# Government Expenditure and Economic Growth in Five ECOWAS Countries: A Panel Econometric Estimation

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**Abstract:** The study explores the cointegration relationship between government expenditure and economic growth for five ECOWAS countries. A panel cointegration approach is used for the dataset for the first time. From the results, government expenditure and economic growth are not cointegrated in both their common and idiosyncratic components. Thus, further analysis on the causalities among the variables could not be assessed. The results collaborate recent findings on the weakness in using fiscal policy to explain economic growth behaviour in these developing and resource constrained countries.

**Key words:** Government expenditure, economic growth, panel cointegration, unit root, fiscal policy, Ghana

## INTRODUCTION

Though, there has been considerable number of research into the relationship between government expenditure and economic growth, the question still remains relevant in developing countries in the wake of the global financial crisis. According to The World Bank (2008) at the heights of the crisis, developing countries faced a financing shortfall of $270-700 billion in 2008 as private sector creditors shun emerging markets and only one quarter of the most vulnerable countries have the resources to prevent a rise in poverty. Many of the world's poorest countries have seen their fiscal revenues decline because of the crisis.

This has left many of these countries becoming evermore dependent on development aid and exports. Many economists have outlined the impact of the crisis on developing countries among others, fiscal deficits and slow down in GDP growth. In resource scarce developing countries, the role of government expenditure in solving market failure is very significant in pushing productivity. In most West African countries, governments are the largest spenders and therefore, a freeze on spending can have very severe consequences on economic growth. For instance, real GDP growth in the countries of West Africa stagnated at 5.4% in 2008 as it was in 2007 and has been projected to slow down by more one percentage point to about 4.2%.

The role of government expenditure in stimulating economic growth has been widely accepted in the macroeconomics literature since, the researches of Wagner (1876) and Keynes (1936), respectively. The importance of the causal relationship between government expenditure and economic growth has long been recognized, though empirical estimates have not yielded significant and conclusive results for developing countries. Several studies in developing countries such as Ansari *et al.* (1997), Bagdigen and Cetintas (2003) and Dogan and Tang (2006) among others have empirically studied the causal relationship by applying conventional unit root and cointegration testing procedures for individual countries.

These studies however, found little or no long run causal relationship between measures of government expenditure and economic growth in most developing countries.

With respect to ECOWAS countries, previous studies by Iyare *et al.* (2005) and Oteng-Abayie and Frimpong (2009) have found no long run causal relationship between growth and government expenditure. The two fold objectives of this study is to revisit the issue on the causal relationship between government expenditure and economic growth using an expanded data set covering five ECOWAS member countries and also to establish the cointegration property in more precise terms by applying a more robust panel cointegration techniques.

## MATERIALS AND METHODS

**Model specification:** There are various formulation of the theoretical relationship between government expenditure and economic growth. Based on Mann (1980) and Iyare *et al.* (2005) among others, we formulate a simple Log-linear model to test the long run relationship between expenditure and growth model as follows:

$$\ln(GEX) = A_0 + A_1 \ln(PCGDP)_{it} + e_{it} \qquad (1)$$

where, GEX is log of government expenditure as a percent of GDP and PCGDP is log of real per capita income.

**Data:** Annual time series data on the log of government consumption expenditures as percent of GDP (GEX) measured and log of Per Capita Gross Domestic Product (PCGDP) for the Gambia, Ghana Guinea, Nigeria and Sierra Leone from the African Development Indicators published by the World Bank were used. The data is for the period 1965-2007. The trend plots (Fig. 1 and 2) of the two variables of interest show variable trends over time in the various countries.

Real GDP growth rates for the selected countries show a trend towards convergence around 5% with the exception of Guinea which is diverging. The fiscal indicator which is the balance between expenditure and revenue in general also shows a tendency towards long run convergence. With regard to the single currency policy being pursued by these countries as West African monetary zone, this is a very satisfactory picture.

**Econometric methodology:** The recently developed panel econometric techniques has become popular for several reasons. Firstly, it is designed to control for cross section
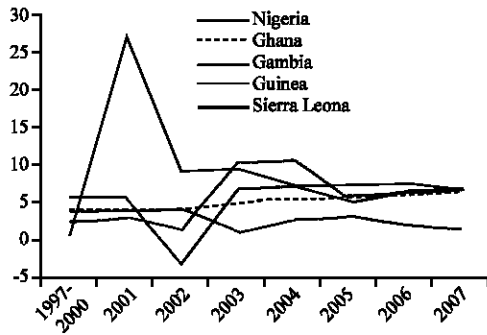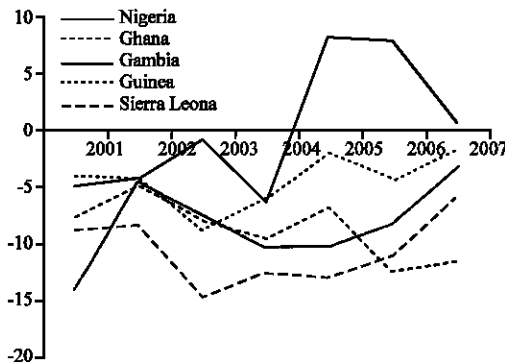


Fig. 1: Real GDP growth (%)



Fig. 2: Fiscal balance indicatiors (GDP (%))

dependencies and secondly to improve on the power of the estimation by exploiting the commonalities of the countries under investigation. In particular, a long run equilibrium between government expenditure and economic growth may occur due to the existence of regional or ational trends or both.

To investigate these issues, each variable is separated into common and idiosyncratic components as suggested by Bai and Ng (2004). Cointegration between the series can occur only if the common factors of the variables cointegrate. If both the common factors and idiosyncratic components are I (1), cointegration is examined separately for the common and the idiosyncratic components. If the common factors are I (1) but the idiosyncratic components are I (0), the nonstationarity in the panel could be entirely driven by a reduced number of regional stochastic trends. This would be the case of cross member cointegration. Suppose that the series Y and X have a single I (1) common factor, i.e:

$$Y_{it} = \lambda_{1i} F_t^Y + E_{it}^Y \qquad (2)$$

$$X_{it} = \lambda_{2i} F_t^X + E_{it}^X \qquad (3)$$

Where:

F = Common factors

E = Idiosyncratic elements of the respective variables

A panel cointegrating relationship between Y and X:

$$Y_{it} - \beta_i X_{it} = \lambda_{1i}\left(F_t^Y - \lambda_{2i}\frac{\beta_i}{\lambda_{1i}}F_t^X\right) + E_{it}^Y - \beta_i E_{it}^X \qquad (4)$$

requires that the null of no cointegration is rejected for both the common and the idiosyncratic components. Cointegration between common factors can be examined by the usual time series tests such as the Johansen reduced rank approach. As the idiosyncratic components are independent by construction, their analysis is done by standard panel tests such as those of Pedroni (1999, 2004). It should be noted, however that the existence of cointegrating relationships that wipe out both the common and idiosyncratic trends is very unlikely shown in Eq. 4.

As with time series cointegration, estimates from a cointegrated panel are robust to a variety of problems that often plague empirical work including endogeneity, omitted variables and measurement error (Phillips and Moon, 2000; Baltagi and Kao, 2000). Moreover, panel cointegration techniques can be implemented with shorter data spans than their time series counterparts and statistical inference is simplified because limiting

Table 1: Panel unit root test

| Categories | Level | | First difference | |
|---|---|---|---|---|
| | Statistics | Prob value** | Statistics | Prob value** |
| **Per Capita GDP (PCGDP)** | | | | |
| Levin, Lin and Chu t-test* | 1.19060 | 0.8831 | -5.24866 | 0.0000 |
| Im, Pesaran and Shin W-test | 0.97703 | 0.8357 | -4.51497 | 0.0000 |
| ADF-Fisher Chi-square test ($\chi^2$) | 8.17865 | 0.6114 | 38.29170 | 0.0000 |
| PP-Fisher Chi-square ($\chi^2$) | 4.12626 | 0.9415 | 45.60690 | 0.0000 |
| **Government expenditure as % of GDP (GEX)** | | | | |
| Levin, Lin and Chu t-test* ($\chi^2$) | -2.04515 | 0.0204 | -2.05194 | 0.0201 |
| Im, Pesaran and Shin W-test♦ | -0.98681 | 0.1619 | -3.16415 | 0.0008 |
| ADF-Fisher Chi-square test♦ ($\chi^2$) | 14.83450 | 0.1382 | 28.06170 | 0.0018 |
| PP-Fisher Chi-square♦ ($\chi^2$) | 7.88505 | 0.6401 | 58.82370 | 0.0000 |

*Null: Unit root (assumes common unit root process) ♦Null: Unit root (assumes individual unit root process); **Probabilities for Fisher tests are computed using an asymptotic Chi-square ($\chi^2$) distribution. All other tests assume asymptotic normality

Table 2: Panel cointegration

| Factors | Test statistic | p value |
|---|---|---|
| **Pedroni residual cointegration tests** | | |
| Panel v-statistic | -0.015973 | 0.3989 |
| Panel rho-statistic | 1.867458 | 0.0698 |
| Panel PP-statistic | 2.585236 | 0.0141* |
| Panel ADF-statistic | 2.078238 | 0.0460* |
| Group rho-statistic | 1.881744 | 0.0679 |
| Group PP-statistic | 1.838432 | 0.0736 |
| Group ADF-statistic | -0.655295 | 0.3219 |
| **Kao residual cointegration tests** | | |
| ADF | -0.949890 | 0.1711 |
| **Johansen Fisher panel cointegration test** | | |
| Fisher stats (trace) | 17.280000 | 0.0684 |
| Fisher stat (max-eigen) | 17.280000 | 0.0684 |

Probabilities are computed using asymptotic Chi-square ($\chi^2$) distributio

distributions are standard normal. Evans (1998) refers to panel cointegration as a stable long-run relation between the dependent variable and the independent variables in countries in a panel. This concept is distinct from cross-member cointegration whereby the dependent variable in one country is cointegrated with the dependent variable of another country in the panel.

We make use of both, the time series (years) and the cross sectional (country level) information of the data set. Econometric testing is performed in 2 steps. Before estimating the long-run cointegratiion relationships, the relevant variables are pre-tested for unit roots and cointegration. Recent literature suggests that panel-based unit root tests have higher power than traditional ADF and Philips-Perron unit root tests based on individual time series. Though these tests are commonly termed panel unit root tests, theoretically, they are simply multiple-series unit root tests that have been applied to panel data structures (Eviews 6 User's Guide). Firstly, We used the Panel unit root tests as proposed by Levin *et al.* (2002) and Im *et al.* (2003).

Panel unit test results are shown in Table 1 (Levin *et al.*, 2002; Im *et al.*, 2003). Secondly, we tested for cointegration. A number of panel cointegration tests have been proposed in the econometrics literature, analogous to time series cointegration tests (Pedroni, 2004). Panel

cointegration tests can be done as pooled (within dimension) tests and as group mean tests, corresponding to the Panel analogues of the time-series rho-statistic, t-statistic and ADF tests (Phillips and Perron, 1988; Phillips and Ouliaris, 1990; Dickey and Fuller, 1979). These are shown in Table 2.

## RESULTS AND DISCUSSION

**Panel unit roots test:** Panel unit root tests are applied to test for stationarity of the time series. From Levin *et al.* (2002) t group unit root and Philips-Perron individual unit root procedure, the hypothesis of a unit root in the levels of all variables for all countries could not be rejected (Table 1). The hypothesis is however, rejected after first differencing, indicating that all variables are stationary in their first-log-first differences. These results are robust to the test method and the exogenous variable specification.

**Panel cointegration:** Following from the results of the Panel unit root tests, researchers were able to test for the cointegration relationship between the variables among the five pooled countries using the panel cointegration technique discussed earlier. A lag length of two was chosen for the test based on SBC information. From Table 2, the results suggests that a stable long run cointegration relationship between government expenditure and economic growth cannot not be estimated. The various cointegration tests did not produce unanimous significant results. For instance, Johansen Fisher panel cointegration tests (trace and maximum eigen) were not significant at the traditional 5% levels. The Kao residual ADF cointegration tests statistics was also not significant (Kao, 1999). With respect to the Pedroni residual cointegration tests, only the panel ADF and PP statistics were significant. However, the group ADF and PP statistics were not significant. These results supports earlier findings from studies by Ansari *et al.* (1997), Iyare *et al.* (2005) and Oteng-Abayie and Frimpong (2009). Thus, the robustness

of the techniques adopted in this study does not show any significant difference in the results obtained in the previous studies. To this point, the study did not find it necessary to estimate a long run dynamic panel regression for the model in accordance with Baltagi. Thus, the reasons attributed to the conclusions that have been discussed by Ansari *et al.* (1997) and Oteng-Abayie and Frimpong (2009).

## CONCLUSION

This study empirically analyzed the cointegration relationship between government expenditures and economics growth using the advanced method of Panel unit root and panel cointegration. A nonstationary Panel data analysis is an appropriate method of analysis in regions such as Sub-Saharan Africa where it is difficult to collect a sufficiently a large sample size. The empirical results revealed that there is no long run cointegration relationship between government expenditures and economic growth among the five ECOWAS countries comprising the Gambia, Ghana Guinea, Sierra Leone and Nigeria over the period from 1986 and 2004. Further analysis on causalities were therefore not necessary. The findings could indicate that government expenditures do not play a significant role in promoting economic growth in the ECOWAS countries in the study.

The ability of governments in the countries studied to increase taxes beyond a certain level prevent government are challenged. Government fiscal policy through spending cuts may not have the necessary direct impact on economic growth in these countries. For instance in Ghana, cuts in government spending are expected to slow growth in productivity. Thus in ECOWAS countries, fiscal policy is unlikely to deliver growth impact without significant external budgetary support. Most importantly, the findings of this study are possible if non-economic factors are more important in explaining the growth of government expenditure than economic factors.

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