

Impact of Fiscal Policy Measures on Economic Growth: A Quantitative Examination of Long-Run Stability (1981-2015)

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Abstract

This research study tried to examine quantitatively, the long-run stability of the impact of fiscal policy measures on economic growth in Nigeria. The main objective was to ascertain the impact of fiscal policy on the growth of the Nigerian economy. The study used the secondary sources of data which were sourced from CBN Statistical Bulletin and other publications relevant to the study. Multiple regression analysis was employed as a method of data analysis, the study was further subjected to a quantitative examination to determine the long-run stability through Augmented Dicker-Fuller test, co-integration and Error correction models. From the findings, government expenditure and tax revenue were found to have a significant impact on the Nigerian Economy for the periods under study. The researcher recommended among other things that, greater emphasis needs to be placed on planning with a view to saving part of the higher oil revenue in an oil reserve fund to be used for properly formulated designed projects, for enhanced economic growth in Nigeria.

Keywords: Economic Growth, Fiscal Policy, Public Expenditure, Tax Revenue, Co-integration, Error correction model

1.0 Introduction

1.1 Background of the Study

One of the remarkable trends in contemporary history has been the importance in the growth of economic life. Any serious discussion of government is bound to raise the question about revenue and expenditure. Through appropriate tax, expenditure and regulatory policies, government seeks to attain certain objectives. The achievement of macroeconomic goals namely, full employment, stability of price level, high and sustainable economic growth and external balance, from time immemorial, has been a policy priority of every economy whether developed or developing, given the susceptibility of macroeconomic variables to fluctuations in the economy. The realization of these goals is not automatic but requires policy guidance. The policy guidance represents the objectives of economic policy (Olawunmi & Ayinla 2007). One of the regulatory policies used by government in achieving its objectives to bring about economic growth is fiscal policy. Fiscal policy is an outgrowth of Keynesian economics; its logical analysis suggests that it offers a sure-fire means of stabilizing the economy.

The goal of modern fiscal policy is to achieve economic efficiency and stability. In a modern economy, no sphere of economic life is untouched by the government. Two major instruments or tools are used by government to influence private economic activity; taxes and expenditure. Fiscal policy has developed an array of instruments to handle different facets of the economics of public sector. But by the very existence of multiplicity of goals, it is often bedeviled by inherent conflict of objectives; between long-term growth and short-term stability, between social welfare and economic growth, and between income redistribution and production incentives has not fared well in the last couple of years (Samuelson & Nordhaus 2005).

1.2 Statement of the Problem

Following statistics, Fiscal policy instrument has been on the increase from 1994 to 2015 despite a decline from GDP growth. Fiscal policy can only be considered effective when it has been properly transmitted through the various instruments to the real sector for achievement of the desired potential objectives. The socioeconomic dimensions of the collapse of oil prices and the general mismanagement of the economy in the 1980s, it was observed that the formal private sector was going extinct, economic activities as measured by aggregate output, industrial production, non-oil exports were all showing distress signs. Above all, there was strong widespread evidence of pervasive and massive poverty in the land in spite of growing public expenditure and fiscal deficit (Obi, 2007). By 1986, all major socioeconomic indicators were pointing downwards. The rates of unemployment were high, purchasing power of the people was down, poverty became entrenched and economic growth

became negative. In sum, there was severe macroeconomic imbalance- domestically and externally. It was apparent that the economy required major adjustment

The force through which fiscal policy transmits to the real sector of the economy has encountered enormous challenges to contemporary policy making in Nigeria. A typical example of a common feature of government fiscal operations in Nigeria with unstable policies is an expanding government spending programme which is above the degree of real resource bringing about wide fluctuation in economic activities. To this end therefore, the researcher is poised to examine quantitatively the effect of fiscal policy on the long-run stabilization of the Nigerian economy.

1.3 Objectives of the Study

The general objective of the research work is to review the effect of fiscal policy on the stabilization of the Nigerian economy. To this end therefore, the researcher has set achieve the following specific objective:

1. To determine the effect of total government expenditure on economic growth of Nigeria.
2. To examine the impact of tax revenue on Nigeria's economic growth.

1.4 Research Questions

In the light of the problems highlighted above, the following questions have been raised to guide the study:

1. Is there any significant relationship between total government expenditure and economic growth of Nigeria?
2. What impact does tax revenue have on economic growth of Nigeria?

1.5 Statement of Hypotheses

The following statement of hypotheses will guide this study:

Ho₁ Government expenditure has no significant relationship with GDP of Nigeria.

Ho₂ Tax revenue has no significant impact on economic growth of Nigeria proxied by GDP.

1.6 Scope of the study

This scope covers time series data from 1981- 2015 due to time constraints and unavailability of required data.

2.0 Review of Related Literature

2.1 Preamble

Fiscal policy is a macroeconomic policy, which is used in controlling or balancing supply of money circulating in the economy. Again, it financially supports government expenditure through tax reforms. Fiscal policy affects the economy; consider might lower tax rates to try to fuel economic growth. If people are paying less tax, they have more money to spend or invest. Increased consumer spending or investment could improve economic growth. Another possibility is that the government might decide to increase its own spending, say, by building more high ways. The idea is that the additional government spending increase jobs and lowers unemployment rate some economic however disputed the notion that government can create jobs, because government obtains some of its money from taxation, in other words, from the productive activities of the sector. One of the problems of fiscal policy is that it tends to affect particular groups disproportionately. A tax decrease might not be applied to tax payers at all income levels, or some groups might see large decrease than others.

2.2 Empirical Literature

The impact of fiscal policy on growth has generated large volume of empirical studies with mixed findings using cross sectional, time series and panel data. Some of these studies are country-specific while others are cross-country. Few of the studies are selected for review as follows: Fuente (1997) examined the impact of public expenditures and taxation on economic growth of 21 OECD countries from 1965 to 1995. The results of the study could not provide evidence in support of fiscal policy-led growth. Specifically, public expenditures tend to crowd-out private investment leading to reduction in disposable income and the incentive to save. Ocran (2009) examined the causal links between fiscal policy (government expenditure) and economic growth (GDP) from 1973 to 1995 in South Africa using a cointegration and error-correction framework. The results provided evidence in support of existence of cointegration between government expenditure and GDP.

The results of the causality tests showed that causation runs from government expenditure to GDP. Mansouri (2008) studied the relationship between fiscal policy and economic growth in Egypt, Morocco and Tunisia. The spans of

data for each country are: 1970-2002 for Morocco, 1972-2002 for Tunisia and 1975-2002 for Egypt. The empirical results showed that 1 percent increase in public spending raised the real GDP by 1.26 percent in Morocco, 1.15 percent in Tunisia and 0.56 percent in Egypt. The results also indicated existence of long-run relationships for all the three countries. 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 empirical results indicated 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. Karimi and Khosravi (2010) investigated the impact of monetary and fiscal policies on economic growth in Iran using autoregressive distributed approach to cointegration between 1960 and 2006. The empirical results indicated existence of long-run relationship between economic growth, monetary policy and fiscal policy. The results further revealed a negative impact of exchange rate and inflation (as proxies for monetary policy), but a positive and significant impact of government expenditure on growth. On Nigeria, Zaglar and Durnker (2003), studied the contributions of public expenditure to economic growth in Nigeria over the periods 1960 to 1992. The findings from the study provided support for fiscal policy-led growth through crowd-in private investment resulting from government expenditure on infrastructure. Nurudeen and Usman (2010) analyzed the impact of government expenditure on economic growth in Nigeria over the period 1970 – 2008. The paper revealed that government total capital expenditure, total recurrent expenditures and expenditure on education have negative effect on economic growth while expenditures on health, transport and communication are growth enhancing.

Dauda (2010) examined the effect of investment spending in education on economic growth in Nigeria using thirty-one (31) year time series data from 1977 to 2007. The study employs cointegration and error correction techniques. The result shows positive and significant effect of educational expenditure on economic growth. Born (1991) investigated the impact of fiscal policy (government expenditure) on economic growth, in line with this (Born and Salani-Matin, Rebelo, 1995) and (Borns and Njikamp, 1999) emphasized, that government activities influences the direction of economic growth Dar Atul Amrrihklali (2003) also pointed out that in the endogenous growth model, fiscal policy is very crucial in predicting future economic growth. Many researchers have attempted to examine the effect of Fiscal Policy on economic growth. Ranyan and Sharma (2008) examined the effect of Fiscal Policy using government expenditure on economic growth during the period of 1950-2007. The authors discovered a significant positive impact of government expenditure on economic growth. They also reported the existence of co-integration among the variables. In the literature, some studies disentangled government expenditure and used multi-variate co-integration analysis to examine the effect of each sector on economic growth. It was evidence that in the long-run, government spending on education had a positive effect on economic growth while government spending on defense, and health had negative effects on economic growth thus, the study concluded that the allocation of resources towards the education sector would be favored in order to enhance growth.

Abdullah (2000) reported after testing on the relationship between government expenditure and economic growth, that size of government is very important in the performance of the economy. He advised that government should encourage and support the private sector in order to accelerate economic growth. He also added that government should increase its spending on infrastructure, social and economic activities. Furthermore, Devarajan, Swamop and Zur (1996) studied the relationship between the composition of government expenditure and economic growth for a group of developing countries including Nigeria. The regression results illustrated that capital expenditure has a significant negative association with growth of real GDP per capital. However, results showed that recurrent expenditure is positively related to real GDP per capital. Anuroa (2010) investigated the causal relationship between aggregated public expenditure and its composition on economic growth for the Nigeria case over the period of 1979-2008. The study developed nine (9) models, hypothesizing nine version of Wagner's law. Empirical methodology employed include, Augmented Dickey-Fuller stationary test, the Johnson multi-variate co-integration method and VAR based vector, and error correction modeling techniques for causality test. He concluded that the public expenditure growth pattern is more protective than productive, and is relegated to passive role as fiscal policy instrument.

Babatunde (2007) tested Wagner's law for Nigeria using annual time series data between 1970-2006. It adopts the Bounds test approach based on unrestricted error correction model and granger causality test. The empirical results from the Bounds test indicates that there exists long run relationship between government expenditure and output in Nigeria, but it formed a weaker empirical support. The causal link between the public expenditure and national income was analyzed in detail by Singh and Sahni (1984) with many studies which has been conducted in

this direction. The findings of these studies produced contradictory results, ranging from “bi-directional causality between both variable; For example Ahsan et al (1989), Ram (1984), Holmes and Hutton (2011) and Singh and Sahni (1984) they concluded that Fiscal Policy measures has significant effect on national economic growth. On the contrary, Bath et al (1990) and Landu (1983, 1986) found that public expenditure expansion has negative effects on national income growth for both developed and developing countries. Ram (1986) in his study of 63 countries found no consistent causality between these two variables while in a recent study conducted by Saklthoel and Vadar (2005) for India, it was found that bi-directional causality exist between economic growth and public expenditure.

Liu et al (2008) examined the causal relationship between GDP and public expenditure for the data during the period of 1944-2002. The causality revealed that total government expenditure raises the economic growth of a country. The author concluded that judging from the causality test in Keynesian hypothesis, it exalts more influence than the Wegner’s law. Landa (1983) carried a study on the effect of government expenditure on economic growth for a sample of 96 countries, the study revealed a negative effect of government expenditure in growth of real output. Mulilie and Hakan (2003) also examined Wagner’s law on the relationship between public expenditure and economic growth for the Turkish country over the period of 1965-2000, using co-integration test and granger causality test, the empirical result found causality in both direction. Kechman et al, (2010) examined also the nature and direction of causality in Pakistan between public expenditure and national income along with various selected components of government expenditure by applying Toda-Tmanoso causality test to Pakistan for the period of 1971-2006. This study finds that there is no-directional causality running from GDP to government expenditure, which supports the Wagners’ law.

Fajingbesi and Odusola (1998) using vector auto-regression (VAR) method in their study of government expenditure and growth in Nigeria found that real capital expenditure positively and significantly affect real output while the effects of real recurrent expenditure was relatively marginal. They argued that the result is contrary to the general notion that the significance of the implication of capital expenditure in Nigeria is economic growth. Shioji (2001) obtained a similar result, they found that infrastructural public investment promotes economic growth, Oded Okun concentrated on a sample of 48 developing countries including Nigeria during the period 1970-1990 while the later study focused on 48 states in the United States over the period 1963-1967 and on 46 Japans’ prefectures during the period 1955-1999. Abu and Abdulahi (2010) in their short- run analysis of recurrent and capital expenditure as well as government spending on agriculture, education, defense, health, and transport also communication sectors of the Nigeria economy obtained results that revealed that government expenditure on transport, communication and health results to an increase in economic growth. Also Maku (2009) examined the link between government expenditure and economic growth in Nigeria over the last three decades using time series data to analyze the Ram (1986) model and regressed real GDP on private investment and human capital investment. He tested for the presence of stationarity in the variable using the argumented Dicker fuller (ADF) unit root test, and used the co-integration test to establish the long run relationship among variables, the error correction model was used. The empirical results showed that public and private expenditures have insignificant effects on economic growth during the review period.

3.0 Research Methodology

3.1 Sources and Methods of Data Collection

Annual data coverage of twenty two years (1981 – 2015) has been used for the empirical analysis in this study. The data were collected on Gross Domestic Product (GDP), Government expenditure and tax revenue. The secondary and time-series data were collected from various sources of the CBN’s statistical Bulletin and annual reports.

3.2 Model Specification

The implicit specification of the model;

$$GDP = f(TGEX, TAX) \text{ -----} 3.1$$

In its explicit form;

$$GDP = \beta_0 + \beta_1 TGEX + \beta_2 TAX + U_t \text{ -----} 3.2$$

Where:

GDP = Gross Domestic Product; TGEX= Total Government Expenditure; TAX= Tax Revenue, U_t = Error term

3.3 Method of Data Analysis

The first stage of analysis is to regress our models using the OLS method. In case if our results are spurious, we subject our variables to a unit root Augmented Dickey-Fuller (ADF) test to determine the stationarity. Then co-integration test is also conducted to establish a long run relationship among our variables in our models. Lastly, an error correction model test will be applied to find the short run deviations experienced.

3.4 Economic Apriori Expectation

This refers to the sign and size of the parameters in economic relationships. In this case, it is expected that government expenditure and tax revenue will have a positive and significant effect on Gross domestic Product (GDP). That is $\beta_1 > 0, \beta_2 > 0$

4.0 Data Presentation, Interpretation and Analysis

4.1 Data Presentation

Table 4.1: Data of Selected Variables (N' Billion)

YEAR	GDP	TGEX	TAX REV
1981	94.33	11.42	11.05
1982	101.01	11.93	8.46
1983	110.06	9.64	7
1984	116.27	9.93	7.74
1985	134.59	13.04	10.83
1986	134.6	16.23	8.07
1987	193.13	22.02	17.68
1988	263.29	27.75	14.57
1989	382.26	41.02	19.26
1990	472.65	60.27	40.27
1991	545.67	66.58	56.94
1992	875.34	92.79	77.85
1993	1089.68	191.23	89.87
1994	1399.7	160.89	82.28
1995	2907.36	248.77	128.79
1996	4032.3	337.42	168.36
1997	4189.25	428.21	179.81
1998	3989.45	487.12	176.33
1999	4679.21	947.69	324.15
2000	6713.57	701.05	455.3
2001	6895.2	1018	586.6
2002	7795.76	1018.18	433.9
2003	9913.52	1225.99	703.1
2004	11411.07	1384	1194.8
2005	14610.88	1743.2	1741.8
2006	18564.59	1842.59	1866.2
2007	20657.32	2348.59	1846.9
2008	24296.33	3078.25	2972.2
2009	24794.24	3280.77	2197.6
2010	54612.26	3993.25	2839.3
2011	62980.4	4233.06	4628.5
2012	71713.94	4199.99	5007.7
2013	80092.56	4797.45	4805.6
2014	89043.62	4200.7	4714.6
2015	94144.96	4650.32	3741.8

Source: CBN Statistical Bulletin, various issues

4.2 Data Analysis

The result of the regression using the OLS method showed that the overall regression is spurious (see appendix 1), therefore a stationarity test is required to examine the long-run relationship between the variables.

4.2.1 Unit Root Test Result

Table 4.2: ADF Test Result

Variables	Max Lag	ADF t-statistic	Order of Integration	Critical Level 1%	Critical Level 5%
GDP	1	-3.999097	1(1)	-3.646342	-2.954021
TAX	1	-4.736666	1(1)	-3.646342	-2.954021
TGEX	1	-7.984445	1(1)	-4.262735	-3.552973

Source: Author's computation using e-views statistical package

The result above reveals that our variables are integrated of order one (stationary at first difference).

4.2.2 Co-integration Result

From the result of the Johansen co-integration test (see appendix 5), three (3) co-integrating equations were detected. This, however, shows that there exists a long-run relationship among our variables.

4.2.3 Error Correction Model Test

Table 4.3 ECM Result

Dependent Variable: D(GDP)				
Method: Least Squares				
Date: 12/04/16 Time: 14:05				
Sample (adjusted): 1986 2010				
Included observations: 25 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-1.591613	0.676432	-2.352954	0.0317
D(TAX(-2))	13.13601	4.268560	3.077388	0.0072
D(TAX(-3))	-6.897994	4.928967	-1.399481	0.1808
D(TAX(-4))	5.202378	6.164903	0.843870	0.4112
D(TGEX(-2))	8.598875	4.982955	1.725658	0.1037
D(TGEX(-3))	12.07328	3.811056	3.167962	0.0060
D(TGEX(5))	1.177165	1.646624	0.714896	0.4850
ECT(-1)	-0.014582	0.166415	-0.087621	0.9313
C	-117.4718	793.1800	-0.148102	0.8841
R-squared	0.920787	Mean dependent var		2179.107
Adjusted R-squared	0.881181	S.D. dependent var		5881.531
S.E. of regression	2027.376	Akaike info criterion		18.34059
Sum squared resid	65764043	Schwarz criterion		18.77938
Log likelihood	-220.2573	Hannan-Quinn criter.		18.46229
F-statistic	23.24838	Durbin-Watson stat		2.007288
Prob(F-statistic)	0.000000			

4.3 Discussion of Findings

From the analysis above, it is revealed that tax revenue (TAX) has a positive and significant relationship with gross domestic product (GDP) of Nigeria at lag 2. It also indicates that total government expenditure exerted a positive and significant impact on GDP at lag 3 (at 5% level of significant). The coefficient of determination (R^2) is 92% which shows that the model is very highly fitted. This also shows that 92% change in GDP was explained by the explanatory variables (Government expenditure and tax revenue). Durbin-Watson equals 2.00 shows that there is no

presence of auto correlation (the model is not spurious). Prob(F-statistic)= 0.00000 shows that the overall model was highly statistically significant at 5% level of significance. We therefore reject the null hypothesis and conclude that government expenditure and tax revenue have significant impact on the Nigerian economy for the periods under study.

5.0 Summary, Conclusion and Recommendations

5.1 Summary of Findings

Government expenditure and tax revenue which are instruments of fiscal policy were found to have a positive and significant impact on economic growth proxied by GDP. This implies that an increase in both government expenditure and tax revenue would lead to an increase on the level of development in Nigeria.

5.2 Conclusion

The role of fiscal policy in securing stability and growth in Nigeria is of fundamental importance. Fiscal policy is a means of raising the domestic savings ratio. All tax revenue are useful in raising the level of domestic saving. The central problem of tax policy in Nigeria is how to obtain the necessary revenue while at the same time providing a correction for a typically high degree of inequality in the distribution of income, but without interfering unduly with private saving and investment. There is need for new policies that look at other ways of sourcing new funds and the issue of mobilizing resources is important. The most strategic thing is the mobilization of domestic resources which are not fully utilized. This is where the issue of taxation comes into play.

5.3 Recommendations

Attaining macroeconomic balance has become a foremost necessity for Nigeria. Policy makers need to understand precisely, the interrelationships between fiscal policy and economic growth in Nigeria. Prudent fiscal policy as reflected in appropriate fiscal deficit and debt trend is to reduce the risk of economic crises, arising from the concerns relating to the government ability to meet its obligation. Such fiscal policy stance prevent interest expenditure from rising to levels that squeeze out critical social spending and ensure that the stock of debt remains at levels consistent with a country's capacity to its debt. Prudent fiscal policy as reflected in appropriate fiscal deficit and debt trend is to reduce the risk of economic crises, arising from the concerns relating to the government ability to meet its obligation. Such fiscal policy stance prevent interest expenditure from rising to levels that squeeze out critical social spending and ensure that the stock of debt remains at levels consistent with a country's capacity to its debt.

The researcher thus, recommended as follows;

1. Greater emphasis needs to be placed on planning, with a view of saving part of the higher oil revenue in an Oil Reserve Fund to be used for properly formulated, designed and budgeted projects producing best values for money.
2. Efficient and fair tax systems are crucial for growth, poverty reduction, good governance and state-building. They tend to result in higher and more stable revenues, more sustainable investments, and improved competitiveness of economies.
3. Development policy requires the existence and functioning of sound administrative machinery. No amount of development planning would have the intended effect if the required stability and level of administrative resources are not invested in their implementation.
4. Tax incentives in the development strategy: Tax and investment incentives have in recent times become a favorite tool in development strategy both for domestic investors and for attracting foreign direct investment (FDI). The rationale for their use is that they constitute an important, if not a major, element in determining investment behavior. Incentives increase the net of tax rates of returns and thereby reduce the need for large initial capital investment and also reduce risk. The availability of incentives tends to make otherwise unpromising and risky ventures more profitable. They are also valuable as an indirect stimulus to investment because they publicize and enhance the country's investment climate.
5. It cannot be emphasized too strongly that the efficiency of the tax system is not just a matter of appropriate tax laws but of the efficiency and integrity of tax administration. In Nigeria, the low revenue yield of taxation can only be attributed to the effect that the tax provisions are not properly enforced, either on account of the inability of the administration to cope with them, or on account of straight-forward corruption in the administration. No system of tax laws, however carefully conceived, is proof against collusion between tax administrations and the

taxpayers. An efficient administration consisting of persons of high integrity is the most important requirement for exploiting the taxation potentials of a country.

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APPENDIX 1

Dependent Variable: GDP				
Method: Least Squares				
Date: 12/05/16 Time: 11:53				
Sample: 1981 2015				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TAX	10.14651	3.891609	2.607279	0.0137
TGEX	6.268923	3.918634	1.599773	0.1195
C	-2506.892	2018.683	-1.241845	0.2233
R-squared	0.906280	Mean dependent var		17827.15
Adjusted R-squared	0.900423	S.D. dependent var		28092.36
S.E. of regression	8864.796	Akaike info criterion		21.09938
Sum squared resid	2.51E+09	Schwarz criterion		21.23270
Log likelihood	-366.2391	Hannan-Quinn criter.		21.14540
F-statistic	154.7214	Durbin-Watson stat		0.467269
Prob(F-statistic)	0.000000			

APPENDIX 2

Null Hypothesis: D(TAX) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.736666	0.0006
Test critical values:	1% level		-3.646342	
	5% level		-2.954021	
	10% level		-2.615817	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(TAX,2)				
Method: Least Squares				
Date: 12/05/16 Time: 12:15				
Sample (adjusted): 1983 2015				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TAX(-1))	-0.933695	0.197121	-4.736666	0.0000
C	103.6809	86.71763	1.195615	0.2409
R-squared	0.419867	Mean dependent var		-29.40030
Adjusted R-squared	0.401153	S.D. dependent var		609.0104
S.E. of regression	471.2840	Akaike info criterion		15.20749
Sum squared resid	6885367.	Schwarz criterion		15.29819
Log likelihood	-248.9236	Hannan-Quinn criter.		15.23801
F-statistic	22.43601	Durbin-Watson stat		1.818721
Prob(F-statistic)	0.000046			

APPENDIX 3

Null Hypothesis: D(GDP) has a unit root					
Exogenous: Constant					
Lag Length: 0 (Automatic - based on SIC, maxlag=1)					
			t-Statistic	Prob.*	
Augmented Dickey-Fuller test statistic			-3.999097	0.0041	
Test critical values:					
	1% level		-3.646342		
	5% level		-2.954021		
	10% level		-2.615817		
*MacKinnon (1996) one-sided p-values.					
Augmented Dickey-Fuller Test Equation					
Dependent Variable: D(GDP,2)					
Method: Least Squares					
Date: 12/05/16 Time: 12:12					
Sample (adjusted): 1983 2015					
Included observations: 33 after adjustments					
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	D(GDP(-1))	-0.679539	0.169923	-3.999097	0.0004
	C	1986.036	1043.943	1.902437	0.0664
R-squared	0.340324	Mean dependent var			154.3836
Adjusted R-squared	0.319044	S.D. dependent var			6530.529
S.E. of regression	5388.995	Akaike info criterion			20.08080
Sum squared resid	9.00E+08	Schwarz criterion			20.17149
Log likelihood	-329.3332	Hannan-Quinn criter.			20.11131
F-statistic	15.99278	Durbin-Watson stat			2.199649
Prob(F-statistic)	0.000366				

APPENDIX 4

Null Hypothesis: D(TGEX) has a unit root				
Exogenous: Constant, Linear Trend				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.984445	0.0000
Test critical values:	1% level		-4.262735	
	5% level		-3.552973	
	10% level		-3.209642	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(TGEX,2)				
Method: Least Squares				
Date: 12/05/16 Time: 12:16				
Sample (adjusted): 1983 2015				
Included observations: 33 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TGEX(-1))	-1.365190	0.170981	-7.984445	0.0000
C	-72.32126	88.34727	-0.818602	0.4195
@TREND("1981")	14.40215	4.632872	3.108687	0.0041
R-squared	0.680190	Mean dependent var		13.60939
Adjusted R-squared	0.658870	S.D. dependent var		404.4349
S.E. of regression	236.2157	Akaike info criterion		13.85388
Sum squared resid	1673936.	Schwarz criterion		13.98992
Log likelihood	-225.5890	Hannan-Quinn criter.		13.89965
F-statistic	31.90288	Durbin-Watson stat		1.835912
Prob(F-statistic)	0.000000			

APPENDIX 5

Date: 12/05/16 Time: 12:18
 Sample (adjusted): 1983 2015
 Included observations: 33 after adjustments
 Trend assumption: Linear deterministic trend
 Series: GDP TAX TGEX
 Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.886535	96.64226	29.79707	0.0000
At most 1 *	0.454985	24.82561	15.49471	0.0015
At most 2 *	0.135279	4.796497	3.841466	0.0285

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.886535	71.81665	21.13162	0.0000
At most 1 *	0.454985	20.02911	14.26460	0.0055
At most 2 *	0.135279	4.796497	3.841466	0.0285

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

APPENDIX 6

Dependent Variable: D(GDP)				
Method: Least Squares				
Date: 12/04/16 Time: 14:05				
Sample (adjusted): 1986 2010				
Included observations: 25 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-1.591613	0.676432	-2.352954	0.0317
D(TAX(-2))	13.13601	4.268560	3.077388	0.0072
D(TAX(-3))	-6.897994	4.928967	-1.399481	0.1808
D(TAX(-4))	5.202378	6.164903	0.843870	0.4112
D(TGEX(-2))	8.598875	4.982955	1.725658	0.1037
D(TGEX(-3))	12.07328	3.811056	3.167962	0.0060
D(TGEX(5))	1.177165	1.646624	0.714896	0.4850
ECT(-1)	-0.014582	0.166415	-0.087621	0.9313
C	-117.4718	793.1800	-0.148102	0.8841
R-squared	0.920787	Mean dependent var		2179.107
Adjusted R-squared	0.881181	S.D. dependent var		5881.531
S.E. of regression	2027.376	Akaike info criterion		18.34059
Sum squared resid	65764043	Schwarz criterion		18.77938
Log likelihood	-220.2573	Hannan-Quinn criter.		18.46229
F-statistic	23.24838	Durbin-Watson stat		2.007288
Prob(F-statistic)	0.000000			