Does the Composition of Government Expenditure Matter for Caribbean Economies' Long-run Sectoral Output Growth? An ARDL Bound Test Approach

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Abstract

One of the main macroeconomic problems facing the region is that debt servicing has occupied a substantive portion of government expenditure. Debt servicing can severely affect economic growth as heavy burden of servicing public debt makes much needed fiscal adjustment both difficult and disorderly. A key question has been; is public sector debt growth enhancing? Theoretical propositions suggest the impact depends on the relative strength of a particular channel of fiscal expenditure on some sectors (Loto, 2011). Economic theories suggest that an increase in government expenditure on socio-economic and physical infrastructures encourages economic growth since is raises the productivity of labour and increase the growth of national output. Despite the central importance of understanding our debt problem and developing a strategy to cope with it, there has not been much work on identifying the root causes. This study improves the existing literature by taking a disaggregated approach to both output and government expenditure in a dynamic model in order to identify the root causes. We examine the long-run GDP impacts of changes in total government expenditure and in the shares of different spending categories for the ECCU countries and Jamaica from the period 1970–2015. The study utilizes an Autoregressive Distributed lag (ARDL) and Error Correction Model (ECM) to establish and analyze short and long-run dynamics. The results suggest that total fiscal expenditure and disaggregated expenditure including debt services have both positively and negatively contributed to all the sectors output. Among others, the study found that high national debt in the region resulted primarily from increases in government expenses and diminishing income sources.

Keywords: fiscal sustainability, debt service, autoregressive distributed, government expenditure

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1. Introduction

The extent of borrowing, the costs and terms of borrowing, particularly from external creditors, and most importantly, the use of borrowed funds, have significant implications for macroeconomic fundamentals. These could have either beneficial or adverse impacts on long-term economic development. Large and widening fiscal balances, high vulnerability to external shock and natural disasters have been the main drivers behind the debt problem in the region. Most of the borrowing in the region has been for infrastructural development, namely the construction of roads and bridges, hurricane rehabilitation and deficit financing. Government borrowing is not necessarily detrimental to an economy. In fact it could be advantageous if the funds borrowed are used for the long term development of the country and gives a return higher than the interest paid on the borrowing. High debt servicing burdens, low returns and in sectors that do not generate tradable outputs removes whatever justification it may have for borrowing by destabilising an economy and affecting the macroeconomic fundamentals that retard economic growth and development.

Despite the central importance of understanding our debt problem and developing a strategy to cope with it, there has not been much work on identifying the root causes. This study improves the existing literature by taking a disaggregated approach to both output and government expenditure in a dynamic model in order to identify the root causes. An understanding of the relationship between changes in total government expenditure and GDP (by sector categories) is expected to provide a working tool to understand the growth debt nexus of Caribbean countries. Therefore the aim of the paper is utilize an Autoregressive Distributed lag (ARDL) and Error Correction Model (ECM) to examine and analyze short and long-run dynamics. The remainder of this paper is structured as follows. The background is discussed in Section II. Section III briefly describes the links between public expenditure composition and GDP growth hypothesised theoretical and empirical literatures. Section IV discusses our testing methodologies; while section V discusses the dataset and reports results for a sample of six (6) countries over 2000-2015. Some conclusions are drawn in section VI.

2. Background

Over the period 2004-2013, several Caribbean countries declared their inability to service domestic and international debt, and have attempted to avoid sovereign default by initiating debt restructuring operations. These include Belize (2007), Dominica (2004-05), Jamaica (2010), St Kitts and Nevis (2011) and Grenada (2005 and 2013). Additionally debt forgiveness was soughed by the governments of Guyana (2006-08), St. Vincent & the Grenadines (2007) and Antigua & Barbuda (2004). In March 2013, the Government Saint Lucia embarked on a unique comprehensive debt restructuring programme. The approach was unique as it was conducted without undertaking significant cuts to public sector budgets and privatization programs. In 2016, Grenada concluded debt restructuring with external commercial creditors and the Paris Club, in that year Grenada made debt payments of $299.4 million.

The great depression of the 1930s has profoundly affected economic thinking; as a consequence there is a general consensus that governments will put regulations in place to avert economic disasters such as high, and escalating debt and debt default. It is assumed that one such regulation - fiscal policy, should in effect help governments stabilize their economies and facilitate growth. Fiscal policy has however led to high and escalating deficits. Fiscal policy is important because it regulates government spending and taxation. It also controls decisions on appropriate levels of taxation and government financial programs. Beyond this, fiscal policy plays a stabilizing role in influencing economic growth through a number of channels, including increased demand and reduced unemployment. National income will rise with increase in productive efficiency and increased supply of work. Long term growth of a country has a positive impact on national income and the level of employment. It also leads to extra tax revenue for government spending. The scope of the role of fiscal policy may be limited by the use of fiscal instruments during unemployment and depression.

Deficit budgeting is the standard fiscal cure. The most popular model of deficit finance is borrowing. However, if the process of recovery from depression is long, the creation and increase of budget deficit will provoke huge problem of debt repayment. Over the last two decades some Caribbean economies have registered relatively high budget deficits which are reflected in rapid debt accumulation. Particularly in the Eastern Caribbean, over the period 2005-2015 total outstanding public debt expanded significantly in Saint Lucia; 88.1 per cent (from $1,583.6m to $2,979.02m), Saint Vincent and the Grenadines 58.6 per cent (from $981.3m to $1,555.07m), and Grenada 43.4 per cent (from $1,578.8m to $2,264.7m). Likewise in Jamaica, total external debt stock inflated by 50.0 per cent over the period 2005-2014 ($4,635,800m to $6,952,820m).

The debt financing approach to fiscal deficit has had several macroeconomic implications on the output growth of Caribbean countries which cannot be overemphasized. Firstly, public debt growth has been larger than the economic growth rate of several Caribbean countries (See Figure 1). In 2011, Grenada's total outstanding debt stock increased by 15.5 percent at the same time there was little to no economic growth; as real GDP growth was registered at 0.4 percent. Secondly, fiscal deficit continues to widen and growing public debt and its servicing costs (payment of interest and principal) have occupied a substantive portion of government expenditure; in 2012 St Kitts and Nevis's debt service to current revenue was approximately 38 percent (See Figure 2). One of the main macroeconomic problems facing the region is that debt servicing has occupied a substantive portion of government expenditure. In 2015, the share of debt service to current revenue was particularly high in Antigua and Barbuda (53.1 percent), Saint Lucia (51.9 per cent) and Grenada (29.2 per cent). Debt servicing is considered a strong constraint on growth and development.

Debt servicing can severally affect economic growth as heavy burden of servicing public debt makes much needed fiscal adjustment both difficult and disorderly. A key question has been; is public sector debt growth enhancing? This depends to a great extent on what has caused the growth in debt. If public debt is used to facilitate the development of the countries' productive sectors and infrastructure then public debt can be expected to aid economic growth in the short and long run. Economic growth in the Caribbean is primarily driven by the service sector, this sector comprises; wholesale and retail trade, public administration and defense, real estate,

renting and business activities, transportation, storage and communication. These can be categories as the unproductive sector portfolio. The main productive sectors in the region are Agriculture, Forestry, Livestock, Fisheries, Industry, Commerce, Mining, Manufacturing and Tourism.

During the last three decades, the region has tried different development models, ranging from industrialization based on imported inputs and technology, to models of structural change which prioritize tourism. The Caribbean has three (3) critical industries: tourism; bauxite mining and alumina production. Bauxite mining industry is critical in the case of Jamaica; while petroleum relatively important for Trinidad and Tobago. Depression in the productive sectors clearly puts a foreign exchange squeeze on countries, affecting public revenues and making it difficult for regional governments to drive economic growth. While the channels of economic growth are well understood, evidence on the causal link from increased public debt to economic growth is inconclusive. Greater public debt can contribute to growth, but growth also increases demand for public financing.

3. Literature Review

i. Theoretical Literature

There are several theories which have attempted to establish the relationship between government expenditure and economic growth. One such theory is the neo-classical growth model, which emphasizes the importance of savings in the growth of an economy. The model asserts that the incentives to save and invest in new capital are affected by fiscal policy; as it results disequilibrium might exist in the capital-output ratio and the output path level, but not the slope. Contrary to this, The Keynesian model argues that government expenditure leads to economic growth. The framework shows that aggregate demand policies should be used to improve economic growth. This approach suggests that recessionary periods require budgetary expenditure to ensure growth. This view departs from the fact that increases in government spending leads to an increase of employment in public sector and firms within the business sector. As employment rises, incomes increase as well as profits which would result in an expansion in the production of goods and services needed by government. Barro (1990) argue that productive public expenditures can lead to long run growth through impacts on private sector production functions.

The Musgrave Rostow's Theory states that there are five (5) stages of economic growth/development; the first stage: Traditional Society is the earliest stage. During the first stage agriculture and limited stock supply are the main elements. The other stages are the transition phase, pre-conditions for take-off, drive to maturity and age of mass consumption. In the early stages of economic growth the theory states that government expenditure should be highly encouraged. Additionally, the theory elaborates on the existence of market failures and encourages government involvement in eliminating/tackling the market failures occurrences. This theory is skewed as it does not take into consideration the private sector's contribution to economic growth. Essentially, it assumes that the government expenditure is the only driver of growth.

ii. Empirical Literature

The ongoing debate on whether government expenditure boosts economic growth has extensively suggests that government expenditure drives the overall performance of the economy, in the long-run. This conclusion has been supported by Olugenga (2007), Keneller et al (2015), Nworji I. D., et al (2012), Joharji, G.A. and M.A. Starr, (2010) and Abdullah HA,(2000), just to name a few. These researches approach towards investigating the relationship differ in terms of the structure of the economies; developed or developing, and the empirical methodology; simple Ordinary Least Square techniques or more complex models such as Vector Error Correction models and Autoregressive Distributed Lags models (ARDL). Olugenga (2007), analyse the impact by focusing on 30 Organization for Economic Cooperation and Development (OECD) countries over the period 1970-2005 by employing regression analysis. Joharji, G.A. and M.A. Starr, (2010), use Johansen (1992, 1988) cointegration methodology to study the Saudi Arabia case by using time-series methods and data for 1969-2005. Gemmel .N., Kneller,. R and Sanz. I.(2014) examined the impact of public expenditure on GDP for OECD countries using data from the 1980s using the ARDL.

There is an overwhelming view among the growth-expenditure literature such as Keneller et al (2015), Donald N.B. and Shuanglin L. (1993), and Gose, Haque and Osborn (2003) that the composition of the government expenditure matters. Keneller et al (2015) takes into account financing expenditure changes and possible endogenous relationships and finds that there a strong positive long-run income levels relationship through reallocation of total spending on infrastructure and education. Donald N.B. and Shuanglin L. (1993), examines the differential effects of various categories if expenditure on economic growth for a sample of 58 countries. The study establishes a positive effect of government expenditures on education and defense, expenditure on welfare has a negative effect on economic growth. Gose, Haque and Osborn (2003) on the other hand examine the growth effects of government expenditure on economic growth for a panel of 30 developing countries over the period 1970 and 1980. The authors findings indicate that the; share of government capital expenditure on GDP is positively and correlated to economic growth, but current expenditure was insignificant. Taking a sample of 56 low, middle, and high income countries Acosta-Ormaechea, S. and Morozumi, A. (2013) analyse the impact of: transport and communications, defense, education health, and social protection on growth. The results reveal that the only component that has statistically significant growth effects is education; specifically, spending on education financed by a reduction in spending on both health and or social protection.

One strand of literature argues that the impact of government expenditure on economic growth might be positive from a holist prospective (i.e the overall GDP) but the results may change if the sectoral composition is considered. This implies that a sector level analysis is an important consideration when analyzing the impact of government expenditure on growth. Osinowo O.H (2015) takes a sectoral output growth approach to analyzing Nigeria's case. The results show that over the period 1970-2013 total fiscal expenditure has positively contributed to all the sectors output with an exception of agriculture sector. The findings also indicate that the manufacturing sector has a positive relationship with all the determinant variables, while inflation rate has negatively impacted output growth of the various sectors with an exception of manufacturing sector. Instead of utilizing the entire disaggregated GDP dataset Joharji, G.A. and M.A. Starr,

(2010) investigate the effect changes in government expenditures on economic growth by focusing on a single component of economic growth; that is, non-oil GDP.

Although there are vast numbers on literature that investigate the relationship between government expenditure and economic growth, little attention have been given to assessing the issues of debt financing and debt servicing on GDP growth. One group of researchers who have considered a debt approach is Gemmel .N., Kneller,. R and Sanz. I.(2014). These researchers examine the impact of public expenditure on GDP for OECD countries using data from the 1980s. Gemmel .N., Kneller,. R and Sanz. I.(2014) apply the ARDL approach and consider a debt financing variable. The study finds that the form of expenditure financing is very crucial in terms of estimating growth effects as well as negative effects from debt-financing increases in public spending on output growth.

An isolated approach; on the impacts of debt servicing and government expenditure is useful for signaling the magnitude of the impact of spending on that particular category on growth. This can be used to provide governments with an indication on whether or not public debt can drive growth in their particular economy. This conclusion is made notwithstanding the fact that other sector wide variables may explain the debt-growth Nexus. Eberhardt and Presbitero (2015) stress that there are various reasons may account for the differences in the relationships between public debt and growth across countries. First, production technology may differ across countries, and thus also the relationship between debt and growth. Second, the capacity to tolerate high levels of debt may depend on a number of country specific characteristics, related to past crises and the macro and institutional framework. Third, vulnerability to public debt may depend not only on debt levels, but also on debt composition (domestic versus external, foreign or domestic currency denominated or long-term versus short term), which may also differ significantly across countries.

4. Model Specification

This study uses the neoclassical growth model as the essential framework, represented by the aggregate production function:

$$Y = f(K, L) \tag{1}$$

where Y is the aggregate output, K is the capital stock (both human and physical), and L is the labour force or population. According to Barro & Sala-i-Martin (2004), the model is built on the assumption that economies with lower starting value of real per capita income tend to grow faster than economies with higher values of real income.

The convergence of income can also be explained by other variables other than per capita income. Our empirical analysis takes this into consideration and augments the production function (i.e Equation 1) by adding a fiscal policy variable. This allows us to test the impact of government fiscal policy after controlling for the stock of physical capital, the labour input and a measure of human capital. The augmented aggregate production function model can be represented as:

$$Y = f(K, L, F\ ) \tag{2}$$

where F represents government spending, this variable is disaggregated into Personal Emoluments (P), Goods and Services (G), , Transfers and Subsidies (D), Capital Expenditure and Net Lending (C), Fiscal Deficits (F) and Debt Service (D). The debt service indicator (includes Interest Payments + amortization) is expected to have a negative relation to economic growth. The following equation will be the basis of our empirical analysis:

$$G_d = \beta_0 + \beta_1 P + \beta_2 G + \beta_3 D + \beta_4 T + \beta_5 C + \beta_5 F + \epsilon_t \quad (3)$$

This relationship can be estimated by applying time series data to cointegration econometric techniques. In this paper we the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration proposed by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001). We follow Arnold *et al*. (2007, 2011) and use an autoregressive distributed lag, ARDL(*p*, *q*), model, parameterised in error correction form. This allows both the short-run dynamic and the long-run equilibrium relationships between GDP and fiscal variables to be separately identified.

Equation 3 is tested by the ARDL approach, this involves estimating the following unrestricted error correction model:

$$\begin{aligned}\Delta G = {} & \partial + \sum_{i=1}^{m} \emptyset_{1i} \Delta(G)_{t-1} + \sum_{i=0}^{m} \emptyset_{2i} \Delta(P)_{t-1} + \sum_{i=0}^{m} \emptyset_{3i} \Delta(G)_{t-1} \\ & + \sum_{i-0}^{m} \emptyset_{i4} \Delta(D)_{t-1} + \sum_{i-0}^{m} \emptyset_{5i} \Delta(C)_{t-1} + \sum_{i-0}^{m} \emptyset_{6i} \Delta(F)_{t-1} \\ & + \sum_{i=0}^{m} \emptyset_{7i} \Delta(D)_{t-1} + \delta_1(G)_{t-1} + \delta_2(P)_{t-1} + \delta_3(G)_{t-1} + \delta_4(D)_{t-1} \\ & + \delta_5(C)_{t-1} + \delta_6(F)_{t-1} + \delta_7(D)_{t-1} + \varepsilon_t \quad (4)\end{aligned}$$

where Δ denotes the first difference operator, ∂ is the drift component and ε_t is the white noise residuals. $\delta_1$through to δ_6 correspond to the long-run relationship. The remaining expressions represent the short-run dynamics of the model.

To estimate the long-run relationship among the variables, we employ the Pesaran, et al (2001) bound testing procedure. The bound procedure is based as proposed by Pesaran et al (2001) suggest two alternative tests. First, a Wald test (i.e. F-statistic) is used to test the joint significance of the first lag of the variables in levels used in the analysis (i. e. ($i.e\ \emptyset_1 = \emptyset_2 = \emptyset_3 = \emptyset_4 = \emptyset_5 = \emptyset_6 = \emptyset_7 = 0$), and then a t-statistic which can be used to test the individual significance of the lagged dependent variable in levels (i.e $\emptyset_1 = 0$).

Regarding the Wald-test Pesaran, Shin and Smith (2001) provide a set of critical values assuming first that the variables under study are I(1) and, second, that such variables are I(0). If the computed F or t-statistics is greater than the upper critical bound critical values, then we can

conclude that the variables are cointegrated (i.e a long-run relationship exist since we must reject the null hypothesis of all the variables $\emptyset_1 t_{\iota}\ \emptyset_5 = 0$ equal to zero), regardless of the order of integration. On the other hand, if these statistics are below the lower critical bound, the null hypothesis of no cointegration since the null hypothesis cannot be rejected. However, if the calculated F- and *t*-statistics are between the upper bound and lower bond, then the decision about cointegration will be inconclusive.

This study utilizes the ARDL technique to estimate the relationship between growth and fiscal policy because of its advantages in comparison to other single equation estimation techniques. Firstly, Pesaran and Shin (1999) argue that the ARDL technique can be reliably used in small samples to estimate and test hypotheses on the long run coefficient in both cases where the underlying regressors are I(1) or I(0). Secondly, ARDL can estimate the short and long-run dynamic relationship between GDP growth and change in fiscal policy. Thirdly, Pesaran et al. (1996, 2001) ARDL technique does not require the classification of variables into I(0) or I(1). Hence the ARDL bounds testing approach allows the analysis of long-run relationships between variables regardless of the order of integration of the series. In order to determine the existence of a long-run relationship between the variables in our study, we employ Pesaran, Shin and Smith (2001) bound testing approach. Fourthly, the ARDL bounds testing approach allows for a distinction to be made between the dependent variable and the explanatory variables, it allows simultaneous estimation of the short-run and long-run components, eliminating the problems associated with omitted variables and the presence of autocorrelation.

Lastly, ARDL model allows variables to have different optimal lags. This avoids some of the frequent difficulties of time series analysis such as the lack of power of unit root tests and doubts about the order of integration of the variables examined. In this study the optimal lag structure is selected by the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC) to simultaneously correct for residual serial correlation and the problem of endogenous regressors (Pesaran and Shin, 1999, p. 386).

If cointegration exists an error correction representation exists. The conditional long-run model can be derived from the reduced form equation (4). The error correction version of equation (4) is represented by the following reduced form equation:

$$\begin{aligned}\Delta G \quad &= \partial + \sum_{i-1}^{m} \emptyset_{1i}\,\Delta(G\quad)_{t-1} + \sum_{i-0}^{m} \emptyset_{2i}\,\Delta(P\ \ )_{t-1} + \sum_{i-0}^{m} \emptyset_{3i}\,\Delta(G\ \ )_{t-1} \\ &+ \sum_{i-0}^{m} \emptyset_{i4}\,\Delta(D\ \ )_{t-1} + \sum_{i-0}^{m} \emptyset_{5i}\,\Delta(C\ \ )_{t-1} + \sum_{i-0}^{m} \emptyset_{6i}\,\Delta(F\ \ )_{t-1} \\ &+ \textstyle\sum_{i-0}^{m} \emptyset_{7i}\,\Delta(D\ \ )_{t-1} + \gamma E(\quad)_{t-1} + \mu_t \qquad (5)\end{aligned}$$

where γ is the speed of adjustment parameter and ECM is the residuals that are obtained from the estimated cointegration model of equation (4). The error correction term shows the speed at which the variables return to equilibrium. The existence of an error-correction term among a number of cointegrated variables implies that changes in the dependent variable are a function of

both the level of disequilibrium in the cointegration relationship and the changes in other explanatory variables (Jordon K. A, Batool S.A and Mehmood T, 2014).

5. Data and Empirical Results

This study employs annual data for Antigua and Barbuda, Dominica, Grenada, St Kitts and Nevis, Saint Lucia and St Vincent and the Grenadines to analyze the impact of government expenditure (by selected categories) on sectoral level growth. The series cover the period 2000 to 2015 and focuses on two categories of data: government expenditure by category; debt service, government investment expenditure and fiscal balance; and, on output growth both at an aggregate level and a disaggregate level to account for real growth in the productive sectors (i.e. Agriculture, Manufacturing, Mining and Fishing). The consumer price index is used as the control variable. All data was sourced from the Eastern Caribbean Central Bank website.

Empirical Estimation

To derive our ARDL short and long-run estimates we first establish the level of integration. Unit root testing has been performed as pretesting of data for suitability of model estimation. ADF unit root tests have been applied on all data. The results indicate that none of the services are I(2). Unit root testing provides justification to precede ARDL because of differences of the integration level of data. If the series is I(2) then the ARDL approach cannot be used.

Secondly, the Bounds Testing autoregressive distributed lag (ARDL) method was employed, since the technique is robust and indifferent about the order of integration of the economic and financial time series. For each of the four sectors (see estimations in Table 1), we perform our different marginal models (for the fiscal variables, investment and debt service). Each cell contains the estimate (*t*-ratio) coefficient for the country in a pooled framework.

Table 1 shows that the value of our F-statistics when compared with Peasaran critical value at 5% level for which the relevant critical value bounds are obtained from Table C1.iii (with an unrestricted intercept and no trend; with three regressors k=3) in Pesaran et al. (2001)). The critical F values at 10 % are 2.72 (lower bound), and 3.77 (upper bound). Those at 5% are 3.23 – 4.35. Since F-Test>critical F at the 5 % percent level for all sectors except fishing we accept the null hypothesis (i.e C(1)=C(2)=C(3)=0). This confirms that there is long-run relationship. Overall the bounds test results support the existence of a mutual relationship between sectoral growth (i.e. of the manufacturing, agriculture and mining sectors) and government expenditure (i.e. and debt service, Investments and fiscal balance).

Table 1. The Results of F-Test for Cointegration

	Max Lags	F-Test
Model	2	
Agriculture Sector Growth	2	6.44*
Manufacturing Sector Growth	2	3.195*
Fishing Sector Growth	2	2.017
Mining Sector Growth	2	2.975

The short and long-run coefficient estimates for three sectors are presented in Table 2. Results for the Fishing Sector were not reported because the values of the coefficient were insignificant. The study establishes that there is significant long run relationship between sectoral growth (agriculture, manufacturing and mining) and the explanatory variables debt service, fiscal deficit and investment expenditure in the Caribbean (i.e. St Kitts/Nevis, Saint Lucia, St Vincent, Grenada, Dominica and Antigua and Barbuda) during the period 2000-2015. The finding agrees that the long run equilibrium relationship between government expenditure (i.e. public debt, fiscal balance and investment expenditure) and economic growth in Caribbean countries is negative.

The debt service variable is significant both in the short and long run. It is estimated from the ARDL long run test that 1% increase in debt service will bring about 0.51% decrease in economic growth in the agriculture sector; a 1.67% decrease in the manufacturing sector and a 7.90% decrease in the mining sector. In other words, debt servicing reduces growth. The long-run models correspond to: ARDL (1, 1, 1, 1) for the mining, ARDL (1, 2, 2, 2) for agriculture, ARDL (2, 2, 2, 2) for agriculture and ARDL (2, 1, 2, 1) and manufacturing.

The impact of the investment expenditure (INVS) on sectoral growth is positive and significant both in the short-run and long-run for all variables. In the short-run the impact of INVS is greater; particularly in Mining Sector. Essentially, in the short-run a 1% unit increase in investment will bring about a 0.83 percent in the Mining sector.

Regarding the fiscal balance variable, the ARDL results for the pool of countries (Antigua and Barbuda, Grenada, Dominica, St Kitts/Nevis and St Vincent and the Grenadines) indicate that in the short run, fiscal deficit (FD) have significantly influenced the sectoral growth in all sectors except the Mining sector during the period 2000-2015. Namely in the long-run a 1 unit increase in fiscal deficit will bring about a 0.023 percent decrease in output growth in the Manufacturing sector. These results offer fairly strong support to the view that the expenditure share variables can be considered weakened sectoral growth and hence force the overall growth to decline.

Table 2: ARDL Estimates

Dependant variable: growth in Agriculture Sector			
Panel A : The long-run Coefficient Estimates			
	DS	INVS	FD
	-0.517 (-2.001)	0.032 (5.215)	-0.023 (-3.379)
Dependant variable: growth in Agriculture Sector			
Panel A : The Short-run Coefficient Estimates			
	DS	**INVS**	**FD**
	-0.441 P-value= 0.000	0. 040 P-value= 0.000	-0.022 P-value= 0.000

Note: t-values are in parenthesis.

Table 2 con't: ARDL Estimates

Dependant variable: growth in Manufacturing Sector			
Panel B : The Long-run Coefficient Estimates			
	DS	INVS	FD
	-1.667 (-10.551)	0.138 (27.789)	-0.023 (7.553)
Dependant variable: growth in Manufacturing Sector			
Panel B : The Short-run Coefficient Estimates			
	DS	**INVS**	**FD**
	-2.743 P-value= 0.000	0. 169 P-value= 0.000	-0.586 P-value= 0.000

Dependant variable: growth in Mining Sector			
Panel C : The long-run Coefficient Estimates			
	DS	**INVS**	**FD**
	-7.975 (-2.823)	0.201 (2.806)	-0.047 (-1.014)
Dependant variable: growth in Mining Sector			
Panel C : The Short-run Coefficient Estimates			
	DS	**INVS**	**FD**
	-2.221 P-value= 0.000	0. 820 P-value= 0.000	-0.241 P-value= 0.356

Note: t-values are in parenthesis.

The ECM for the manufacturing sector was found that the ECT is -0.416 and its P-value is 0.0002. The Error Correction Term (ECT) is fractional, negative and significant. Thus, the conditions for ECM are met. The speed of adjustment is 42.3%. This implies that the entire system of the model can get back at long-run equilibrium at a speed of 41.6% annually. Thus, there is system correction of disequilibrium to long run equilibrium.

Table 4: Error Correction Model

Dependent variable manufacturing growth		
	Coefficient	Standard Error
DS(-1)	0.810142	0.174888
INVS(-1)	-0.005795	0.013096
FD(-1)	0.016315	0.005545
RESIDMAN	-0.416030	0.107205

6. Conclusions

This study improves the existing literature by taking a disaggregated approach and employing a dynamic model in order to establish and identify the relationship between government expenses and diminishing GDP growth rates. This paper offers new evidence for Caribbean countries; particularly Antigua and Barbuda, Grenada, Dominica, St Kitts and Nevis, St Lucia and St Vincent and the Grenadines on the impact of the composition of public expenditure on GDP growth, with emphasis of public sector debt and debt servicing. Our study concludes that not many researchers have considered a sector level analysis of GDP growth on government expenditure (i.e disaggregated) within the context of the Caribbean. We fill this gap by decomposing government expenditure into; debt servicing, government investment expenditure and fiscal policy. The GDP growth sectoral level composition investigated are; agriculture, manufacturing, mining and fishing.

Considering that previous researchers have omitted from their analyses, an interpretation or a parameter estimate to measure the impact of debt financing on GDP sectoral output growth, we are of the view that this study adds extensively to existing literature. Our study have not only considered those concerns which relates to the relationship between economic growth and government expenditure but more importantly those relating to the impact of public debt on economic growth.

Our examination of the impact of public expenditure on GDP for Antigua and Barbuda, Grenada, Dominica, St Kitts and Nevis, St Lucia and St Vincent and the Grenadines in a pool data context sought to deal explicitly with the debt creating (fiscal deficits and government investments) and debt financing (debt service) aspects, allowed output effects to tested separately. Using the Autoregressive Distributed Lag (ADRL) approach for the time-series 2000-2015 our examination reveal that a long and short-run relationship exists between sectoral growth (i.e. of the manufacturing, agriculture and mining sectors) and government expenditure (i.e. and debt service, Investments and fiscal balance).

The empirical results conclude that debt service variable is significant both in the short and long run. In fact, the ARDL long run estimates indicate that 1% increase in debt service will bring about 0.51% decrease in economic growth in the agriculture sector; a 1.67% decrease in the manufacturing sector and a 7.90% decrease in the mining sector. In other words, debt servicing reduces growth. The impact of the investment expenditure on sectoral growth is positive and significant both in the short-run and long-run for all variables. In the short-run the impact of investments is greater; particularly in Mining Sector. Essentially, in the short-run a 1% unit increase in investment will bring about a 0.83 percent in the Mining sector. Regarding the fiscal balance variable, the ARDL results indicate that in the short run, fiscal deficits have significantly influenced the sectoral growth in all sectors analyzed except of the Mining sector during the period 2000-2015. Namely in the long-run a 1 unit increase in fiscal deficit will bring about a 0.023 percent decrease in output growth in the Manufacturing sector. These results offer fairly strong support to the view that the expenditure share variables can be considered weakened sectoral growth and hence force the overall growth to decline. Our study therefore concludes that impact depends on the relative strength of a particular channel of fiscal expenditure on some sectors.

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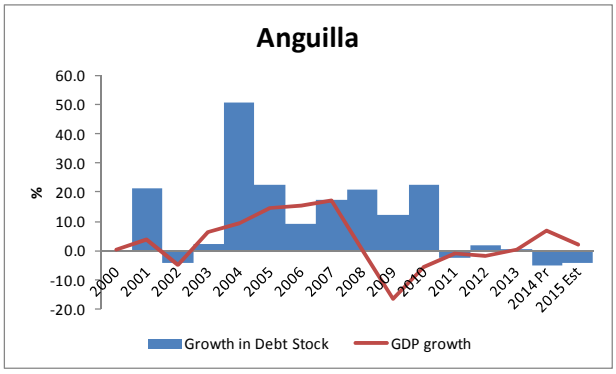
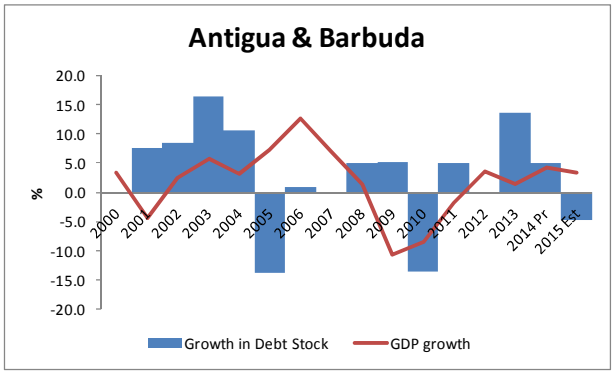
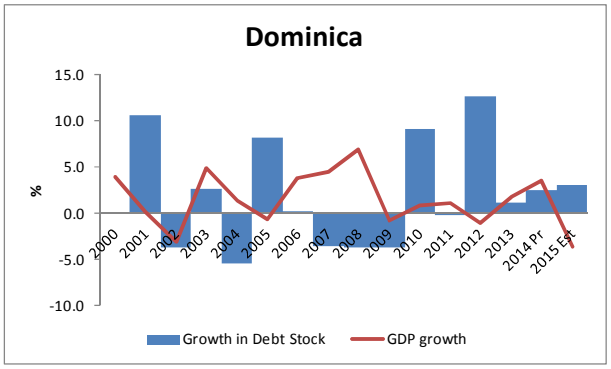
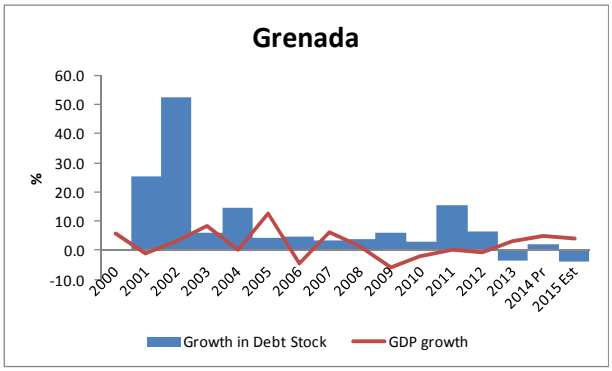
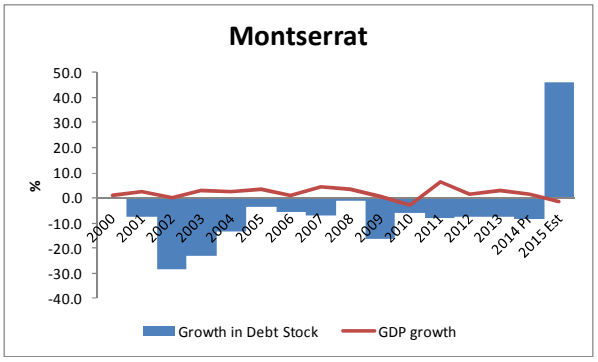
Figure 1:

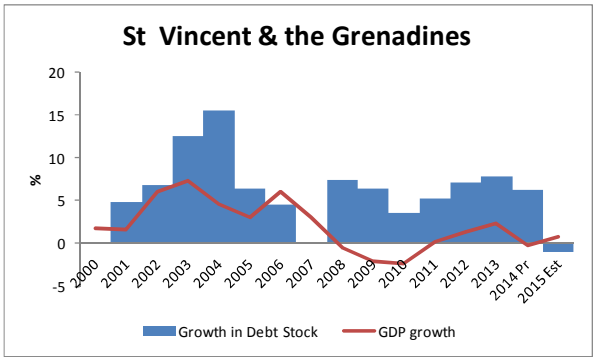

Anguilla
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Pr 2015 Est
Growth in Debt Stock
GDP growth

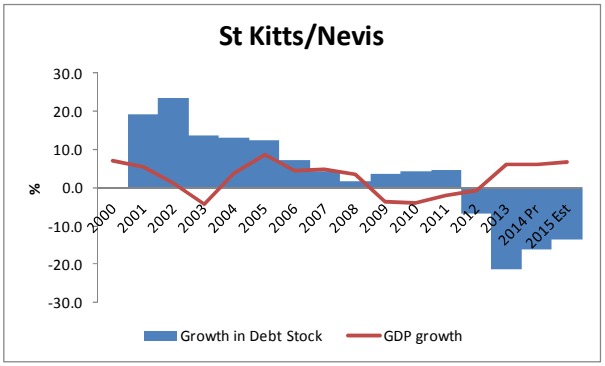

Antigua & Barbuda
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Pr 2015 Est
Growth in Debt Stock
GDP growth

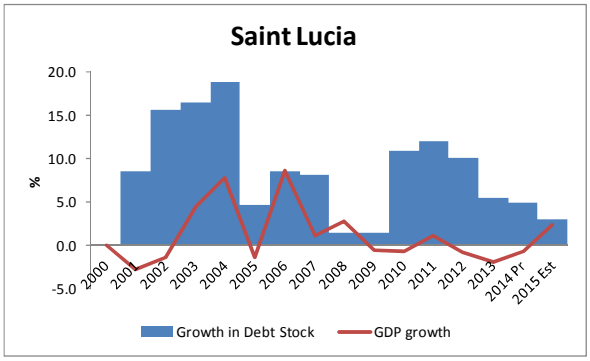

Dominica
15.0
10.0
5.0
0.0
-5.0
-10.0
%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Pr 2015 Est
Growth in Debt Stock
GDP growth


Grenada
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 Pr 2015 Est
Growth in Debt Stock
GDP growth


Montserrat
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014 Pr
2015 Est
Growth in Debt Stock
GDP growth


St Vincent & the Grenadines
20
15
10
5
0
-5
%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014 Pr
2015 Est
Growth in Debt Stock
GDP growth


St Kitts/Nevis
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014 Pr
2015 Est
Growth in Debt Stock
GDP growth


Saint Lucia
20.0
15.0
10.0
5.0
0.0
-5.0
%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014 Pr
2015 Est
Growth in Debt Stock
GDP growth

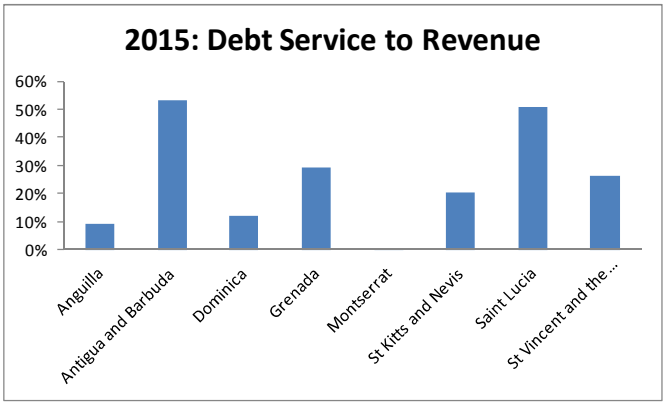
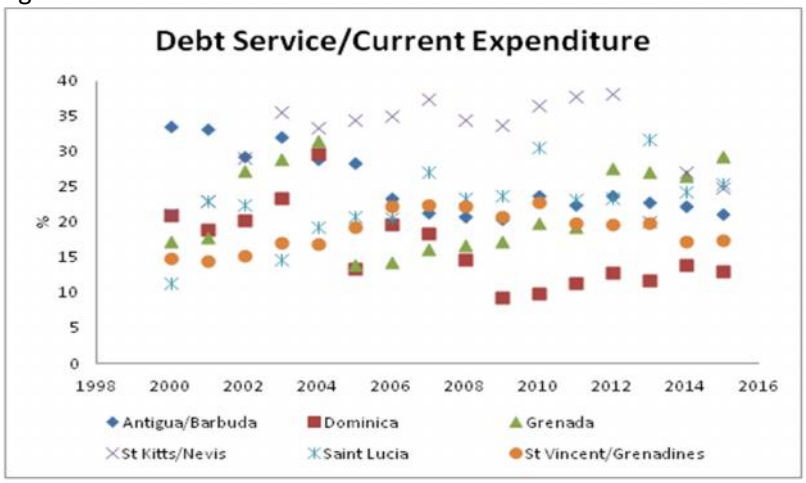

2015: Debt Service to Revenue
60%
50%
40%
30%
20%
10%
0%
Anguilla
Antigua and Barbuda
Dominica
Grenada
Montserrat
St Kitts and Nevis
Saint Lucia
St Vincent and the...

Figure 2:



Source: Eastern Caribbean Central Bank