“Impact of fiscal policy variables on economic growth in Nigeria (1970-2012): a managerial economics perspective”

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Impact of fiscal policy variables on economic growth in Nigeria (1970-2012): a managerial economics perspective

Abstract

This study is set out to investigate the impact of fiscal policy variables (capital expenditure, recurrent expenditure and direct income tax) on economic growth in Nigeria. The study adopts a growth accounting framework that specifies economic growth as a function of the fiscal policy variables. Using a time series data for the period 1970-2012, the study tests for the presence of unit root test, using the augmented Dickey-Fuller test for stationarity. It is discovered that all the variables are integrated at I(1). The Johansen cointegration reveals the presence of a long run relationship between economic growth and all the dependent variables (CX, RX and TX). The VECM analysis indicates that capital expenditure and recurrent expenditure are positively related and statistically significant in determining economic growth in the long run. As expected, direct income tax is inversely related and statistically significant in determining economic growth in the long run. A 1% increase in capital expenditure leads to an increase of 3.94% in income. A 1% increase in recurrent expenditure leads to an increase of 3.22% in income. On the other hand, a 1% increase in direct income tax leads to a fall of 6.83% in national output. Moreover, only tax determines economic growth in the short run, as a 1% in direct income tax causes national output to fall by 0.39%. These results meet apriori expectations with respect to their signs. GDP adjusts to its long run equilibrium when there is a shock at a slow speed of 3.07%. The pairwise granger causality indicates that causality relationship does not exist between any of the fiscal policy variables and economic growth. Based on these results, the study recommends the adoption of tax policies that would spur growth instead of retarding growth with a wide margin, as has been observed from the study. Efforts should be made to skew the pattern of public spending towards capital expenditure as it leads to higher growth than recurrent expenditure.

Keywords: capital, economic growth, fiscal policy, government, taxation.
JEL Classification: O23.

Introduction

Economic thinkers before the Great Depression never supported of government playing a major role in economic decision making until 1929-30s. Government intervention in the economy came as a result of the inability of the market forces to resolve the problems of the Great Depression. Since then, Keynesian prescription of the use of fiscal policy came into the limelight as a means of regulating the level of economic activity in a country.

Fiscal policy refers to government's management of the economy through the changes of its income and spending abilities and actions to achieve certain desired macroeconomic objectives. The objectives of fiscal policy include: economic growth, price stability, BOP equilibrium, exchange rate stability, etc. (Blanchard, 2009). Fiscal policy has two major basic components which are government expenditure and taxation. Government can manipulate each of these two variables in order to achieve a certain level of economic activity and objectives which would favor the generality of its citizens.

In Nigeria, fiscal policy is an important economic tool used by the government to distribute and re-distribute income and welfare. "Undoubtedly, fiscal policy is central to the health of any economy, as government's power to tax and to spend affects the disposable income of citizens and corporations, as well as the general business climate" (Abata, Kehinde and Bolarinwa, 2012). The government agency responsible for Fiscal policy formulation and implementation is the Federal Ministry of Finance. Other agencies that are involved include the National Planning Commission and the Debt Management Office. All these agencies were established to work towards the achievement of economic welfare for the people of Nigeria.

One of the tools of fiscal policy which is used by the government to influence growth and development is public spending. In Nigeria, public spending takes the form of capital expenditure and recurrent expenditure. Capital spending includes expenditure in public works and goods, while recurrent spending includes expenditure used for maintaining the work force (salaries and allowances). The basic Keynesian analysis shows that increasing public spending induces investment, income, growth and consequently improved economic well-being. The budgeted amount for spending in annual budgets in Nigeria has never declined over the years. However, issues of hunger, poor infrastructural development, poor investment, poverty, etc., pervade the Nigerian society. This is one area that is a cause of concern for policy makers.

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In terms of using fiscal policy to achieve growth and welfare in Nigeria, the current federal government in Nigeria has adopted a medium term fiscal policy framework (MTEF) whose theme is fiscal consolidation, job creation and inclusive growth. In this framework, the government intends to skew public expenditure away from recurrent expenditure to the capital expenditure. It has also widened the revenue generation through more efficient tax reforms and boosting the non-oil sector. For instance, theme of 2012 federal budget was tagged with theme: fiscal consolidation and job creation. In that respect, government effort was to invest in key priority sectors; power, agriculture, education, housing, transport (railways), direct job creation, roads and rail projects, maternal and child health programs, (Subsidy reinvestment programme: SURE-P), and aviation. In their efforts to reduce the cost of governance, the federal government is resolved to rationalize government agencies with overlapping functions. This will lead to some modest savings that would be plough back into productive sectors that will improve the welfare of Nigerians (Federal Ministry of Finance, 2012).

This trend of fiscal discipline continued in the 2013 budget which budget was tagged: fiscal consolidation with inclusive growth. It featured a 5% rise in government spending; N3 billion set aside for women entrepreneurs and farmers; a fiscal deficit of 0.68% drop from 2012 budget deficit figure of 2.85%; projected economic growth of 6.5% (6,85% in 2012); decline in recurrent expenditure from 71.47% (in year 2012) to 68.7% (in year 2013); capital expenditure increase from 28.53% (2012) to 31.3% (2013). Welfare priority sectors received the highest attention in this budget. Education ranked the first position as it received N426.53 billion, defense came second with N348.9 billion. Police came third with N319 billion, as Health received the fourth position with N279.23 billion. Works received N183.5 billion, while Agriculture and Power received N81.41 billion and N74.26 bilion. One thing about this in 2013 is that Education, Health and Agriculture received significant jump when compared to previous year's allocation. In 2012, the percentage of budgeted amount for Education, Health and Agriculture total expenditure stood at 8.52%, 1.21% and 1.70%, respectively. However, in 2013, Education, Health and Agriculture's budget to total budget increased to 8.67%, 5.70% and 1.70%, respectively (Federal Ministry of Finance, 2013). All these are government efforts to improve economic growth and welfare in Nigeria, but achievement of better economic welfare in Nigeria still remains elusive with the rising and unabated unemployment, inflation, social restiveness, poverty, etc.

Although monetary policy is major economic policy used by the government to influence the level and direction of aggregate demand through the use of instruments like money supply and interest rate, another issue that has bothered policy makers in Nigeria is that of the contribution of the different components of fiscal policy (capital, recurrent expenditure, and taxation) on economic growth. Many regimes of government in Nigeria have always adopted expansionary fiscal policy with the objective of ensuring that the average Nigeria worker is well catered for. The Udoji Award of 1976 and other welfare packages to workers have been attributed to as the original causes of inflation and unemployment in Nigeria. Even after then, workers' agitations for higher wages and spending policies in Nigeria have always favored increasing recurrent expenditure, with little capital expenditure.

Again, many previous studies have ignored the inclusion of taxation in their studies of the relationship between fiscal policy variables and economic growth. The theory of balanced budget explains the equality between government expenditure and taxation. However, the level of fiscal deficit in developing countries demands that tax should be isolated in empirical studies to study its impact on economic growth. The few empirical studies that have tried to toe this line of analysis were inconclusive in their findings. For instance, the result in the study by Fajingbesi and Odusola (1999) shows that real government capital expenditure has significant positive influence on real output level of economy while real government recurrent expenditure exert little influence on economic growth. On the other hand, the study by Ogiogio (1995) revealed that budgeted recurrent expenditure exerts more influence on economic growth than budgeted capital expenditure. Reconciling this controversy is one of the areas this study focuses on.

There is also the question of the impact of government expenditure on economic growth. While some studies claim that government expenditure engenders growth by increasing personal incomes, employment and consumption (Ekpo, 1994; Dauda, 2010), others claim that it crowds out private investment through increase in cost of borrowing (interest rates) in developing countries (Husnain, Khan, HaqPadda, Akram, and Haider, 2011; Fuente, 1997; Karimi and Khosravi, 2010).

Research question. The above analysis led to the following research questions:

- What is the impact of the different basic components of fiscal policy on economic growth in Nigeria?
- What is the direction of causality relationship between economic growth and fiscal policy variables?

Research objectives. The research objectives are:

- To analyze the impact of different basic components of the fiscal policy on economic growth in Nigeria,
- To establish the direction of causality relationship between economic growth and fiscal policy variables.

1. Theoretical framework

The theoretical underpinning for this study is basically the endogenous growth theory which advocates the stimulation of level and growth rate of per capita output through within the model using fiscal policy (e.g., government spending).

The traditional neoclassical growth model assumes that output is a function of capital and labor, while technology is given:

$$Y = Af(K, L), \quad (1)$$

where Y = output, A is technology, being exogenous, while capital (K) and labor (L) are endogenous factors.

In the New Growth Model (Endogenous Growth Model) technology is viewed as endogenously determined:

$$Y = f(K, L, A). \quad (2)$$

Technology (A) refers to rate of investment, (K) is the investment in capital stock and (L) is the human capital.

This model envisages greater role of government in improving the efficiency or resource allocation and promoting investment to raise the rate of economic growth in the developing countries (Ahuja, 2009). The government can directly make adequate investment in economic infrastructure such as power, communication, roads, and highways and in human capital, which promote private investment and generate increasing returns to scale. Though, in many respects, endogenous growth is a mere extension of the neoclassical theory of growth. It, however, makes a departure from the neoclassical policy of free market and passive role of government. More specifically, models of the growth effects of fiscal policy are usually built on the basis of Barro and Sala-i-Martin (1992) framework. This study draws inspiration from these studies by employing a production function in which government expenditure and taxation enter as inputs. The choice of this framework is owed to its simplicity in application and availability of time series data in Nigeria.

2. Literature review

Many empirical works have tried to trace and analyze the relationship between fiscal policy and economic growth. In Nigeria, previous studies have also attempted to demonstrate that government budgetary expenditures and revenues actually influence the economic growth of the country. For instance, Oyinlola (1993), studied the impact of budgetary expenditure on the defence sector on economic growth of Nigeria and discovered that defence expenditure exerts significant positive impact on economic growth. In a latter study that was slightly modified, the data make-up of the budgetary correlates and increased the number of observations, the findings reveal that government budgetary activity has significant impact on economic growth. In the same vein, Easterly and Rebelo (1993), studied the impact of government expenditure and income on Gross Domestic Product and found that government activities determine the direction of Economic growth in Nigeria.

Olugbenga and Owoye (2007) in their study investigated the relationships between government expenditure and economic growth for thirty (30) OECD countries for the period 1970-2005 and found that a long-run relationship exists between expenditure by government and economic growth. Findings revealed a unidirectional causality relationship running from government expenditure to economic growth, for sixteen (16) out of the thirty countries in support of the Keynesian hypothesis. On the other hand, the direction of causality for ten (10) out of the thirty (30) countries runs from economic growth to government expenditure, in confirmation of the Wagner's law, which states that public expenditure is a consequence of economic growth (Wagner, 1883). The study showed the existence of bi-directional relationship between government expenditure and economic growth for a group of four countries in the study.

Onodje (2009) conducted an empirical study on the effects of fiscal policy shocks on private consumption to the Nigerian situation. It examines whether government expenditure shocks and tax revenue shocks have Keynesian effects. Data spanning the period 1980 to 2004 were used to estimate a vector error correction model. The estimation results show that both government consumption and tax revenue shocks have Keynesian effects; thereby validating the position of the empirical literature. Dauda (2010) examined the effect of investment spending in education on economic growth in Nigeria using thirty-one (31) years' time series data from 1977-2007. The study employs cointegration and error correction model techniques. The result shows positive and significant effect of educational expenditure on economic growth.

Taiwo and Agbatogun (2011) in their paper analyze the implications of government spending on the growth of Nigeria economy over the period 1980-2009. Using Johansen cointegration, unit root test and error correction model, it was discovered that total capital expenditure, inflation rate, degree of openness and current government revenue are significant variables to improve growth in Nigeria. In the final analysis, future expenditure on capital and recurrent should be managed along with adequate manipulation of other macroeconomic variables to ensure steady and accelerate growth. Medee and Nenbee (2011) study centred on an empirical investigation of the impact of fiscal policy variables on economic growth in Nigeria between 1970 and 2009, while adopting the not widely understood method of vector auto regression (VAR) and error correction mechanism techniques, the researchers found that there exist a mild long-run equilibrium relationship between economic growth and fiscal policy variables in Nigeria.

In Oseni and Onakoya (2012), the researchers aimed at testing the argument that only three fiscal variables (productive expenditure, distortionary tax and fiscal deficit) contribute to growth by using annual time-series data of Nigeria from 1981 to 2010. The study finds that in the case of Nigeria, four fiscal variables (productive government expenditure, unproductive government expenditure, distortionary taxes, non-distortionary taxes, government budget deficit) contribute immensely to growth either positively or negatively. Chude and Chude (2013) studied the impact of government expenditure on Economic Growth in Nigeria. This study investigates the effects of public expenditure in education on economic growth in Nigeria over a period from 1977 to 2012, using cointegration error correction model (ECM). The results indicate that total expenditure on education is highly and statistically significant and has positive relationship with economic growth in Nigeria in the long run. The researchers conclude that economic growth is clearly impacted by factors both exogenous and endogenous to the public expenditure in Nigeria.

In other countries, similar studies have also been carried out. For instance, the study conducted in Kenya by Amanja and Morrissey (2006) contributes to a theoretical and empirical debate on the question whether or not fiscal policy stimulates growth in the long run. They believe that government's involvement in economic activity is vital for growth, but an opposing view holds that government operations are inherently bureaucratic and inefficient and, therefore, stifle rather than promote growth. They used time series annual data to investigate the relationship of various measures of fiscal policy on growth. Categorising government expenditure into productive and unproductive and tax revenue into distortionary and non-distortionary, the study found out that unproductive expenditure and non-distortionary tax revenue do not contribute to growth as predicted by economic theory.

Enache (2009) investigated the connection between fiscal policy and economic growth in Romania using forecasted time series data which covered periods between 1992 and 2013. The researcher used OLS as the technique for data analysis. Empirical results showed weak evidence for the positive impact of fiscal policy on economic growth. The study concluded that government authorities could use fiscal policy to affect economic growth in an indirect manner. The study by Karimi and khosravi (2010) investigated the impact of monetary and fiscal policies on economic growth in Iran, using ARDL to cointegration approach for time series data between 1960 and 2006. The empirical result indicates existence of long run relationship between economic growth, monetary policy and fiscal policy. The result further reveals a negative impact of exchange rate and inflation (as proxies for monetary policy), but a positive and significant impact of government expenditure on economic growth.

Starr and Joharji (2010) in their study investigated whether government spending can boost the pace of economic growth as is widely debated. The study examines the relationship between government spending and non-oil GDP in the case of Saudi Arabia. The researchers use the methods of cointegration and error correction model. Using time-series methods and data for 1969-2005, they found that increases in government spending have a positive and significant long-run effect on the rate of growth. Estimated effects of current expenditure on growth turn out to exceed those of capital expenditure – suggesting that government investment in infrastructure and productive capacity has been less productive in Saudi Arabia than programs to improve administration and operation of government entities and support purchasing power.

Alm and Rogers (2011) ask in their research: what factors influence state economic growth in the United States? The study employs annual state (and local) data for the years 1947 to 1997 for the 48 contiguous states to estimate the effects of a large number of factors, including taxation and expenditure policies, on state economic growth. The study used orthogonal distance regression (ODR) to deal with the likely presence of measurement error in many of the variables. The results indicate that the correlation between state (and state and local) taxation policies is often statistically significant but

also quite sensitive to the specific regressor set and time period; in contrast, the effects of expenditure policies are much more consistent.

Baum & Koester (2011) searched for the answer to the question: does the state of the business cycle matter for the effects of fiscal policy shocks on GDP? This study analyzes quarterly German data from 1976 to 2009 in a threshold structural vector autoregressive model. The analysis finds that hiking spending results to a short-term fiscal multiplier of around 0.70, while the fiscal multiplier resulting from an increase in taxes and social security contributions yields -0.66. Moreover, the threshold model derives basically new revelations on the impact of shocks, depending on when in the business cycle they occur, their size and their direction. Fiscal spending multipliers are much bigger in periods of an inverse output gap but have only a very weak effect in periods of a positive output gap.

Cottarelli and Jaramillo (2012) in their study discussed the relationships between fiscal policy and growth both in the short and in the long run. While using the tools of debt ratio and GDP ratio with the tools of sensitivity analysis, and cross section data from the G7 countries in 2011 and 2012, findings reveal that a fiscal tightening will have a negative impact on growth. The authors concluded that with the proper policies, the deep links between potential growth and fiscal policy could promote a virtuous circle in which pro-growth fiscal adjustment measures, other structural reforms, and lower debt boost growth and the latter facilitates fiscal adjustment.

Sineviciene & Vasiliauskaite (2012) studied the interaction of fiscal policy with Private investment in the Case of the Baltic States. It was for the period 1995-2010 using annual data. It showed that fiscal policy indicators have positive and significant relationship with private investment in the Baltic States. The study reveals that current taxes on income, wealth, etc., indicators explain about 86 percent of the changes in private investment. Gross fixed capital formation by public sector indicator contributes about 80 percent of the private investment changes in the Baltic States. The empirical studies cited above, relating to fiscal policy and economic growth in both Nigeria and other countries left some gaps. The study variables are real gross domestic product (dependent variable) and government capital, recurrent expenditure, direct income tax (independent variable). This study as a departure from some domestic literature is a disaggregated analysis of the components of fiscal policy which focused on establishing long run relationship between fiscal policy and growth. This study also investigates a causality relationship between fiscal policy and growth using current data.

3. Model specification

Going by the theoretical framework, we adopt the endogenous production function in which economic growth is specified as a function of recurrent expenditure, capital expenditure and direct income tax. The econometric version of the model becomes:

$$GDP_t = \beta_0 + \beta_1 RX_t + \beta_2 CX_t + \beta_3 TX_t + \mu_t, \quad (3)$$

where GDP_t = gross domestic product (Proxy for Growth); RX_t = Total Recurrent Expenditure; CX_t = Total Capital Expenditure; TX = direct income tax; μ_t = error term.

3.1. Justification of variables. Various empirical studies on the impact of fiscal policy on economic growth have been conducted.

Total Recurrent Expenditure: although is a component of public expenditure, which is financed by taxes, the character of transfer payments is different from that of public consumption or capital expenditure since it is a monetary transfer from the government.

Total Capital Expenditure: if productive, creates income in the future and, therefore, there is no need to impose higher taxes. It is expected to impact positively on economic growth through increases in real investment, private income and wealth. As revealed by Ekpo (1995), capital expenditure on transport, communication, agriculture, health and education positively influence private investment in Nigeria, which invariably enhanced the growth of the overall economy

Direct income tax: has a direct effect on private consumption through disposable private income (Blinder and Solow, 1974). Since it is generally assumed that the marginal distortion increases with income, an increase in gross taxation leads to an accelerating decline in permanent income (both in the resources of the economy and the disposable income of individuals). It is important to keep in mind that both taxation and transfer payments may also lead to liquidity effects and since they create a change in the distribution of income, their effects may differ (Lavi and Strawczynski, 2005).

3.2. Research methodology. The annual time series data are expressed in nominal terms. They are for the period 1970-2012 and were obtained from the Central Bank of Nigeria Statistical Bulletin. The first stage in the empirical investigation is to analyze the time series properties of the data using the unit root (Augmented Dickey-Fuller) test to determine the order and level of difference stationarity of the variables. For a two variable relationship, the ADF assumes:

$$\Delta Y_t = \beta\alpha 0 + \alpha_1 \Delta Y_t + \alpha_2 (Y - \beta X)_{t-1}, \quad (4)$$

where Y_t is the dependent variable; the dependent variable is all share index; X_t is a vector of independent variables (inflation rate, interest rate and exchange rate) which were found to be cointegrated with the dependent variable; are stationary residuals from the cointegration static model.

If all the variables are I(1), and are cointegrated, we used a special form of vector autoregressive model (VAR) to estimate the error correction model. This is done to modify the system of equations to allow for the cointegrating relationship between the I(1) variables. The reason behind this choice is to retain and use valuable information about the cointegrating relationship and to ensure that the best technique that takes into account the properties of the time series data. The study employed the econometric techniques of Johansen (1991) cointegration, the vector error correction analysis and the Granger causality techniques for data analysis.

4. Data analysis and discussion of results

4.1. Unit root test. We begin by the presentation of the ADF Unit root test of stationarity of the time series variables in Table 1A. The result of the Augmented Dickey-Fuller unit root test showed that all the variables are I(1), where the absolute values of the ADF t-statistic exceed the 5% critical value.

4.2. Cointegration test. We then proceed to estimate the Johansen (1991) cointegration to establish a long run relationship. This result is presented in Table 2A. The long run test indicates the presence of only one cointegrating equation at 5% level of significance at those ranks where the value of the trace statistic exceeds the 5% critical value.

From the Table 2A in the appendix, the value of the trace statistic (54.24) exceeds the 5% critical value, there cointegration exists. To confirm this, the eigenvalue is up to 0.5 at the second row. Thus, cointegration exists.

4.3. Vector error correction model. Since stationarity of our data have been ascertained (to avoid falling prey to spurious regression) and the long-run equilibrium condition of the among the variables included in our models have been ensured, it is imperative we further the course of our analyses into looking at the estimates obtained from the technique of analysis – the vector error correction model (VECM).

The result of the VECM analysis in Table 3A in the appendix reveals that the ECM term is correctly signed. The value of the error correction coefficient is 3.07% and is not significant. This indicates that 3.07% of the short run errors of the GDP are corrected each year. In other words, GDP adjusts to its long run equilibrium at a poor speed of 3.07%. The VECM analysis indicates that capital expenditure, recurrent expenditure and direct income tax are significant in determining economic growth in the long run. A 1% increase in capital expenditure leads to an increase of 3.94% in income. A 1% increase in recurrent expenditure leads to an increase of 3.22% in income. On the other hand, a 1% increase in direct income tax leads to a fall of 6.83% in national output. These results meet the apriori expectations with respect to their signs.

4.4. Granger causality analysis. The Granger causality test, according to Granger (1986), is used for testing the short run direction of causality between variables. The Granger causality analysis result presented in Table 4A reveals no causality relationship between any of the fiscal policy variables and GDP, based on the probability of the F-distribution which were all above 5% level of significance on each null hypothesis.

Conclusion and recommendations

The objective of this study is to analyze the impact of fiscal policy variables on economic growth in Nigeria. Public expenditure and revenue are the two important tools of public finance management in Nigeria. The importance attached to the components of public expenditure (a fiscal policy tool) by economic managers has attracted criticisms from many quarters. This arises because of the dwindling trend of capital expenditure as the country strives to achieve the Millennium Development Goals and other development agenda. Worries are that if this trend continues, the achievement of those long term goals will be a mirage. Again, previous studies have not accounted for the role of taxation in growth accounting. This study was set out to investigate the impact of fiscal policy variables (capital expenditure, recurrent expenditure and direct income tax) on economic growth in Nigeria. The study adopted a growth accounting framework that specified economic growth as a function of the fiscal policy variables. Using an annual time series data for the period 1970-2012, the study tested for the presence of unit root test using the augmented Dickey-Fuller test.

It was discovered that the variables were integrated at I(1). The Johansen cointegration revealed the presence of a long run relationship between economic growth and the dependent variables. This finding is in agreement with Taiwo & Agbatogun (2011), Medee and Nenbee (2011) and Karimi and Khosravi (2010), who claim that there is a long run relationship between fiscal policy variables and economic growth in Iran.

The VECM analysis indicates that capital expenditure and recurrent expenditure are positive and significant in determining economic growth in the long run. This corroborates the findings of Starr, and Joharji (2010), and Onodje (2009) who claim that both government consumption and tax revenue shocks have Keynesian effects; thereby validating the position of the empirical literature. Also, direct income tax is negatively and statistically significant on economic growth over the period under study. A 1% increase in capital expenditure leads to an increase of 3.94% in income. The ECM result indicates that a 1% increase in recurrent expenditure leads to an increase of 3.22% in income. On the other hand, a 1% increase in direct income tax leads to a fall of 6.83% in national output. Moreover, only tax determines economic growth in the short run, as a 1% in tax causes national output to fall by 0.39%. These results meet *apriori* expectations with respect to their signs. GDP adjusts to its long run equilibrium at a poor speed of 3.07% and is not statistically significant.

The Pairwise Granger causality analysis indicates that causality relationship does not exist between any of the fiscal policy variables and economic growth. This is in contrast with Olugbenga and Owoeye (2007) whose results show that both government consumption and tax revenue shocks have Keynesian effects; thereby validating their position in the empirical literature.

The findings have showed that fiscal policy variables matter for decision making in the short run concerning economic growth. Tax revenue generation should be taken as a serious issue by the government since its effect on the economy does not die out easily, but in the long run. Based on these results, the study recommends the adoption of tax policies that would spur growth instead of retarding growth with a wide margin, as has been observed from the study. Efforts should be made to skew the pattern of public spending towards capital expenditure as it leads to higher growth than recurrent expenditure.

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Appendix

Table 1A. Summary of the result of ADF unit root test of the time series data

Variables	t-statistic	5% critical value	Order of integration
Log(GDP)	-4.697051	-2.9358	I(1)
Log(CX)	-3.72424	-2.9358	I(1)
Log(RX)	-5.248412	-2.9358	I(1)
Log(TX)	-5.892362	-2.9358	I(1)

Source: Author's computations

Table 1.1A. Result of augmented Dickey-Fuller test equation for recurrent expenditure

ADF test statistic	-5.892362	1% critical value*		-3.6019
		5% critical value		-2.9358
		10% critical value		-2.6059
*MacKinnon critical values for rejection of hypothesis of a unit root.				
Augmented Dickey-Fuller test equation				
Dependent variable: D(LOG(RX),2)				
Method: least squares				
Date: 09/18/14 Time: 17:11				
Sample(adjusted): 1973 2012				
Included observations: 40 after adjusting endpoints				
Variable	Coefficient	Std. error	t-statistic	Prob.
D(LOG(RX(-1)))	-1.606070	0.272568	-5.892362	0.0000
D(LOG(RX(-1)),2)	0.149131	0.162624	0.917028	0.3651
C	0.358004	0.105485	3.393878	0.0017
R-squared	0.704087	Mean dependent var		0.007627
Adjusted R-squared	0.688091	S.D. dependent var		0.982286
S.E. of regression	0.548594	Akaike info criterion		1.709124
Sum squared resid	11.13537	Schwarz criterion		1.835790
Log likelihood	-31.18248	F-statistic		44.01833
Durbin-Watson stat	2.015885	Prob (F-statistic)		0.000000

Table 1.2A. Result of Augmented Dickey-Fuller test equation for tax

ADF test statistic	-5.248412	1% critical value*		-3.6019
		5% critical value		-2.9358
		10% critical value		-2.6059
*MacKinnon critical values for rejection of hypothesis of a unit root.				
Augmented Dickey-Fuller test equation				
Dependent variable: D(LOG(TX),2)				
Method: least squares				
Date: 09/18/14 Time: 17:11				
Sample(adjusted): 1973 2012				
Included observations: 40 after adjusting endpoints				
Variable	Coefficient	std. error	t-statistic	Prob.
D(LOG(TX(-1)))	-1.366200	0.260307	-5.248412	0.0000
D(LOG(TX(-1)),2)	0.077829	0.162947	0.477632	0.6357
C	0.282777	0.076043	3.718623	0.0007
R-squared	0.638519	Mean dependent var		0.004713
Adjusted R-squared	0.618980	S.D. dependent var		0.553594
S.E. of regression	0.341716	Akaike info criterion		0.762366
Sum squared resid	4.320488	Schwarz criterion		0.889032
Log likelihood	-12.24732	F-statistic		32.67840
Durbin-Watson stat	2.041474	Prob (F-statistic)		0.000000

Table 1.3A. Result of augmented Dickey-Fuller test equation for GDP

ADF test statistic	-4.697051	1% critical value*		-3.6019
		5% critical value		-2.9358
		10% critical value		-2.6059
*MacKinnon critical values for rejection of hypothesis of a unit root.				
Augmented Dickey-Fuller test equation				
Dependent variable: D(LOG(GDP),2)				
Method: least squares				
Date: 09/18/14 Time: 17:07				
Sample(adjusted): 1973 2012				
Included observations: 40 after adjusting endpoints				
Variable	Coefficient	Std. error	t-statistic	Prob.
D(LOG(GDP(-1)))	-1.061462	0.225985	-4.697051	0.0000
D(LOG(GDP(-1)),2)	0.109189	0.163356	0.668409	0.5080
C	0.138501	0.062088	2.230716	0.0318
R-squared	0.485029	Mean dependent var		0.001054
Adjusted R-squared	0.457192	S.D. dependent var		0.469679
S.E. of regression	0.346038	Akaike info criterion		0.787505
Sum squared resid	4.430477	Schwarz criterion		0.914171
Log likelihood	-12.75010	F-statistic		17.42433
Durbin-Watson stat	2.026893	Prob (F-statistic)		0.000005

Table 1.4A. Result of augmented Dickey-Fuller test equation for capital expenditure

ADF test statistic	-3.724242	1% critical value*	-3.6019
		5% critical value	-2.9358
		10% critical value	-2.6059
*MacKinnon critical values for rejection of hypothesis of a unit root.			
Augmented Dickey-Fuller test equation			
Dependent variable: D(LOG(CX),2)			
Method: least squares			
Date: 09/18/14 Time: 17:09			
Sample (adjusted): 1973 2012			
Included observations: 40 after adjusting endpoints			

Table 1.4A. (cont.). Result of augmented Dickey-Fuller test equation for capital expenditure

Variable	Coefficient	Std. error	t-statistic	Prob.
D(LOG(CX(-1)))	-0.884285	0.237440	-3.724242	0.0007
D(LOG(CX(-1)),2)	-0.191130	0.159180	-1.200711	0.2375
C	0.165758	0.079360	2.088675	0.0437
R-squared	0.570414	Mean dependent var		-0.035194
Adjusted R-squared	0.547193	S.D. dependent var		0.565353
S.E. of regression	0.380431	Akaike info criterion		0.977016
Sum squared resid	5.354933	Schwarz criterion		1.103682
Log likelihood	-16.54032	F-statistic		24.56467
Durbin-Watson stat	2.064813	Prob (F-statistic)		0.000000

Table 2A. Result of Johansen cointegration analysis

Date: 09/18/14 Time: 17:13				
Sample (adjusted): 1972 2012				
Included observations: 41 after adjusting endpoints				
Trend assumption: linear deterministic trend				
Series: LOG(GDP) LOG(CX) LOG(RX) LOG(TX)				
Lags interval (in first differences): 1 to 1				
Unrestricted cointegration rank test				
Hypothesized		Trace	5 Percent	1 Percent
No. of CE(s)	Eigenvalue	Statistic	Critical value	Critical value
None *	0.506809	54.23883	47.21	54.46
At most 1	0.369321	25.25760	29.68	35.65
At most 2	0.136788	6.358278	15.41	20.04
At most 3	0.007954	0.327399	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level				
Trace test indicates 1 cointegrating equation(s) at the 5% level				

Note: Eviews 6.0 computations.

Table 3A. Result of the VECM analysis

Vector error correction estimates				
Date: 09/18/14 Time: 17:18				
Sample (adjusted): 1973 2012				
Included observations: 40 after adjusting endpoints				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating eq:	CointEq1			
LOG(GDP(-1))	1.000000			
LOG(CX(-1))	3.940961			
	(1.26385)			
	[3.11822]			
LOG(RX(-1))	3.224734			
	(1.45577)			
	[2.21514]			
LOG(TX(-1))	-6.831465			
	(1.93764)			
	[-3.52566]			
C	-15.86988			
Error correction:	D(LOG(GDP))	D(LOG(CX))	D(LOG(RX))	D(LOG(TX))
CointEq1	-0.030757	-0.043324	-0.047844	0.034797
	(0.02386)	(0.02830)	(0.03689)	(0.02458)
	[-1.28898]	[-1.53064]	[-1.29701]	[1.41575]
D(LOG(GDP(-1)))	0.059497	0.038466	0.142452	-0.142240
	(0.16990)	(0.20153)	(0.26265)	(0.17500)
	[0.35018]	[0.19087]	[0.54236]	[-0.81278]
D(LOG(GDP(-2)))	-0.091631	-0.169877	0.004429	-0.267118
	(0.16923)	(0.20074)	(0.26162)	(0.17431)
	[-0.54145]	[-0.84625]	[0.01693]	[-1.53240]

Table 3A (cont.). Result of the VECM analysis

Cointegrating eq:	CointEq1			
D(LOG(CX(-1)))	0.298572	-0.083280	0.155323	0.094998
	(0.15720)	(0.18646)	(0.24301)	(0.16192)
	[1.89933]	[-0.44662]	[0.63916]	[0.58670]
D(LOG(CX(-2)))	0.077717	0.198542	0.188326	0.171004
	(0.15999)	(0.18978)	(0.24733)	(0.16479)
	[0.48576]	[1.04619]	[0.76145]	[1.03769]
D(LOG(RX(-1)))	0.047264	0.080764	-0.369320	0.006226
	(0.10574)	(0.12542)	(0.16346)	(0.10891)
	[0.44699]	[0.64393]	[-2.25940]	[0.05716]
D(LOG(RX(-2)))	0.024477	0.097007	-0.134228	0.139603
	(0.10140)	(0.12028)	(0.15675)	(0.10444)
	[0.24139]	[0.80653]	[-0.85632]	[1.33664]
D(LOG(TX(-1)))	-0.261686	-0.195021	-0.220452	-0.227122
	(0.18355)	(0.21772)	(0.28375)	(0.18906)
	[-1.42567]	[-0.89572]	[-0.77692]	[-1.20130]
D(LOG(TX(-2)))	-0.394902	-0.159634	0.482824	-0.037847
	(0.18090)	(0.21458)	(0.27965)	(0.18633)
	[-2.18297]	[-0.74394]	[1.72651]	[-0.20312]
C	0.170782	0.216753	0.186381	0.225311
	(0.09258)	(0.10981)	(0.14311)	(0.09536)
	[1.84477]	[1.97386]	[1.30233]	[2.36284]
R-squared	0.259235	0.166404	0.411305	0.246395
Adj. R-squared	0.037005	-0.083674	0.234697	0.020314
Sum sq. resids	3.327749	4.682166	7.952566	3.530576
S.E. equation	0.333054	0.395060	0.514865	0.343054
F-statistic	1.166517	0.665408	2.328912	1.089851
Log likelihood	-7.025876	-13.85517	-24.44984	-8.209170
Akaike AIC	0.851294	1.192758	1.722492	0.910459
Schwarz SC	1.273514	1.614978	2.144712	1.332678
Mean dependent	0.130443	0.189240	0.225313	0.207983
S.D. dependent	0.339393	0.379501	0.588540	0.346592
Determinant residual covariance		0.000310		
Log likelihood		-42.44122		
Log likelihood (d.f. adjusted)		-65.45579		
Akaike information criteria		5.472789		
Schwarz criteria		7.330557		

Table 4A. Result of Granger causality analysis

Pairwise Granger causality tests			
Date: 09/18/14 Time: 17:59			
Sample: 1970 2012			
Lags: 2			
Null hypothesis:	Obs.	F-statistic	Probability
LOG(CX) does not Granger cause LOG(GDP)	41	2.03783	0.14508
LOG(GDP) does not Granger cause LOG(CX)		0.33080	0.72051
LOG(RX) does not Granger cause LOG(GDP)	41	0.80676	0.45421
LOG(GDP) does not Granger cause LOG(RX)		0.33951	0.71437
LOG(TX) does not Granger cause LOG(GDP)	41	0.69115	0.50752
LOG(GDP) does not Granger cause LOG(TX)		0.37038	0.69307

Note: Eviews 6.0 computations.