AN EXPLORATION OF ALTERNATIVE METHODOLOGIES FOR ASSESSING DEBT AND FISCAL SUSTAINABILITY

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ABSTRACT

This paper reviews alternative methodologies for measuring debt sustainability. In this study, we apply the econometric approach and the gap analysis approach to fiscal data of St. Kitts and Nevis, Dominica, St. Vincent and the Grenadines and Jamaica to analyse sustainability during the period 1970 – 2005. We find that the econometric approach is a useful approach that addresses the issue of long-term sustainability. On the other hand, the gap analysis is more flexible and can be used to address short, medium and long-term sustainability. The empirical results suggest that countries in the sample face serious issues of fiscal sustainability.

Keywords: debt sustainability, alternative methodologies, gap, co-integration.

[1] This research was done while the author was on a three-month work attachment with the Social and Economic Research Unit of the Caribbean Development Bank. The project was conceptualized by the head of the unit, Juliet Melville, who provided initial supervision. The exercise was completed in close collaboration with Patrick Kendall, Research Economist with SERU, who made an invaluable contribution to the presentation, analysis and interpretation of the findings. Extensive comments from both provided useful insights.

1.0 Introduction

In many Caribbean economies, output growth in recent years has been relatively low and economic activity has not been vibrant enough to generate sufficient revenue for the attainment of budget surpluses. Instead, these economies have been consistently registering relatively high budget deficits which are being reflected in rapid debt accumulation. Since today's deficit adds to tomorrow's expenditure to service new debt, deficits and debt reduction should be twin targets of any government.
Persistent deficits and debt accumulation may induce currency depreciation and high interest rates, making borrowing more expensive. Additionally, over time, too great a debt means that debt service payments will exert increasing claims on government's revenue, adversely impacting expenditure on other critical goods and services, compromising the growth trajectory of the country and the social well-being of the populace. Eventually debt can become unsustainable. Governments therefore have to perform a delicate balancing act between using loan resources to support economic and social development objectives while maintaining the capacity to meet the associated debt service obligations. In the region, indebtedness in recent years has been on the rise. A study by Ratna Sahay in 2004 indicated that in 2003, 14 out of 15 Caribbean countries were among the top 30 of the world's most highly indebted countries. The issue of debt sustainability is therefore of direct relevance to Caribbean countries, given their persistent fiscal deficits and above average debt ratios.[2]

The term 'debt sustainability' has many definitions. One concept of sustainability relates to solvency or the ability of the government to service its debt obligations infinitely without explicit default. The IMF and World Bank (2001) define "debt sustainability" as a country's ability to service its borrowing, external and domestic, public and publicly-

[2] Public debt refers to the indebtedness of central government, statutory bodies and contingent liabilities and comprises domestic and external debt. Domestic debt is owed to lenders within the country, while, external debt is that part of the government debt which is owed to creditors outside the country

guaranteed, and private non-guaranteed, including both short-term and long-term debts, without compromising its long-term development goals and objectives and without resorting to debt rescheduling or accumulation of arrears. Blanchard (1990) states that an economy has achieved fiscal sustainability when the ratio of public sector debt to GDP is stationary and consistent with the overall demand (both domestic and foreign). This study defines fiscal sustainability as governments' ability to repay current and future debt in keeping with Blanchard's definition.

The main aim of this paper is to identify an appropriate approach for assessing debt sustainability in Caribbean economies. In this regard, a comprehensive review of the theoretical framework of alternative methodologies used to assess debt sustainability is presented in order to identify and develop the most appropriate approach for the Caribbean. The main analytical apparatuses used in this study are Stationary Testing and the Primary Gap Approach.

The remainder of this study is structured as follows. Section 2 is a comprehensive review of the theoretical framework of alternative methodologies focusing on the conventional approach, stationarity testing and the Human Development approach. Section 3 highlights the present and historical development of debt and budgetary deficits in Jamaica, Dominica, St. Kitts and Nevis and St. Vincent and the Grenadines. Section 4 presents results of Stationary Testing and the Primary Gap Approach. The policy recommendations and conclusion are discussed in Section 5.

2.0 Measures of Debt Sustainability

There is a variety of methodologies for defining and assessing the sustainability of fiscal programmes. These include the Conventional approach, Econometric approach, the Probabilistic model (Mendoza & Oviedo 2003), the Sudden Stop approach and the Human Development approach. These approaches use various indicators to show how fiscal policy expands and signal when it is likely that debt servicing would become increasingly difficult. The starting point of these approaches is

the balance sheet of the consolidated public sector or the government budget constraint:

$$B_t = B_{t-1}(1+i_t) - (R_t - G_t) \qquad 1$$

where B_t denotes government debt, i_t the nominal interest rate, G_t represents government expenditure (excluding interest payments), R_t government revenues and $R_t - G_t$ is the primary surplus. It expresses the relationship between government's current debt, the last period's debt, the interest rate and the primary surplus.

Solving forward to a terminal period s from an initial period 0, the budget constraint can be represented as follows:

$$B_s = (1+i)^s B_{t-1} - \sum_{t=1}^{s} (R_t - G_t)(1+i)^{s-t} \qquad 2$$

Dividing throughout by $(1+i)^s$, rearranging to solve for B_{t-1} and letting $s \longrightarrow \infty$ yield the government inter-temporal budget constraint:

$$B_{t-1} = \left[\lim_{s\to\infty} \frac{B_s}{(1+i)^s} \right] + \sum_{t=1}^{\infty} \frac{R_t - G_t}{(1+i)^t} \qquad 3$$

Since in the limit, the first term on the RHS in equation (3) equals zero, then the government's fiscal stance is sustainable only if the stock of outstanding debt B_{t-1} equals the discounted value of future government surpluses, given the assumption that at the end of the period nothing will be owed to creditors nor will debtors owe anything to government. A necessary condition for sustainability is that the term in square brackets of equation (3) should be equal to zero. This lead to equation (4)

Hence for sustainability:

$$B_{t-1} = \sum_{t=1}^{\infty} \frac{R_r - G_t}{(1+i)^t} \qquad 4$$

Equation (4) implies that government cannot indefinitely accumulate debt by borrowing new money to pay back old liabilities, including interest payments. Once this condition holds, then the government budget constraint is fulfilled. This condition is called the "No Ponzi Game" (NPG) condition i.e $\left[\lim_{s\to\infty} \frac{B_s}{(1+i)^s} = 0\right]$; it constrains the public debt from growing faster than the interest rate.

2.1 Conventional Approaches

The primary gap, tax gap and net worth gap indicators are hereafter referred to as "Conventional Approaches". The definitions of these indicators are essentially the same. A sustainable fiscal policy is one that ensures that the debt to GDP ratio converges back towards its initial level. These indicators differ only from a statistical point of view. The *primary gap* measures the distance from the sustainable primary balance. The *tax gap* expresses the difference between the actual and the sustainable revenue-to-GDP ratio. The net worth indicator measures what the government may temporarily need to keep its gross debt from rising by using its assets to finance the deficits.

2.1.1 Primary Gap Indicator

The Primary Gap indicator was first proposed by Blanchard (1990) and further developed by Buiter et al (1993). It computes the primary balance needed to stabilize the debt-to-GDP ratio, and is the difference between the required augmented surplus ratio to GDP and the actual

augmented surplus ratio to GDP. The starting point of this approach is the one-period government budget identity which is defined as:

$$B_t^d + X_t B^*_t = (1+r)B_{t-1}^d + (1+r^*)X_t B_{t-1}^* - S_t \qquad 5$$

where B_t^d : domestic currency denominated debt

B_t^* : foreign currency denominated debt

X_t : current period exchange rate

r_{r-1}: ex post interest rate on domestic currency denominated debt

r_{t-1}^*: ex post interest rate on foreign currency denominated debt

s_t : primary surplus of the central government

Assuming the desire to maintain unchanged a given level of indebtedness, i.e. that $b_t = b_{t-1} = b_{t+2}$ etc, $= b_0$. The primary gap indicator developed by Buiter et al (1993) is given by:

$$GAP = \left(\frac{r - g_t}{1+g_t}\right) b_0 - s_t \qquad 6$$

b_0 is the constant debt to GDP, thus the augmented surplus ratio given by equation 7 (as defined by Buiter) is required to maintain a stable debt-to-GDP ratio.

$$\tilde{s}_t = s_t - \left(\frac{(1+i_t^*)(1+\gamma_t) - (1+i_t)}{(1+\pi_t)(1+g_t)}\right) b_{t-1}^* \qquad 7$$

Hence the one period primary gap indicator, which is the difference between the required augmented surplus ratio to GDP and the actual

augmented surplus ratio to GDP, is an indicator of fiscal sustainability (Blanchard, 1990; Buiter, 1995)

A negative gap indicates that the required primary surplus is lower than the actual primary surplus, implying downward pressure on the debt-to-GDP ratio. If the indicator is positive, then the required primary surplus is higher than the actual primary surplus, suggesting that government must embark on fiscal adjustment programmes to ensure that the debt-GDP ratio does not increase.

2.1.2 Tax Gap Indicator

Blanchard (1993) also defines sustainability as stability in the debt to GDP ratio and suggests a number of indicators (short, medium and long-term) that can be used to evaluate the sustainability of fiscal programmes implemented by government. Blanchard looked at the change in policies required to maintain the debt to GDP ratio constant. In this regard, he proposed the application of a "tax-gap" indicator. The tax gap indicates the increase in tax ratio (tax effort and/or the cut in expenditure) required for public debt sustainability.

The permanent tax to output ratio necessary to stabilize the debt ratio is given by:

$$\bar{t} = G_t - (g_t - r_t)b_t \qquad 8$$

here G_t is the ratio of government non-interest spending to output, t_t is the tax to output ratio, r_t is the real interest rate, g_t is the real growth rate of GDP and b_t denotes the current debt stock. Adding t_t to both sides of equation (8) yields the tax gap indicator:

$$t_t - \bar{t} = t_t + (g_t - r_t)b_t - G_t \qquad 9$$

Equation (9) measures the difference between the permanent tax ratio and the current tax ratio. A negative indicator shows that current taxes are

too low to stabilize the debt ratio, given current spending policies, and that fiscal policy is thus unsustainable.

2.1.3 Net worth Gap Indicator

Buiter (1985) suggested a somewhat different indicator of sustainability and "defined a sustainable policy as one capable of keeping the ratio of public sector net worth to output at its current level."

Net worth (NW) = Assets
(Real + Financial) – Liabilities (Financial) 10

where: *Assets (A) = Fixed Capital + Financial Assets (Shares etc.) and Financial Liabilities (L) = General Government Debt (Gross Outstanding Debt)*

However, this indicator is hard to apply since the government net worth is very difficult to measure. Nonetheless, he argues that a sustainable fiscal policy should keep the ratio of public sector net worth to output constant. He calculated the permanent adjustment required to achieve this objective as:

$$F = R(S - W) \qquad 11$$

where, F is the ratio of the required adjustment (or long-term balance) to GDP , W is the ratio of net worth to GDP, R the real long-term interest rate and S the present value of government spending.

2.1.4 Critique

The gap (i.e. tax, primary and net worth) approaches rely on accounting indicators, and usually set a constant debt-to-GDP ratio as a benchmark for the sustainability of fiscal policies. These approaches do not identify the level of debt which might be considered sustainable. They merely seek to stabilize the debt ratio. Additionally, the exclusive emphasis which this approach puts on the relationship between GDP growth and increases in debt does not capture the important role that lenders ultimately play in determining what debt strategies are sustainable.

Furthermore, the absence of any reference to the structure of the debt and particularly the existence of external debt and the possible impact of exchange rate movements are other weaknesses of many gap approaches.

Second, the interpretation of gap indicators is quite straightforward and simple. However, Chalk and Hemming (2000) argue that despite the simplicity and ease of interpretation associated with this approach, these indicators do not distinguish between countries with varying degrees of indebtedness and fiscal imbalance, and are therefore more useful in the case of countries characterized by high debt and primary deficits. Debt sustainability may not be realistically achievable if the initial level of debt is very high. Notably, the debt-to-GDP ratio may be so high that the fiscal adjustment required may not be economically feasible. Hence, governments may not be able close the gap over time and debt reduction may be required.

The gap approaches require that the primary surplus relative to GDP remain consistent over time. Arguably, this criterion is strong. Chalk and Hemming (2000) note that the fundamental issue of solvency is in meeting the budget constraint given in equation (4). This does not require the debt-to-GDP ratio to be constant. Chalk and Hemming (2000) also state that the gap methodology can be applied to the majority of countries but for countries which are well-endowed with non-renewable resources, the usual approach can often give a misleading impression about fiscal sustainability, since financial wealth differs from resource wealth.

2.2 Econometric Approach

This approach is based on the assumption that fiscal sustainability exists when government policies satisfy the Present Value Budget Constraint, which is defined by equation (4). The methodology examines whether the fiscal data (revenue, expenditure excluding interest payment of debt) are consistent with the NPG condition. The basic idea behind the methodology is that these variables may grow over time; hence, a stable equilibrium (cointegrating) relationship should exist between them.

If there is no long-term or equilibrium relation between them, then government is violating its intertemporal budget constraint.

The Econometric approach consists of two main tests. The first, "test for stationarity", uses unit root tests such as Dickey and Fuller, Phillips and Perron, and Perron tests to assess the statistical properties of revenue (R_t) and expenditure (G_t). Test for Stationarity was developed and applied by Hamilton and Flavin (1986). These unit root tests require large samples, and do not guarantee robust results in small samples. The second test uses co-integration techniques to determine the relationship between the coefficients (R_t) and (G_t). Given that (R_t) and (G_t) are both stationary, Hakkio and Rush (1991) define cointegration between these variables as a necessary condition for the present value budget constraint to hold.

From the inter-temporal budget constraint (see equation 3), tests of fiscal sustainability can be derived using the concept of co-integration.

Following Hakkio and Rush (1991), equation (3) can be re-expressed as follows:

$$(G_t + iB_{t-1}) - R_t = \sum_{s=0}^{\infty} \frac{\Delta R_{t+s} - \Delta G_{t+s}}{(1+i)^{t+s}} + \lim_{s\to\infty} \frac{\Delta B_{t+s}}{(1+i)^{t+s}} \qquad 12$$

where the last term $\lim_{s\to\infty} \frac{\Delta B_{t+s}}{(1+i)^{t+s}}$ goes to zero and G_t and R_t are assumed to be non-stationary so that the ΔR_t and ΔG_t are stationary. The result is that the RHS is stationary. This implies that the LHS of the equation must also be stationary {i.e. $(G_t + iB_t) - R_t$ must be stationary}. $(G_t + iB_{t-1}) - R_t$ can be stationary only if $(G_t + iB_{t-1})$ and R_t are co-integrated with the co-integrating vector being 1, -1). *where* $0 > \beta > 1$.

If the null hypothesis holds, test for co-integration is conducted based on the following regression equation:

$$R_t = \alpha + \beta G_t + \varepsilon_t \qquad 13$$

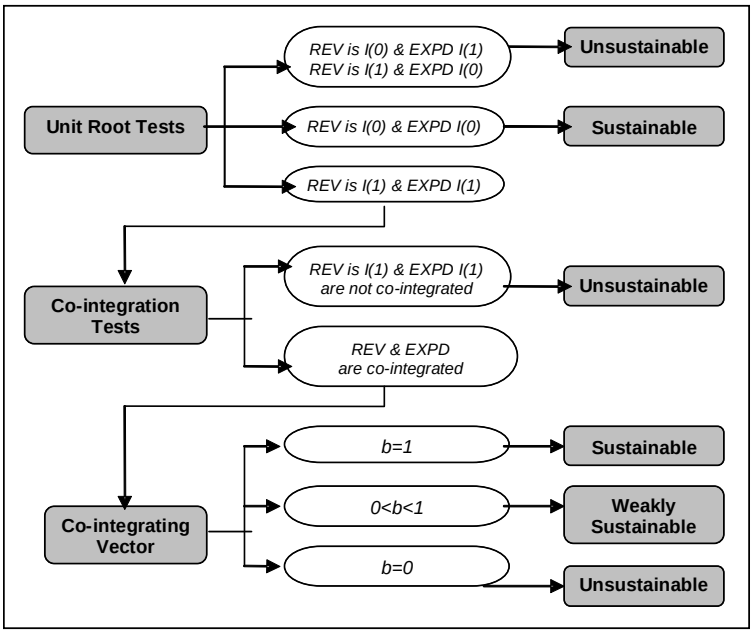
The necessary and sufficient condition for sustainability is that the series in equation (13) must be co-integrated with vector $\beta(1-1)$. If only one of the series is I(1), while the other is I(0), the two series will diverge, implying that public debt is not sustainable. The test of co-integration therefore is a test of fiscal sustainability.

The null hypothesis is that there is no co-integration. If the null hypothesis is rejected, then the series is co-integrated. Several possible conclusions may be established: (i) there is no co-integration, that is, the fiscal balance is not sustainable; (ii) there is co-integration with $\beta = 1$, that is, the fiscal balance is sustainable and (iii) there is co-integration, with $0 < \beta < 1$, that is, the deficit is weakly sustainable. On the other hand, if $\beta \leq 0$, government expenditures grow faster than government revenues, and the fiscal balance may not be sustainable.[3] Figure 1 summarizes the criteria for sustainability.

Jha (2001) used the econometric approach to conduct sustainability tests for a sample of low and middle-income countries for the period 1950 – 1999. The results showed that in all countries both government expenditure and government revenue were non-stationary and not co-integrated. Jha (2001) therefore concluded that the fiscal deficits for both middle and low-income countries in his sample were not sustainable in the long run.

[3] See Hakkio and Rush (1991) and Trehan and Walsh (1991)

Figure 1: Econometric Approach



2.2.1 Critique

The econometric approach involves testing a set of historical time series data on government spending and revenue to determine the existence of co-integration. However, these require long data sets, a requirement that may be unrealistic in many developing countries, since data are relatively poor and limited with respect to time span and accuracy. Also, this technique captures only long-term sustainability but does not capture problems of short and medium-term sustainability.

The results of these tests do not provide clear policy directives (they do not give clear benchmarks like the gap approach). The approach does not rule out large primary deficits or high debt. Government is simply required to run adequate primary surpluses in the future. Moreover, the restrictive condition only constrains the debt from growing

faster than the interest rate. Additionally, it assumes that in the long run the country will be able to maintain access to financing.

2.3 Sudden Stop (SS) Approach

Edwards (2004) defines a sudden stop to be a period in which a country's net capital inflows (the financial account balance) decline by at least 5% of GDP in one year. However, there are various definitions of sudden stop. Most are centred on a sharp increase in the current account deficits, accompanied by a sharp decrease in the financial account balance. A substantial current account deficit raises a question about the country's capability of continually financing such an imbalance. This can trigger a panic that induces a sudden stop.

Sudden Stops in capital flows force abrupt adjustments of the current account deficit. A fall in the financing of the current account deficit implies that the country must follow a forced adjustment in its absorption of tradable goods. Since the consumption of non-tradable goods is a complement to the consumption of tradable goods, a fall in the latter will imply a fall in the former, leading to a decrease in non-tradable prices. In a small open economy tradable prices are taken as a given which implies that the real exchange rate (RER) must adjust. This adjustment will generate valuation effects on the debt-to-GDP ratio, which, in turn, affect fiscal sustainability. (Calvo et al. 2003).

Empirical analysis of this approach was conducted by Calvo et al. (2003). They considered the effects of a depreciation of the RER of 50 percent on debt valuation and fiscal sustainability for Argentina, Brazil, Chile, Columbia and Ecuador for the year 1998. They found that the RER depreciation had a substantially negative effect on Argentina's fiscal performance.

The SS approach proposed by Calvo et al. (2003) takes into consideration the effects of real exchange rate depreciation on fiscal sustainability. In this regard they propose an indicator which incorporates the currency composition of the debt and GDP. They consider the case

of a small open economy experiencing a current account deficit before a sudden stop takes place. By definition:

$$CAD = A^* + S^* - Y^* \qquad 14$$

where CAD is the current account deficit, A^* is absorption of tradable goods, S^* represents net non-factor payments to foreigners, and Y^* is the supply of tradable goods. If financing of the current account deficit is stopped, the full amount of that imbalance would have to be cut, and therefore the current account balance must be adjusted abruptly.

Further, they considered a typical sustainability calculation, where the size of the primary surplus necessary to keep a constant ratio of debt to GDP is computed, given the cost of funds and growth rate of the economy. The equation is given by:

$$b_{t+1} = b_t \frac{(1+r)}{(1+\theta)} - s_t \qquad 15$$

here b_t is the debt to GDP ratio, t is the time period, r is the real interest rate on debt, θ is the GDP growth rate, and s_t is the primary surplus as a share of GDP. To obtain a constant debt to GDP ratio ($\bar{b}_t$), r and θ are assumed to be constant and the required primary surplus must satisfy the following:

$$s_t = \bar{b}t\left[\frac{(1+r)}{(1+\theta)} - 1\right] \qquad 16$$

This defines the steady state of debt. It is a traditional debt sustainability calculation, but Calvo et al point out that it hides the true

composition of the debt-to-GDP ratio b_t. To correct for this, they decomposed debt in terms of tradables and non-tradables.

$$\bar{b}t = \frac{p_t B_t + B_t^*}{pY_t + Y_t^*} = \frac{B_t + e_t B_t^*}{Y_t + e_t Y_t^*} \qquad 17$$

where (e_t) is the real exchange rate (defined as the price of tradables relative to nontradables), p_t is the inverse of the real exchange rate, B_t is debt payable in terms of nontradables, B_t^* is debt payable in terms of tradables, Y_t is output of non-tradables, and Y_t^* is output of tradables.

Calvo et al (2003) emphasize that debt composition, as well as output composition, matter a great deal for sustainability analysis, because mismatches between debt and output composition can lead to substantial differences in valuation of the debt/GDP ratio following real exchange rate depreciation.

For example, if $b_t = e_t B_t^* / Y_t$, all valuation effects take place only on debt. This is the worst case scenario in which RER depreciation has a substantially negative impact on fiscal sustainability. On the other hand if $(B_t / e_t B_t^*)/(Y_t / e_t Y_t^*) = 1$ the composition of debt and output are perfectly matched. When this condition holds, RER depreciation has no effect on fiscal sustainability. A value of 1 would indicate a perfect match and a value of zero would indicate the highest degree of mismatch.

2.3.1 Critique

Sudden Stops are modelled as large, unexpected shocks. One cannot tell whether the predictions of particular models are robust to changes, allowing agents to act on expectations of sudden stops. Precautionary savings theory suggests that this can be a flaw since, when faced with possible catastrophic events, agents build a buffer stock of savings to lower the long-run probability of these outcomes.

Also, using the debt-to-GDP ratio to determine sustainability, the theory is implicitly assuming that resources can easily be directed from the rest of the economy to the tradable goods sector to generate the required

foreign exchange. Often the majority of public debt is denominated in foreign currency.

2.4. The Probabilistic model of Mendoza and Oviedo (MO) (2003)

The Probabilistic model is a new approach to assessing fiscal sustainability proposed by Enrique G. Mendoza and Pedro Marcelo Oviedo (2003). The guiding principle of the model is that of Credible Repayment Commitment (CRC). Mendoza and Oviedo (2003) define debt sustainability as one in which the government is able to repay its debt and maintain the credit relationship. This implies that the government cannot accumulate more debt than it can service.

The probability model determines a threshold debt level, and produces estimates for the number of periods it will take to hit the debt threshold. Mendoza and Oviedo (2003) develop a complete dynamic stochastic general equilibrium model where the behaviour of utility-maximizing individuals and profit-maximizing firms determines government revenues endogenously. These assumptions lead to a simple formulation of the CRC, where the threshold value for the debt-to-GDP ratio satisfies the following condition:

$$b_{t-1} \leq b^* = \frac{t^{\min} - e^{\min}}{r - g} \qquad 18$$

where b^* represents the threshold value for the debt-to-GDP ratio, $t^{\min}$ is the lowest possible realization of the ratio of government revenues to GDP, r_t real interest rate, g_t GDP growth and $e^{\min}$ is the minimum level of the government expenditure-to-GDP ratio that can be sustained if a country were to enter a fiscal crisis in which tax revenue reaches and stays at $t^{\min}$ and pushes b_{t-1} above b^*.[4]

The approach also captures the stock of debt that government is "willing" to repay if lenders choose r so that b^* reflects a debt rationing

[4] Note that b* is the sustainable debt ratio in the long run.

level that enforces the government's participation constraint (i.e. constraint under which the government always finds it preferable to repay and maintain a relationship with creditors). This implies that the government cannot accumulate more debt than it can service if it were to enter a fiscal crisis. There will be a debt limit above which no additional borrowing can take place. The model incorporates volatility of fiscal variables in determining ability to repay. Mendoza and Oviedo assume that the volatility in government revenues can be traced back to fundamentals such as terms-of-trade shocks, sudden stops, international interest rates or productivity.

The probabilistic model requires information regarding the volatility of government revenue, average levels of revenue and expenditure, the size of potential adjustment in expenditure that would be needed if government were to fall into a state of crisis, an estimate of the risk-free interest rate on government debt and a growth rate for the economy.

2.4.1 Critique

Unlike the standard approach which defines a policy target (i.e. expressed as the primary balance-to-GDP) needed to stabilize the economy, Mendoza and Oviedo's model defines the "maximum" debt level and not a "target" debt level (to be achieved through policy adjustment). The maximum debt level is not the equilibrium or optimal debt level. Therefore, the task of government is to strengthen fundamentals so that the probability of hitting the upper limit of government debt remains low. However, the debt level limit does not imply that governments with the debt levels at or below the limit are default-free. The possibility of default can still occur in the case where the inability to pay arises due to large unexpected shocks to either government revenues or outlays.

Secondly, for any given average revenue-to-GDP ratio, governments that have a less volatile revenue base will have higher t^{min} and hence they will be able to sustain higher levels of debt. Additionally, actual value of expenditure adjustment that can be announced is not as

critical as the value of t^{min} that can be credibly announced. Nevertheless, countries which can commit to large adjustments in expenditure can sustain higher debt-to-GDP ratios and may never be asked to act on these commitments. The focus on government debt misses fragile debt positions in the private sector that can subsequently become liabilities of the public sector. Often there is a domino effect when there is bankruptcy in the private sector.

2.5. Human Development Approach

A recent paper by Jeffrey Sachs (2002) summarizes the inconsistency of the approaches discussed, noting that "it is perfectly possible, and indeed is currently the case, for a country or region to have a 'sustainable debt' (and significant debt servicing) according to IMF macroeconomic criteria, while millions of people within the country are dying of hunger or disease". One of the key principles of Sachs' approach is that human development is imperative and should take precedence over debt payments. As a consequence, developing countries should be able to set aside as much fiscal revenues as are needed to reach these goals and only then use the remainder for debt service. Debt sustainability here is linked to the achievement of the millennium development goals.

The underlying principle of Sachs' (2002) approach is the inadequacy of the IMF debt sustainability analysis to deliver debt sustainability in the presence of imperative human development needs. Therefore, rather than arbitrarily setting "sustainable" ratios of debt to revenue and other arbitrary sub-criteria, the human development approach takes as its core the amount of revenue which a government can realistically be expected to raise after deductions of necessary funds for basic human needs have been made.

The approach is based on four assumptions. Firstly, *it is not reasonable to levy tax on income below the international absolute poverty line* which is determined by the World Bank to be US$1 per person per day at purchasing power parity at 1985 prices. Secondly*, taxation greater than 25% on incomes* (i.e. adjusted GDP), will give rise to excessive distortions in the

economy and thus hinder economic development. Thirdly, *measurements of what countries can afford in terms of debt-servicing* are considered after minimum levels of government spending have been set aside to meet targets for the most basic level of human development. Human development expenditure is limited here to basic health and primary education. Lastly, *only a limited amount of any remaining revenue should be allocated towards debt service*, in order to leave resources for other essential government expenditure. Servicing demands above this level would be inconsistent with debtor governments' ability to meet their countries' development needs.

The proposed human development approach involves three steps. In the first step *the resource envelope is determined.* This includes all available resources to Government and is defined as fiscal revenue, including grants. Including grants may cause overestimation because grants tend to flow irregularly as disbursements are subject to delays and dependent upon adherence to certain conditionalities. Additionally, the amount of income or GDP below the international absolute poverty line is subtracted from the taxable income base. In other words, earnings below the poverty line are not subject to taxation. This can be expressed as a percentage of GDP.

The second step involves *costing the human development expenditure.* The approach is based on the assumption that resources available to Highly Indebted Poor Countries (HIPC) governments must first be used for essential expenditures that are necessary to eradicate poverty. These expenses include those for social sector development (health, education, etc.), and basic infrastructure. Estimating the social costs relies on the resource requirements necessary to attain the MDGs.

The final step entails *determining the net revenue available for all other expenditures.* Net revenue available for all other expenditures, including recurrent expenditure, personal emoluments, external debt service, etc. is obtained by deducting the total human development expenditure (in Step 2) from total available revenue (in Step 1). In a situation where net revenue is below zero, it would mean that debt service is non-payable, warranting total debt cancellation and increased grant aid. If the amount is

above zero, then one would proceed to assess external debt against net revenue.

There are limits to the human needs approach. Firstly, it is not designed for all countries but specifically for those economies which are highly impoverished and so arguably will have limited applicability to Caribbean economies with the exception of Haiti. The nature of Caribbean economies is radically different from the richer and more developed countries of Latin America, as is the nature of their interaction with the world economy. A level of external debt which may be sustainable for Mexico, Brazil or Argentina cannot be assumed to be sustainable for Caribbean economies.

Additionally, this approach does not pay adequate regard to domestic debt nor private sector debt. Private sector liabilities can become government debt if guaranteed by government. Lastly, this methodology allows countries to pursue their most basic human development needs in terms of health and education. However, essential needs for human development are not limited to these two areas.

In brief, the above-mentioned methodologies build on the government budget constraint which links together the fiscal deficit, public debt, economic growth, inflation, interest rate and the balance of payments. These methodologies do not indicate what level of debt is sustainable. Instead, they indicate whether given policies can lead to upwards trends in the debt-to-GDP ratio and ascertain when fiscal adjustment is required. These approaches consider financial sustainability. However, debt sustainability analysis should also consider economic sustainability since a country should not only be able to generate enough resources to serve its debt obligation but also to improve its economic performance.

2.6 Overall Assessment

A good indicator of fiscal sustainability is one that sends clear and easily interpretable signals when current policy appears to be leading to a rapidly growing debt-to-GDP ratio (Blanchard 1990). This study therefore considers the primary gap and the test for stationary approaches

as the most appropriate methodologies for ascertaining debt sustainability in Caribbean economies.

The selection of the primary gap approach is based on two fundamental points. First, this indicator not only signals when there is a need for adjustment, but it also indicates the magnitude of the adjustment needed (it provides a benchmark for attaining sustainability i.e. the required primary surplus needed to close the primary gap). Second, the interpretation of gap indicators is quite straightforward and simple. The results of this indicator can be used to guide governments towards a sustainable fiscal path. It is an attractive indicator for Caribbean economies because the ultimate objective of government is to control its budget balance.

The econometric approach is considered the second most useful methodology because it examines whether the historical process that generates fiscal data is likely to result in the violation of the No Ponzi Game condition. Moreover, the econometric approach is very useful since it combines economic theory, mathematics and statistical tools to empirically verify the underlining macroeconomic theory. In Section 5, these two methodologies will be employed to examine empirically if debt is sustainable in St. Kitts and Nevis, Jamaica, Dominica and St. Vincent and the Grenadines.

3.0 Trends and Origin of Debt in Selected Countries

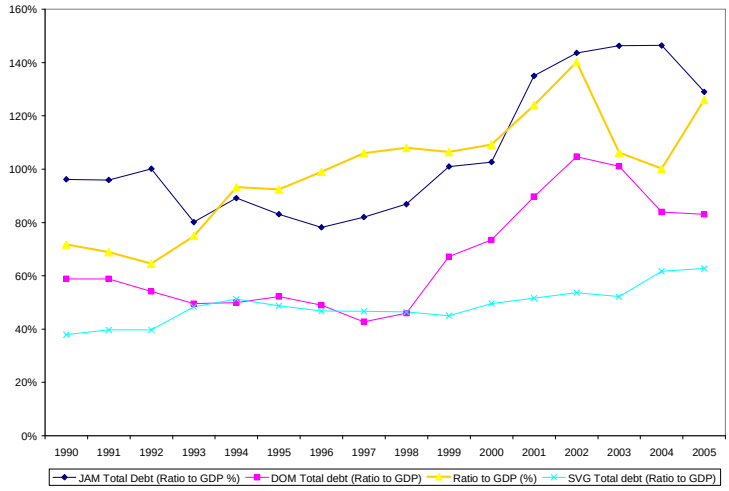
In this section an analysis of historical data on debt ratios, GDP and fiscal data will be analysed to determine the origin and causes of debt in St. Kitts and Nevis, Dominica, Jamaica, and St. Vincent and the Grenadines. The choice of these countries has been dictated by their high and growing level of indebtedness and by the availability of data.

In the 1950s and 1960s, growth rates were typically high and interest rates were low in St. Kitts and Nevis, Jamaica, Dominica and St. Vincent and the Grenadines. In contrast, during the 1970s and early 1980s, oil supply shocks, foreign exchange distress, and low growth rates made it difficult for countries to service their existing debt. As a result,

economies resorted to new debt, which worsened their debt status. Meanwhile, interest payments on loans mounted and so countries in the Caribbean were caught in the vicious cycle of large deficits, large debt service payments and substantial debt accumulation.

Over the last three decades total public sector debt in these countries increased significantly (*see Figure 2).* In the 1970s, St. Kitts and Nevis' public debt-to-GDP ratio averaged 35%. Debt increased moderately in the 1980s, but by the 1990s total outstanding debt, exacerbated by large and persistent losses by the government's sugar company and devastating effects caused by hurricanes, increased significantly. By 2005, St. Kitts and Nevis's public debt-to-GDP ratio escalated to 181%. Throughout the 1980s, Jamaica's public debt increased rapidly. At the end of 1984, Jamaica's total outstanding debt as a ratio of GDP was 235%, but declined to 125% in 2005.

Figure 2: Total Public Sector Debt-to-GDP



Data Source: Bank of Jamaica Annual Reports (various issues), Annual Statistical Digest, IMF Statistics and the ECCB Annual Statistics

St. Vincent and the Grenadines' total external debt-to-GDP increased gradually from 16% in 1980 to 36% in 1994. In 2002, total public debt-to-GDP hiked to 74%. This was 14% points above the debt threshold set out by the ECCB.[5] This increase was partly due to the weakening of the governments' fiscal performance, and more specifically, the additional expense placed on the government as a result of defaulting on a government guaranteed loan of US$57.78 million for the construction of the Ottley Hall marina and shipyard. Up until 2004, the Ottley Hall debt was the single largest loan in the debt portfolio. By the year 2005, the government of St. Vincent and the Grenadines recorded its highest debt-to-GDP ratio of 84%, equivalent to debt stock of US$361.14 million.

During the 1970s and 1980s Dominica's total debt stock was relatively low. In the 1990s its public sector debt increased significantly. For example, the debt to GDP ratio rose from 46% in 1998 to 67.2% in 1999. By 2003 Dominica's public debt-to-GDP was over 100%. During the last quarter of 2003, a decision was taken by the IMF's Executive Board to approve a three-year US$11.4 million credit. Additionally, The World Bank approved a US$3 million structural adjustment loan. By the end of 2005 Dominica's public debt-to-GDP declined to 83%. Two oil shocks in the 1970s triggered a reduction in the demand for export commodities, and deepened the above-mentioned economies' needs for borrowing. To add to their economic hardship, these economies suffered to some extent from extensive damage caused by natural disasters.

Dominica, St. Kitts and Nevis, St. Vincent and the Grenadines and Jamaica are highly vulnerable to weather conditions, natural disasters and international economic developments. These economies have been affected significantly by tropical storms and hurricanes. These include hurricanes David in 1979, Frederick and Allen in 1980, Gilbert in 1988,

[5] The proposed fiscal benchmarks for the member countries of the ECCU are as follows: (i) current account fiscal surplus of 4.0 percent of GDP; (ii) overall fiscal deficit not to exceed 3 percent of GDP; (iii) central government debt to GDP ratio not to exceed 60 percent of GDP; (iv) debt service payment ratio to current revenue not to exceed 15 percent.

George in 1998, Lenny and José in 1999 and Ivan in 2005. These hurricanes disrupted agricultural production in sectors such as bananas, coconuts and sugar production, forcing governments to increase their expenditure to assist and rebuild these sectors of the economy.

Figure 3: Fiscal Balance-to-GDP 1990 – 2005

Data Source: Bank of Jamaica Annual Reports (various issues), Annual Statistical Digest, IMF Statistics and the ECCB Annual Statistics

In general, these economies run persistent fiscal deficits. (See Figure 3). Between 1970 and 2005 Jamaica's fiscal deficit as a percentage of GDP averaged 6 %. During the period 1987 to 1995, deficits were lower (averaged 2 % of GDP) as the government embarked on policies to foster improved growth in tourism and the export of goods in order to generate increased foreign exchange earnings.

Between 1990 and 2000 the fiscal balance improved. A substantial increase in export of goods and services, driven in part by the devaluation

of the Jamaican currency, was one of the causes of improvements both in growth and fiscal performance. The exchange rate depreciated from JA$7.184 ≡ *US*$1 in 1990 to JS$42 ≡ *US*$1 in 2000.

In 1998, St. Vincent and the Grenadines' overall fiscal balance as a percentage of GDP was -3%. The fiscal balance worsened persistently from -0.6% in 2000 to -5.7% in 2005. (*see Figure 3).* In 2004 and 2005 the deterioration was mainly as a result of increases in recurrent expenditure (especially personal emoluments, goods and services) as well as government's increased engagement in road rehabilitation and capital programmes.

Figure 4: Real GDP Growth rate 1990 – 2005

Data Source: Bank of Jamaica Annual Reports (various issues), Annual Statistical Digest, IMF Statistics and the ECCB Annual Statistics

This study found that the principal reasons for the high levels of public sector debt to GDP between 1970 and 2005 in the above-mentioned economies were persistent fiscal deficits, low growth rates (*see Figure 4*), natural disasters, high interest rates, greater use of commercial borrowings and oil supply shocks. Much emphasis must be placed on addressing these underlining causes of increased indebtedness to help limit debt burdens.

Given the above conclusion that persistent fiscal deficits have significantly impacted the debt-to-GDP ratio, this study will empirically analyse the relationship between government revenue and expenditure to determine if these variables diverged over time. To determine this, the Primary Gap and Test for Stationarity methodologies will be applied to time series data of the selected economies. These methodologies seem to be the most appropriate tests for examining debt sustainability in the Caribbean. The basic logic of the chosen methodologies is that the ratio of debt to GDP must converge back towards its initial level and the fiscal variables cannot grow without limit, since they are constrained by the NPG condition.

4.0 Data Methodology and Results Analysis

This section applies the Primary Gap Indicator and the Econometric procedure to assess fiscal and debt sustainability in selected Caribbean countries.

4.1. Data Source

The data are annual from 1970 – 2005 and are obtained from the IMF *International Financial Statistics of the IMF, St. Kitts and Nevis' Annual Estimates, Bank of Jamaica and ECCB Annual Economic and Financial Statistics, the St. Vincent and the Grenadines Statistical Digest, the ECCB Economic and*

Financial Review, the ECCB Digest of External Debt and *the CDB Economic and Social Indicators*. All variables are expressed as a percentage of GDP at current market prices. A graphical representation of the series is displayed in the Appendix. Definition and details of all data are detailed in the Appendix.

4.2 Empirical results

4.2.1 Stationarity Testing

The initial step of the analysis requires testing for unit root in the series. The Augmented Dickey-Fuller test (ADF test) and the Phillips-Perron test **(**PP test) were applied to the revenue (REV) and expenditure (EXPD) variables and the results are presented in Table 1. The Akaike Information Criteria (AIC) was used to select the optimal lag length.

With respect to St. Kitts and Nevis, the ADF and PP tests indicate that both REV and EXPD are I(1) variables. Hence, the Johansen test for cointegration was applied. The results indicate that the null of no cointegration cannot be rejected, suggesting that there is no cointegrating relationship among the variables (*see Table 2)*. This indicates that St. Kitts and Nevis' fiscal policy has been unsustainable over the period 1970 – 2005.

A graphical representation of Dominica's REV variable suggests that the series is stationary. The ADF and PP tests confirm this as both tests indicate that REV is in fact stationary with t-stats of -5.39 and -5.44 respectively. However, the EXPD series contains a unit root. Given that REV is I(0) and EXPD is I(1), the conclusion is that fiscal policy in Dominica has been unsustainable during the period 1970 – 2005.

Table 1
Unit root tests for fiscal variables - ratios to GDP 1970 - 2005

Country	Variable	Specification	ADF t-stat	PP t-tat	Critical value	Conclusion
SKN	REV	Level	-1.74	-2.3	-3.64	Unit Root
		1st difference	-3.35	-7.72*	-3.64	Stationary
	EXPD	Level	-1.94	-2.61	-3.64	Unit Root
		1st difference	-4.91*	-9.26*	-3.64	Stationary
DOM	REV	Level	-5.39*	-5.44*	-3.63	Stationary
	EXPD	Level	-1.26	-2.83	-3.69	Unit Root
		1st difference	-3.78*	-10.39*	-3.72	Stationary
JAM	REV	Level	-2.69	-2.48	-3.63	Unit Root
		1st difference	-7.51	-7.59	-3.63	Stationary
	EXPD	Level	-1.94	-2.4	-3.63	Unit Root
		1st difference	-7.5	-7.5	-3.63	Stationary
SVG	REV	Level	-5.20*	-5.21*	-3.63	Stationary
	EXPD	Level	-3.24	-3.13	-3.63	Unit Root
		1st difference	-8.55*	-9.18*	-3.63	Stationary

*** reject the null of unit root at 5% level**

Table 2

Tests for cointegration between revenue and expenditure (% GDP)

Country	Hypothesized No. of CEs	Eigenvalue	Trace Statistic	1 percent Critical Value	Max-Eigen Statistic	1 percent Critical Value
SKN	None	0.17	9.64	25.08	6.54	20.16
	At most 1	0.09	3.09	12.76	3.1	12.76
JAM	None	0.48	23.44	19.93	18	18.52
	At most 1	0.18	5.41	6.63	5.41	6.63

Trace and Max-eigenvalue test indicates no cointegrating equation at the 1% significance level

Figure 5
Ratio of Expenditure to GDP in levels (DOM)

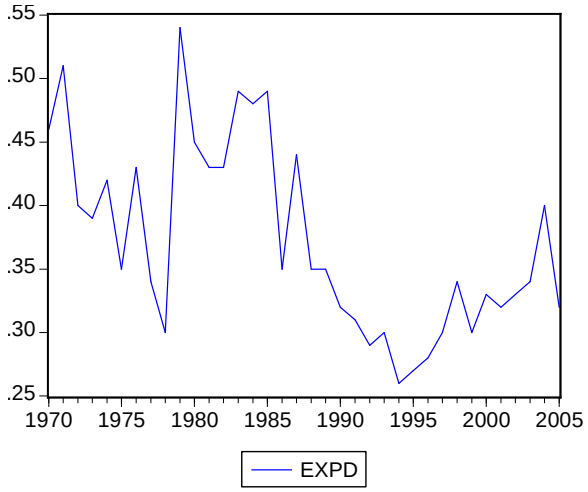
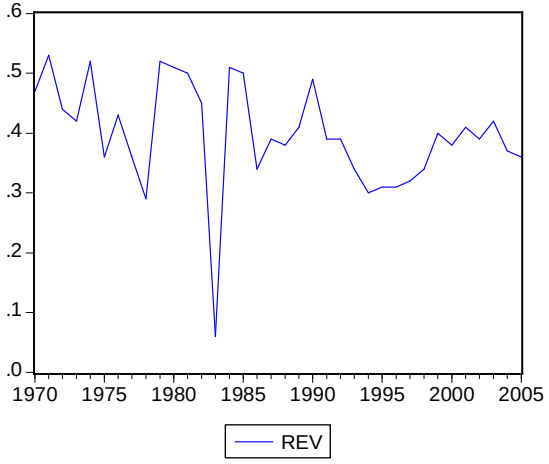


Figure 6
Ratio of Revenue to GDP in levels (DOM)



Results in Table 1 suggest the presence of a unit root in REV and EXPD for the Jamaica series, indicating that the null hypothesis cannot be rejected at the 1% level. Test for cointegration was then conducted. Using lag-lengths of more than 1, the trace unrestricted co- integration test indicates one cointegrating vector at 1% level (See Table 2). Test of cointegration restrictions $\beta = (1-1),$ shows that the restrictions are binding, suggesting sustainability of fiscal policy in Jamaica during the sample period (See Table 3).

Table 3
VEC Estimates

Restrictions: JAMAICA				
β (1,1)=1, β (1,2)=-1				
Tests of cointegration restrictions: JAM				
Hypothesized No. of CE(s)	Restricted Log-Log likelihood	LR Statistics	Degree of Freedom	Probability
1	136.87	2.32	**1**	0.1279
1 Cointegrating Equation(s): Convergence achieved after 1 iteration				
Restricted cointegrating coefficients (standard error in parentheses)				
REV	**EXPD**			
1	-1			
C	0			
Adjustment coefficients (standard error in parentheses)				
D(REV)	-0.167546			
	(0.10369)			
D(EXPD)	0.461610			
	-0.15877			

Figure 7
Ratio of Expenditure to GDP in levels (SVG)

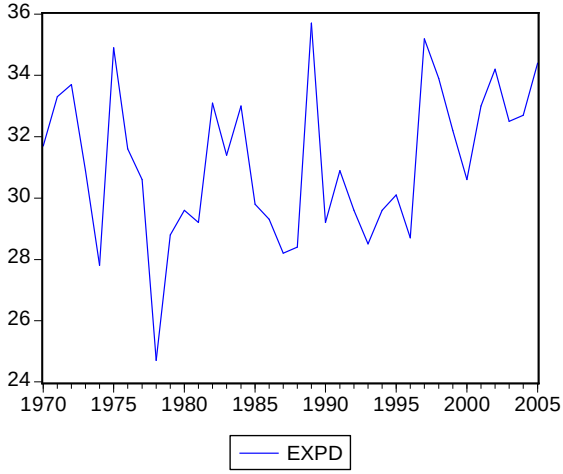
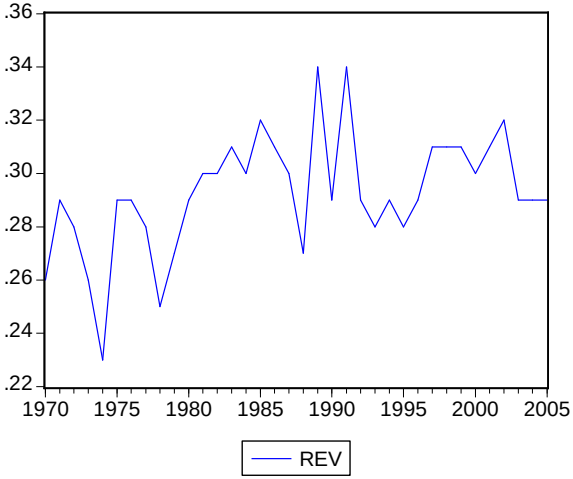


Figure 8
Ratio of Revenue to GDP in levels (SVG)



For St. Vincent and the Grenadines (SVG), the graph of REV suggests it may be stationary (*see Figure 8).* Results for the ADF and PP tests confirm this. Unit root tests indicate that REV is in fact stationary with t-stats of -5.20 and -5.21 respectively. On the other hand EXPD contains a unit root. Given that REV is I(0) and EXPD is I(1), the conclusion is that fiscal policy in SVG has been unsustainable.

4.2.2 Primary Gap Results

Tables 4 and 5 show the estimated one-period gap for the period 1991 -2005 for Dominica, Jamaica, St. Kitts and Nevis and St. Vincent and the Grenadines. These figures include debt incurred by central government only. This study computes the augmented primary surplus to GDP ratio proposed by Buiter et al. (1993). The augmented primary surplus was deemed more suitable, given that it takes into consideration the currency composition of debt and these countries have a substantial portion of external debt. Since a significant portion of the stock of central government domestic debt is contracted through Treasury bills, the interest rate on T-bills was applied to the domestic debt[6]. In the case of the external debt, the rate used was the effective rate of interest – the ratio of interest payments to the debt stock. Rather than the official exchange rate, the nominal effective exchange rate (NEER) was used in order to facilitate use of the augmented primary surplus. The NEER was unavailable for Jamaica. This was, however, not problematic, given the fact that Jamaica uses a flexible exchange rate regime. As in Marks (2004), the inflation rate used was that of the GDP deflator.

[6] Treasury Bill Rate is the rate at which short-term securities are issued or traded in the market. Other estimates of the domestic interest rate (bond rate, weighted average rate or loans to central government etc.) can be used, depending on the type of borrowing in which the central government has been engaged. The important point is that the domestic rate used should be reflective of the type of government borrowing.

Table 4

CENTRAL GOVERNMENT

Data and Calculations for One-Period Primary-Gap Indicator of Fiscal Sustainability 1991 - 2009 (US$mn)

Central government stock variables (US$mn)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
St. Vincent & the Grenadines										
Actual primary surplus - GDP ratio (%)	0.0%	3.4%	0.0%	-0.2%	0.6%	-1.3%	1.4%	-3.6%	-2.0%	-0.6%
Correction factor for interest differentials 1/		0.00	(0.01)	0.07	0.02	(0.07)	(0.01)	0.02	(0.00)	(0.01)
Augmented primary balance-GDP ratio (%) 2/		3.4%	0.4%	-2.3%	0.1%	0.9%	1.7%	-4.2%	-2.0%	-0.4%
Required one-period primary surplus - GDP ratio 3 /		-0.6%	-0.7%	0.8%	2.6%	-1.3%	0.6%	0.7%	-0.8%	0.7%
One-period primary gap 4/		-3.9%	-1.2%	3.2%	2.6%	-2.1%	-1.1%	5.0%	1.1%	1.1%
Jamaica										
Actual primary surplus - GDP ratio (%)		13.7%	13.4%	11.9%	13.1%	11.5%	5.5%	1.5%	5.9%	10.4%
Correction factor for interest differentials 1/		0.43	0.35	(0.09)	0.02	(0.10)	(0.18)	(0.16)	(0.12)	(0.04)
Augmented primary balance-GDP ratio (%) 2/		-14.91%	-12.35%	18.59%	12.02%	17.82%	14.48%	8.53%	10.84%	12.03%
Required one-period primary surplus - GDP ratio 3 /		-23.2%	-25.2%	-6.6%	0.4%	-0.4%	10.2%	7.7%	12.4%	9.6%
One-period primary gap 4/		-8.3%	-12.9%	-25.2%	-11.6%	-18.2%	-4.3%	-0.8%	1.6%	-2.4%
St. Kitts Nevis										
Actual primary surplus - GDP ratio (%)	1.1%	-0.7%	0.2%	-0.7%	-1.6%	-4.5%	6.0%	-2.2%	-4.4%	-3.2%
Correction factor for interest differentials 1/		(0.03)	(0.03)	0.01	(0.03)	(0.05)	(0.01)	(0.01)	(0.01)	0.02
Augmented primary balance-GDP ratio (%) 2/		0.3%	1.1%	-1.1%	-0.9%	-3.2%	6.3%	-1.9%	-4.0%	-3.9%
Required one-period primary surplus - GDP ratio 3 /		1.3%	-2.4%	-0.7%	-3.7%	2.5%	0.5%	-5.2%	2.3%	0.8%
One-period primary gap 4/		1.0%	-3.5%	0.3%	-2.8%	5.7%	-5.8%	-3.3%	6.3%	4.7%
Dominica										
Actual primary surplus - GDP ratio (%)	-15.7%	-7.6%	-9.7%	-4.1%	-4.1%	-3.0%	-1.3%	-1.6%	-0.3%	-8.8%
Correction factor for interest differentials 1/	(0.04)	(0.01)	(0.01)	0.04	0.00	(0.08)	(0.02)	0.02	0.02	(0.03)
Augmented primary balance-GDP ratio (%) 2/		-7.5%	-9.4%	-5.6%	-4.2%	-0.5%	-0.8%	-2.3%	-0.9%	-8.1%
Required one-period primary surplus - GDP ratio 3 /		-2.0%	-0.2%	0.9%	-0.8%	2.5%	-0.4%	1.5%	0.5%	1.1%
One-period primary gap 4/		5.5%	9.2%	6.5%	3.3%	3.0%	0.4%	3.8%	1.3%	9.3%

Data Source: ECCB Statistical Digest , International Statistics Yearbook and the Staff Report for the 2005 Article IV Consultation (projected figures)

1/ Derived as: $\left\{\left(\frac{(1+i^*)(1+\gamma_t)-(1+i_t)}{(1+\pi_t)(1+g_t)}\right)b^*_{t-1}\right\}$

3/ Derived as: $s_t = \frac{r_t - g_t}{1+g_t} b_{t-1}$

4/ Derived as: Required primary surplus (3) - augmented primary surplus (2)

2/ The key variables include real GDP growth, nominal interest rate, inflation rate, exchange rate appreciation and foreign debt

Table 5

CENTRAL GOVERNMENT

Data and Calculations for One-Period Primary-Gap Indicator of Fiscal Sustainability 1991 - 2009 (US$mn)

							Projected			
Central government stock variables (US$mn)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
St. Vincent & the Grenadines										
Actual primary surplus - GDP ratio (%)	0.3%	-0.7%	-1.3%	-2.4%	-2.0%	-4.0%	-4.8%	-2.9%	-1.5%	-1.3%
Correction factor for interest differentials **1/**	(0.00)	(0.01)	(0.04)	(0.08)	(0.05)	(0.01)	(0.00)	0.00	(0.03)	(0.02)
Augmented primary balance-GDP ratio(%) **2/**	0.4%	-0.3%	0.1%	0.0%	-0.3%	-3.6%	-4.7%	-3.1%	-0.3%	-0.4%
Required one-period primary surplus - GDP ratio **3/**	2.1%	2.5%	0.9%	0.8%	-2.2%	0.3%	0.18%	0.00%	-0.34%	0.07%
One-period primary gap **4/**	1.8%	2.9%	0.8%	0.8%	-1.9%	3.9%	4.84%	3.05%	-0.03%	0.44%
Jamaica										
Actual primary surplus - GDP ratio (%)	12.6%	8.5%	7.1%	13.5%	13.0%	11.6%	12.8%	13.0%	13.0%	13.0%
Correction factor for interest differentials **1/**	(0.01)	(0.01)	(0.02)	0.04	(0.02)	(0.03)	0.02	0.02	0.02	0.03
Augmented primary balance-GDP ratio (%) **2/**	12.9%	9.1%	7.9%	11.4%	14.2%	13.4%	11.6%	12.0%	11.9%	11.8%
Required one-period primary surplus - GDP ratio (%) **3/**	4.5%	5.2%	6.1%	11.9%	0.7%	-1.0%	-4.5%	-1.1%	0.7%	0.3%
One-period primary gap (%) **4/**	-8.4%	-3.9%	-1.8%	0.5%	-13.6%	-14.4%	-16.2%	-13.1%	-11.2%	-11.5%
St. Kitts Nevis										
Actual primary surplus - GDP ratio (%)	-11.8%	-9.1%	-7.2%	-2.3%	-3.0%	-0.4%	6.3%	7.4%	7.9%	8.0%
Correction factor for interest differentials **1/**	(0.01)	(0.01)	(0.02)	(0.05)	(0.03)	(0.01)	0.03	0.05	(0.01)	(0.01)
Augmented primary balance-GDP ratio (%) **2/**	-11.4%	-8.8%	-6.1%	0.9%	-1.6%	-0.1%	5.3%	5.5%	8.3%	8.2%
Required one-period primary surplus - GDP ratio (%) **3/**	-3.5%	4.2%	7.8%	8.1%	-2.7%	0.6%	-2.3%	-4.1%	2.1%	3.0%
One-period primary gap (%) **4/**	7.9%	13.1%	13.9%	7.2%	-1.1%	0.7%	-7.6%	-9.5%	-6.2%	-5.2%
Dominica										
Actual primary surplus - GDP ratio (%)	-3.7%	-6.7%	-6.0%	0.8%	2.9%	4.2%	3.0%	3.0%	3.0%	3.0%
Correction factor for interest differentials **1/**	(0.02)	0.01	(0.01)	(0.03)	(0.04)	(0.05)	(0.03)	(0.05)	(0.03)	(0.05)
Augmented primary balance-GDP ratio (%) **2/**	-3.1%	-7.3%	-5.2%	2.8%	5.5%	7.2%	4.5%	5.6%	4.4%	5.4%
Required one-period primary surplus - GDP ratio (%) **3/**	3.0%	6.6%	10.9%	5.6%	1.1%	1.4%	1.5%	1.6%	1.7%	1.6%
One-period primary gap (%) **4/**	6.1%	13.9%	16.1%	2.9%	-4.4%	-5.9%	-3.0%	-3.9%	-2.7%	-3.7%

Data Source: ECCB Statistical Digest , International Statistics Yearbook and the Staff Report for the 2005 Article IV Consultation (projected figures)

1/ Derived as: $\left(\frac{(1+i^{*})(1+\gamma_{t})-(1+i_{t})}{(1+\pi_{t})(1+g_{t})}\right)b^{*}_{t-1}$

3/ Derived as: $s_t = \frac{r_t - g_t}{1+g_t} b_{t-1}$

4/ Derived as: Required primary surplus (3) - augmented primary surplus (2)

2/ The key variables include real GDP growth, nominal interest rate, inflation rate, exchange rate appreciation and foreign debt

The calculations for the one-period primary gap for Dominica show the gap to be positive for the period 1991 – 2003. Only for the years 2004 and 2005 were the one-period primary gaps negative. The gap results are consistent with those of the Testing for Stationarity analysis which indicated that debt was unsustainable for the period 1970 -2005, suggesting the need for fiscal adjustment. From the medium-term projections for Dominica, the results suggest that if the real GDP growth rate and GDP inflation remain as projected for the period 2006 – 2009, and the required fiscal adjustments (the primary surplus – GDP ratio) are not undertaken, Dominica's debt will become sustainable, continuing the trend which began in 2004 and 2005.

St. Kitts and Nevis (SKN) results indicate that the gap was positive throughout the period 1991 to 2005 except for five years. During those years (1992, 1994, 1996, 1997 and 2004) real GDP growth was high compared to other years in the sample. Like Dominica, the gap results are consistent with the results of the Testing for Stationarity approach which found debt unsustainable for the period 1970-2005. The medium-term projections for the period 2006 – 2009 indicate that if fiscal adjustment is significant and the inflation rate and interest rate on foreign debt decline, then SKNs' debt can become sustainable. Interest rate on foreign debt is projected to decline during 2006 – 2009 on the assumption that the government of SKN will use the revenue from the sale of land to refinance high cost debt. Consequently, both the stock of debt and interest payments will fall.

With respect to St. Vincent and the Grenadines (SVG), application of the gap analysis to central government debt shows that in 1991 the primary gap was -3.9%. During that year real interest rate was low and negative (-0.1%) and the augmented primary surplus was at its highest of 3.4%. Similarly, in 1992, 1995, 1996 and 2004 the gap was also negative as a result of the high levels of augmented primary surplus. The remaining years for the sub-period 1991 to 2005 showed positive gaps. The stationarity testing approach indicated that debt during 1970 – 2005 was unsustainable in SVG. This is consistent with the gap analysis findings. On the other hand, the medium-term forecast shows the gap for the

period 2006 – 2007 at 4.6% and 4.1% respectively, declining thereafter to 0.4% of GDP in 2009. Therefore, there is need for vigilance, given the fact that the gap for the period is mainly positive and in the early years, quite large. This conclusion is based on the projected debt dynamics which include increased interest rates on both foreign and domestic debt and low augmented primary balance.

In 1998 and 2003 Jamaica had one-period primary gaps of 1.6% (1998) and 0.5% (2003). During these years real GDP growth was -1.2% (1998) and 2.3% (2003). At the same time real interest rates were 17.23% (1998) and 29.5% (2003). The primary gaps for all other years during 1991 to 2005 were negative, as the primary surplus continued to be large, compensating for low growth, high real interest rates and volatility of the exchange rate. These are consistent with the Testing for Stationarity analysis which found the central government debt sustainable in the long run. The medium-term forecast (2006 – 2009) for Jamaica suggests that, given the projected debt dynamics including lower rate of depreciation of the exchange rate, tightened interest rates and moderate growth rates during 2006 – 2009, the gap will continue to be negative.

Kufa et al. (2003) found that throughout the 1990s up to 2001 the ECCU member countries' actual primary balance exceeded the debt stabilizing balance. Medium-term projections conducted for these economies indicated that the fiscal position of St. Vincent and the Grenadines was sustainable based on the projected primary balances, interest rates and GDP growth.

Marquez (2000) argues that the "gap" approach does not assess a country's ability to generate sufficient savings to facilitate payment of debt. Marquez (2000) conducted a debt sustainability analysis of the Eastern Caribbean Currency Unit (ECCU) countries. The findings of the "gap" approach indicate that ECCU countries' debts were sustainable. On the other hand, when Marquez incorporated a variable to consider countries' ability to generate savings, the debts of these countries were found to be unsustainable.

5.0 Policy Recommendations

The foregoing results give some validity to the concerns expressed in Sahay (2004) about the need for fiscal adjustment in several Caribbean countries. There are, however, several additional possible strategies for successfully reducing public debt to more sustainable levels. These include stable monetary policies, asset sales/privatization, reducing vulnerabilities to exogenous shocks, growth-enhancing structural reforms, debt restructuring, reducing government spending and prudent debt management strategies.

Marquez (1999), supporting the need for prudent debt management strategies, argues that in ECCB member countries where debt is not sustainable, governments should negotiate loans with interest rates that are less than commercial rates and fixed. In addition, Marquez highlighted the need for governments of the ECCB member countries to facilitate stable repayment by borrowing predominantly in US dollars since the EC dollar is pegged to the US.

The IMF has repeatedly stressed the need for Jamaica, Dominica and other Caribbean countries, to reduce debt through comprehensive debt restructuring and reducing government spending. These strategies have ultimately failed to address the underlying problem. Perez (2007) noted that Caribbean economies are constrained by the external sector (Balance of Payments), not its 'budget constraint.' Therefore, since debt is accumulated through a fiscal-external sector, debt stock will eventually become unsustainable. As a result, debt restructuring and government expenditure reduction will fail to produce positive results if they are not designed to consider the relationship between the fiscal accounts and the external accounts.

The results of the one-period gap analysis highlight a major deficiency in the methodology. The gap can vary substantially from year to year as fiscal performance growth, interest and exchange rates change, hence the need to focus more on the trend in the medium-term scenario to determine whether government's fiscal stance is trending towards or away from sustainability.

The econometric approach is stronger than the gap approach in that it tests statistically the hypothesis of sustainability. However, its usefulness is limited by several shortcomings. It is retrospective. It is also limited in terms of its policy prescriptions. It merely indicates whether the fiscal stance is sustainable or not, without being able to indicate what level of adjustment should be undertaken. Unlike the gap analysis, it requires long data sets which may not be available in some countries and is technically more difficult. The gap analysis, on the other hand, requires significantly less data, is simple and easy to apply. Given the limitations of the econometric approach, it is recommended that Caribbean countries adopt the primary gap indicator as the main indicator for assessing the fiscal stance, but particularly the medium-term indicator, in light of limitations of the one-period gap analysis. Further, it is recommended that similar analysis should be applied to public sector debt so that governments can understand the fiscal implications of guaranteeing debt. This will help governments to be more circumspect and vigilant about borrowings by public sector enterprises (PSEs) and reduce the possibility of fiscal surprises from PSEs.

6.0 Conclusion

In this study, a comprehensive review was conducted of the literature on fiscal sustainability with emphasis on developing countries. The research also examined historical trends of debt, real growth and interest rates and fiscal balances to determine the main factors for the current and past levels of high indebtedness. In this regard, we found that high interest rates, low growth rates and weak fiscal management have all been significant contributors. The results also indicate that while there is good reason to be concerned about fiscal sustainability of ECCB member countries, they are all in the process of making the necessary fiscal and other adjustments to address the problem. However, increased attention has to be paid to the guaranteed debt of PSEs, which in some cases poses a challenge. In conclusion, it is important to note also that, to the extent that there are off balance sheet projects, that is, projects for which the

cost is not included in the fiscal accounts, the valuations of the fiscal gap have been underestimated. Hence, the fiscal adjustments required would be higher than those estimated in this paper.

Given the exceptionally high levels of debt and the interaction of these countries' internal sector with the external sector, the selected policy option must incorporate elements for the interaction between the internal and external sector. This will enable Caribbean economies to implement debt strategies that would potentially reduce debt to more sustainable levels.

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