** |
| **DW-Statistic** | 1.618998 |

**Source**: Author

**Note:** lnE is the dependent variable. ***(**) implies the null hypothesis is rejected at 1% (5%) level of statistical significance

For equation (2), the long-run results in Table 5 show that, a percentage increase in government expenditure leads to a 0.99 percentage increase in government revenue. The result is statistically significant at 1 percent level of significance. The implication is that, an elastic relationship exists between government revenue and government expenditure over the period. The effect of expenditure increases on revenue generation efforts is approximately one-for-one. The short-run results in Table 6 indicate that, a percentage increase in government expenditure increases government revenue by 1.16 percent in the second period lag. This is fairly highly elastic and it is statistically significant at 1 percent level of significance. The long- and short-run results confirm similar results obtained by Aregbeyen and Insah (2013) for Ghana. Interestingly, a percentage increase in revenue in the first period lag increases current government revenue by 1.24 percent while a percentage increase in government revenue in the second period lag reduces current revenue by 0.9 percent.

**Table 5: Estimated Long-Run Coefficients Using the OLS Approach-Dependent Variable lnR**

| VARIABLE | COEFFICIENT |
|---|---|
| **Const** | -0.200716 |
| | (0.510026) |
| **lnE** | 0.988424*** |
| | (0.0297486) |
| **R-Bar-Squared** | 0.993540 |
| **F-Statistic** | 1103.961*** |
| **DW-Statistic** | 1.933343 |

**Source**: Author

**Note:** lnR is the dependent variable. ***(**) implies the null hypothesis is rejected at 1% (5%) level of statistical significance

**Table 6: VAR EQUATION-Dependent Variable lnR**

| VARIABLE | COEFFICIENT |
|---|---|
| **Const** | 1.47627** |
| | (0.547391) |
| **lnE_1** | -0.593759 |
| | (0.387041) |
| **lnE_2** | 1.16380*** |
| | (0.314824) |
| **lnR_1** | 1.23757*** |
| | (0.392688) |
| **lnR_2** | -0.880552*** |
| | (0.300311) |
| **R-Bar-Squared** | 0.969331 |
| **F-Statistic** | 245.9500*** |
| **DW-Statistic** | 1.621456 |

**Note:** lnR is the dependent variable. ***(**) implies the null hypothesis is rejected at 1% (5%) level of statistical significance

The F-statistic in the various estimated regression results is statistically significant at 1 percent level of significance. It indicates that the coefficients are jointly significant. Especially for the short-run results, the fact that the F-statistic for each equation is statistically significant at 1 percent level of significance indicates the possibility of the validity of a causal relationship.

**Granger Causality Test Results**

The validity of the long-run and short-run relationships permits a Granger-causality test to be done. Causality may therefore run in at least one direction (see Engel and Granger, 1987). Pairwise Granger causality tests are done. We test the null hypothesis of the absence of Granger causality against the alternative hypothesis of the presence of Granger causality. In fact, Granger Causality test is actually a predictability test. That is, it indicates how much of the current government revenue and government expenditure can be explained by previous levels of government revenue and government expenditure, and if the explanation can be improved when lagged values of government revenue and government expenditure are added (see Al-Zeaud, 2012).

From the Granger causality results in Table 7, there exists a causal relationship between government expenditure and government revenue. The causality is unidirectional and very strong. Specifically, government revenue causes government expenditure. Therefore, we find evidence of Tax-spend hypothesis. In other words, increases in government revenue lead to increases in government expenditure without a feedback effect. This is similar to the evidence of a unidirectional revenue-expenditure nexus running from revenue to expenditure found for Ghana by previous studies (see Amoah and Loloh, 2008; Wolde-Rufael, 2008). Contrarily, Doh-Nani and Awunyo-Vitor (2012), and Aregbeyen and Insah (2013) find evidence of bidirectional causality for Ghana running from revenue to expenditure and from expenditure to revenue while Magazzino (2012) find evidence of fiscal neutrality for Ghana. It must however be stated that revenue and expenditure are both influenced by the level of economic activity. Therefore, the presence of Granger causality does not necessarily differentiate the direct causality between revenue and expenditure and the indirect causality effects through GDP (see Narayan and Narayan, 2009; Chang and Chiang, 2009; Mehrara et. al, 2011). Moreover, a non-linear relationship may exist between government expenditure and government revenue and other variables which are not indicated in the model since Granger causality only tests linear relationships.

**Table 7: Granger Causality Test Results**

| Null Hypothesis | Obs | F-Statitic | Prob. |
|---|---|---|---|
| E does not Granger Cause R | 32 | 0.44688 | 0.6443 |
| R does not Granger Cause E | | 15.9356 | 3.E-05 |

## CONCLUSIONS AND POLICY RECOMMENDATIONS

The long- and the short-run results show that expenditure and revenue determine each other, indicating a strong and a valid long-and short-run relationship between revenue and expenditure over the period studied. However, the second period lag results for the short-run imply increases in taxes have a rather negative effect on government spending, indicating the possibility of an absence of fiscal illusion. Hence, the citizenry must clearly know how much the government is spending so they can realize the cost of government activities and decide if they can "fund" such continually growing expenditure. It is also possible that, given the absence of fiscal illusion, "starving-the-beast" policies may not work for Ghana. The Granger Causality test results however indicate a unidirectional causal relationship between government revenue and government expenditure. This relationship runs from government revenue to government expenditure. Therefore, evidence of Tax-Spend hypothesis is found over the period considered. The implication is that, even though in recent years, government has not been doing badly in terms of its revenue generation efforts, it still has to do more. Government must broaden the tax base to capture the large and mostly untaxed informal sector of the economy in order to raise revenue that will enable it make revenue decisions to fund its expenditure plans and reduce the frequent fiscal slippages. This will address the huge revenue-expenditure disparities that exist and which continually cause fiscal imbalances in Ghana. Besides, the fact that past and present government revenue levels have impact on government expenditure implies they temporarily precede each other, providing necessary information for forecasting expenditure levels in future. Hence, proper cost-benefit analysis of government activities will ensure that the government spends "wisely" and on growth-enhancing "activities".

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