SOME MONETARY IMPLICATIONS FOR PUBLIC DEBT MANAGEMENT IN THE CARIBBEAN

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1. Introduction

It is increasingly recognised that sound fiscal policy is crucial to the achievement of macroeconomic stability, an important prerequisite for sustained economic growth. In order to combat chronic unemployment, most governments, since the end of World War II, have departed from the idea of achieving a balanced budget over the business cycle and have instead adopted a policy of continuing fiscal deficits. This policy has largely been responsible for the steady build-up of national debt over time.

To ensure a sustainable level of national debt that would not adversely affect macroeconomic stability, the literature usually favours keeping the fiscal deficit to GDP ratio in the neighbourhood of 3% of GDP on average. Not many developing countries have managed to keep to this average benchmark figure and deficits in excess of 10% of GDP have been recorded. Financing relatively large deficits usually pose problems because more often than not heavy reliance is placed on central banks to monetize the deficit. The monetisation of the deficits by the central bank may not only raise public debt relative to a non-accommodating policy but also have grave implications for money growth, inflation and ultimately economic growth.

The pressure for monetary accommodation to monetize fiscal deficits is more prevalent in developing countries where alternative avenues for financing the deficit are limited. For developed economies the availability of sound capital markets provide a wider base from which governments can raise funds to finance fiscal deficits without recourse to the central bank.

Debt monetisation is therefore not an automatic process. That partly explains why most studies in developed countries have found little or no evidence that government debt growth influences monetary growth. Many developing countries usually have less developed capital markets and in addition their central banks are usually obliged to take up any unsubscribed portions of government debt issues. Budget deficits are therefore likely to be financed predominantly through the creation of monetary base, with possible inflationary consequences.

This paper aims to examine the possible link between government debt and money growth and inflation for a number of Caribbean countries (Barbados, Guyana and Jamaica), emphasising the impact of different methods of financing the deficits on the monetary base.

2. Theoretical Framework

The possible link between fiscal variables and the money supply becomes apparent when the consolidated government budget constraint is examined. If we assume that governments finance fiscal deficits by either borrowing from the private sector or seek recourse to central bank financing, then the following relationship holds:

$$\dot{D}_t = \dot{M}_t + F_t + iD_t \qquad (1)$$

where D_t is the amount of outstanding interest bearing government debt at time t, F_t is the primary deficit (fiscal deficit net of interest payments), i, the average rate of interest on government debt, M the monetary base and ($\cdot$) the first difference operator.

Equation (1) may be recast in real terms as

$$\frac{\dot{D}}{P} = \frac{F}{P} + \left(i - \frac{\dot{P}}{P}\right)\frac{D}{P} + \frac{\dot{M}}{P} \qquad (2)$$

Equation (2) illustrates a number of ways in which a government may reduce the real value of its debt. It could be done through:

(i) a reduction of the primary deficit

(ii) the creation of "high powered money" (popularly referred to in the literature as financing the deficit through seigniorage).

(iii) a reduction in the real interest charges to government through the adoption of measures that increase the actual rate of inflation above the average rate of interest on government debt.

From equation (2) one sees that the most cost effective way for governments to reduce the real value of outstanding debt is to reduce the primary deficit. In the context of fixed exchange rate regimes, as is the situation with many developing countries, governments do not have much scope to reduce real debt through high inflation rate (item iii) because they cannot determine their own inflation rate. Moreover, the relatively high efficiency losses associated with inflation taxes make them extremely unattractive options.

The above equations suggest a link between monetary growth and the fiscal deficit. How strong the link is depends on the degree of reliance that governments place on the central banks vis-a-vis the private sector to finance the deficit. The concept of "fiscal dominance", proposed by Sargent and Wallace (1981) provides an even more patent link between monetary growth and fiscal deficits. These authors distinguish between the fiscal and monetary authorities. They argue that fiscal policy is dominant where the monetary authorities cannot influence the real primary deficit, as is usually the case in many developing countries.

In that situation they argue that the money supply becomes endogenous. If the real interest rate $(r) = (i - \frac{\dot{P}}{P})$ exceeds the rate of economic growth (g), government debt will expand more rapidly than real income. A point in time, T, will ultimately be reached

when the public will be either unwilling or unable to absorb additional government debt. The debt/GDP ratio will therefore reach a maximum beyond which any deficit will have to be financed by the monetary authorities through money creation. From the government budget constraint, the money supply relation at a time when fiscal dominance occurs is given by:

$$\Delta M = PY \left[\frac{F}{Y} - (r - g) \left(\frac{D}{Y} \right) \right] \qquad (3)$$

where Y is nominal income and g is the rate of economic growth. Equation (4) gives a direct relationship between the fiscal deficit and changes in the monetary base, given the maximum amount of government debt which the private sector is willing and able to absorb, and it depicts an extreme situation whereby the real government deficit is financed not through new debt issue but primarily through central bank financing. The main conclusion to be drawn from the equation is that if the real interest rate exceeds the real growth rate, a higher debt/GDP ratio will be associated with a higher proportional rate of growth of the nominal money stock, unless velocity (PY) falls so as to offset the higher debt service burden. Thus, any financing policy prior to T that leads to increased debt accumulation (higher value of D/Y), will require higher real seigniorage after T, and thus a higher rate of growth of nominal money and , sooner or later, more inflation.

3. Empirical Model

The theoretical overview suggests that government deficits may affect money growth and therefore imply a link between government debt and money growth. However, it remains a theoretical question which needs to be determined empirically. The literature generally only points to a weak association between debt growth and money growth for developed countries (see Protopapadakis et al (1987)), Allen and Smith (1983), and Niskaden (1978). De Haan and Zelhorst (1990), although not finding broad support for the hypothesis that government deficits influence money growth in developing countries, do nevertheless find evidence for some developing countries. Moreover, they also find support for a positive relationship between budget deficits and inflation during periods of acute inflation. In the Caribbean, Grant (1998) finds some support that the growth in debt and its financing had an impact on monetary management in Jamaica during the period 1990 to 1997.

This paper takes a more general approach to examine the impact of the monetisation of fiscal deficits on money growth in Barbados, Jamaica and Guyana, utilising both parametric and non-parametric methods in our analysis. The latter analyses of the data via the use of Spearman and Kerdall correlation coefficients.

For the parametric tests, we estimate the following reduced form equation.

$$m = \sum_{i=1} \beta_i m_{t-i} + \sum_{i=1} \lambda_i d_{t-i} + \sum_{i=1} \Phi_i y_{t-i} + \varepsilon \qquad (4)$$

where represents the growth rate of the real monetary base, d_t denotes real debt growth, y is real GDP growth and ε is an error term. Equation (4) enables us to examine what sort of impact that growth in debt have on monetary growth in the three Caribbean countries and whether any impact is permanent or temporary. For instance, if a permanent increase in debt growth results in a permanent increase in money growth, then the sum of the debt coefficients in equation (4) must be positive and statistically significant. The long-run impact of debt growth on money is given by

$$\frac{(\lambda_1 + \lambda_2 + \lambda_3 \ldots + \lambda_n)}{(1 - \beta_1 - \beta_2 - \ldots \beta_n)}$$

and differs from the simple sum of coefficients because it accounts for the impact of past debt growth on past money growth. If debt growth has only temporary effect on money

growth, then there is likely to be a statistically significant reduction in the log-likelihood (LL) value from removing the debt growth variables from the money growth regression. By replacing the debt variables with variables representing the various means of financing the deficit, the equation also allows us to examine the impact of the mode of financing of the deficit also on the monetary base.

As an additional issue, we examine the debt to inflation relation, to find out if debt growth influences inflation other than through its impact on money growth. The reduced form equation to be estimated is:

$$\pi_t = \sum \alpha_i \pi_{t-i} + \sum \beta_i m_{t-i} + \sum \lambda_i d_{t-i} + \sum \varphi_i y_{t-i} + \varepsilon_t \qquad (5)$$

where π_t is inflation.

We also investigated the impact of the various forms of financing the deficit on money growth both in the short and long-run. The former is done utilising impulse response (IR) analysis to measure the time profile of a shock in the financing variable on the money base. This methodology involves shocking the estimated equation of the monetary base by one standard deviation of the errors of each of the financing variables identified. The responses that occur in the initial periods after the shock will detail the behaviour of the monetary base in the short-run; the responses that occur in later periods provide further insights into the long-run effects.

Two different IR functions can be computed, the standard orthoganalised IR function popularised by Sims (1980, 1981), and the Generalised IR function proposed by Koop *et al.* (1996) and Pesaran and Shin (1996). The orthoganalised IRs are not unique and depend on the particular ordering of the VAR. This is so because the orthoganalised IRs are obtained by first employing a Cholesky decomposition of the covariance matrix of the shocks and since the Cholesky decomposition is non-unique, therein lies the problem. Generalised IRs, by construction, circumvent the problem of dependence of the orthoganalised IRs on the ordering of the VAR. It is for this reason that we focused the generalised IR in this study.

4. Barbados

4.1 *Trends of Public Debt and Fiscal Deficits in Barbados*

There has been more than a thirty-fold increase in Barbados' Public Debt[1] during the period 1972-1999. Relatively low levels of government borrowing in the pre-Central Bank era kept the debt/GDP ratio to within 10% of GDP (at factor cost). However, with increased access to domestic sources in the 1970s following the establishment of the Central Bank, the debt ratio began to rise, climbing to 32% in 1972/73. In the 1980s, there was increased recourse to external sources of finance in addition to the continued access to domestic sources of finance. The debt ratio increased to 61% of GDP in 1988 and peaked at 84.9% in 1994. The sharp rise in the 1980s and early 1990s may be attributed largely to increased fiscal deficits.

Between 1971/72 and FY 1990/91, the average size of the fiscal deficit was 5.8% of GDP. On five occasions during this period the deficit exceeded 8% of GDP. However, the severity of the recession of 1991/92 persuaded government of the need for tighter fiscal management, reflected in moderate deficits averaging below 2% of GDP in the period between 1992/93 and in 1998/99. This fiscal restraint is remarkable since some expenditures observed in this period included the cost of settling contingent liabilities of public enterprises and the sugar industry (1992/93) while some were attributable to liabilities incurred by enterprises in the pre-stabilisation period.

The impact of fiscal deficits and public debt on monetary aggregates in Barbados may

[1] For the purpose of this paper, public debt is narrowly defined as that incurred by the central government. Balance of Payment support loan undertaken by the Central Bank of Barbados and the liabilities of statutory bodies are excluded.

arise mainly from the relatively heavy reliance on external sources of finance and, and to some extent, central bank finance. Recourse to these mode of financing have direct effect of increasing the monetary base [2]. Between 1974-89, external resources financed more than 50% of the deficits in ten out of the sixteen years. Central Bank financing of the deficits although not excessive, has not been insignificant. It accounted for 25% or more of the total financing in seven years of the period of analysis. However, in the periods preceding the recession of 1991-92 when Barbados experienced difficulty accessing foreign finance, central bank accommodation was high, financing more than 60% of the deficits in 1989 and 1990 and 30% in 1991.

4.2 *Non-Parametric Tests*

In order to avoid spurious correlation between debt growth and money growth due to their independent relation with real growth of GDP, we adjust debt and money growth by subtracting real growth of GDP. These adjusted variables are defined as excess debt growth and excess money growth. Table 1 presents the Spearman and Kendall rank correlation coefficients between the excess growth rate of debt and the excess growth of money (both reserve and M1 measures) and inflation. These coefficients are calculated for the entire sample period 1977Q2 – 1997Q4 and for sub-periods in order to prove their robustness. The sign of the coefficient indicates the direction of the relationship, and its absolute value indicates the strength, with larger absolute values indicating stronger relationships; possible values range from –1 to 1.

The test statistics indicate that the correlation between excess debt growth and excess money growth over the entire period is large and highly significant. However, the overall correlation between excess debt growth and inflation is negative and relatively small although significant at the 5 per cent level.

[2] There were periods when the domestic component of external finance was sterilised at the Central Bank. However, the evidence suggests that these deposits were, over time, drawn down to finance government expenditure.

The results within each sub period show a similar degree of correlation between excess debt and money growth. A positive correlation between debt and money growth over the whole sample and also within sub-periods lend great support for the Monetization relation/hypothesis which asserts that an increase in debt growth has a positive effect on money growth.

Table 1 – rank correlation of excess debt with excess money and prices (growth rates)

	Debt and Reserve Money	Debt and M 1	Debt and Prices
1977 Q2 – 98 Q4			
Spearman	0.547**	0.411**	-0.266*
Kendall	0.376**	0.279**	-0.177*
1977 Q2 – 83 Q4			
Spearman	0.513**	0.340	-0.069
Kendall	0.352**	0.232	-0.052
1984 Q1 – 90 Q4			
Spearman	0.553**	0.515*	-0.085
Kendall	0.418**	0.377**	-0.016
1991 Q1 –98 Q4			
Spearman	0.406*	0.265	-0.096
Kendall	0.266*	0.177	-0.056

* Significant at 5% level

** Significant at 1% level

4.3 *Parametric Tests*

Equation 4 is estimated over the period 1977Q2 – 1998Q4 as a vector autoregression (VAR). Since the variables are all stationary (representing growth rate) then there is no need to consider cointegration. The optimal lag length has been set to four (4) and was determined on the basis of the Akaike Information Criterion and the Schwarz Bayesian Criterion. The estimation is done using both the monetary base and M1 (Money Supply) as measures of money. The tests results of the debt-money relationship, are presented in Table 2.

Table 2 – The effect of debt growth on money growth

Long-run impact Coefficient		Sum of debt Coefficient		LL-ratio statistic ††	
Base	M1	Base	M1	Base	M1
0.496**	0.454**	0.581*	0.601**	3.481**/2	7.234**/2
(2.256)†	(2.688)	(1.974)	(2.254)		

** Significant at 1% level
* Significant at 5% level
† The numbers in parentheses are the t-statistic
†† The χ^2 statistic were computed between a regression with no debt growth and a regression in which debt growth lags were introduced one at a time. Any significant χ^2 statistic is reported. The numbers to the right of '/' show the lag length at which significant statistics was obtained.

The overall conclusion from Table 2 is that the data provide support that debt growth leads to monetary expansion in Barbados. With either measure of money, there is a positive long-run effect; a 1% increase in the debt growth increases the monetary base by approximately 0.5% in the long run. The simpler test, the sum of the debt coefficients also confirm a long-run impact. There is also an interim effect as indicated by the LL-ratio-statistic which shows a significant effect in the second period.

Next we turn our attention to the Debt-inflation relation. The results are presented in Table 3. Apart from its impact on inflation through its effect on money growth, there is no evidence that debt growth have a long-run effect on inflation. Both the sum of coefficients and long-run impact coefficient tests are insignificant. Furthermore, the values of these coefficients are small. The results do however suggest a short-run association between debt growth and inflation as indicated by significant LL-ratio statistic.

Table 3 – The effect on debt growth on inflation

Long-run impact Coefficient		Sum of debt Coefficient		LL-ratio-statistics	
Base	M1	Base	M1	Base	M1
0.239	0.239	0.138	0.084	3.68*/2	-
(1.061)	(1.084)	(1.57)	(0.835)		

** Significant at 1% level
* Significant at 5% level
The numbers in parentheses are the t-statistic

4.4 ***Financing the deficit***

Next we turn to the examination of the impact of the different forms of financing the deficit on the monetary base. The forms of financing examined are Central Bank of Barbados financing (cbbf), commercial bank financing (cbf), foreign financing (ff) and other domestic financing (odf) which comprises financing from the national insurance board, the private non-bank sector and other domestic entities. We estimate four variants of equation 4 by replacing the debt variable with a financing variable (in levels) and including the interest rate on Government treasury bills as an additional explanatory variable.[3]

In each case the long-run impact is calculated and tested for significance, then the short-

[3] Stationarity test were conducted on these additional variables and the results indicate that they are all integrated of order zero i.e. I(0).

run dynamics are investigated with the use of impulse response analysis.

The results for the long-run impact of the various forms of deficit financing are presented in Table 4 while those for the short-run analysis are in Figure 1a to Figure 1d. The findings indicate that of the various sources available for financing the deficit, only that of the Central Bank of Barbados have a significant long-run impact on the growth rate of money. The long-run coefficient is -.00009, which says that an increase of $10,000 in the level of Central Bank financing would overtime lead to a fall in the growth rate of the monetary base by 0.9%. To put this in perspective consider the growth rate of the monetary base for the first quarter of 2000, which was 14.9%. Now suppose the Central Bank provides financing to Government of $50,000, then, with no further transactions between Government and the Central Bank it can be expected that over time the growth rate in the monetary base would fall to 10.4%.

Although it is only the financing from the Central Bank that has a long-run impact on the growth rate of money, all the various forms of financing have short-run influences. The short-run dynamics of the Central Bank financing and commercial banks financing are quite similar (see Figure 1a and 1b). The initial impact is an increase in the monetary base and oscillation around equilibrium as it converges toward it. This 'cobweb' path towards equilibrium represents the monetary base overshooting its equilibrium position and is probably a result of the rapid speed of adjustment in this market. Since this overshooting appears to be every four quarters, which according to our data set is January – March, it could also represent efforts of both the monetary authorities and the government to stabilise this sector at the close of the fiscal year.

The initial impact of financing from other domestic sources is a reduction in the growth rate of the monetary base, but this very quickly starts to rise again until it reaches its equilibrium level with no long-run influences (Figure 1g). The foreign financing has a similar time profile except it overshoots its equilibrium position a couple of times before settling down (Figure 1c).

Table 4 – The impact of financing on the monetary base (BMBG)

Financing from:	Long-run impact coefficient	Lag Length of VAR
Central Bank of Barbados	-.00009 (-2.3102)	4
Commercial Banks	-.00006 (-1.0841)	4
Other Domestic sources	-.00002 (-1.0588)	7
Foreign sources	.00004 (1.1147)	4

The numbers in parentheses are the t-statistic

5. Guyana

5.1 *Trends of Public Debt and Fiscal Deficits*

After independence in 1966 Guyana pursued a policy of "cooperative socialism," with increasing state intervention in the economy. The results were dismal. Real GDP grew only at 0.4 percent a year over 1966-88, less than population growth. The sugar and bauxite industries, the two pillars of the economy, collapsed after they were nationalized. Production of sugar fell from 350,000 tons to 130,000, and that of calcined bauxite from over 800,000 tons to less than 200,000 tons. The key determinants constraining growth were economic mismanagement and the over-extended role of the state. In the 1970s Guyana squandered the bonanza in sugar prices and failed to adjust to the two petroleum

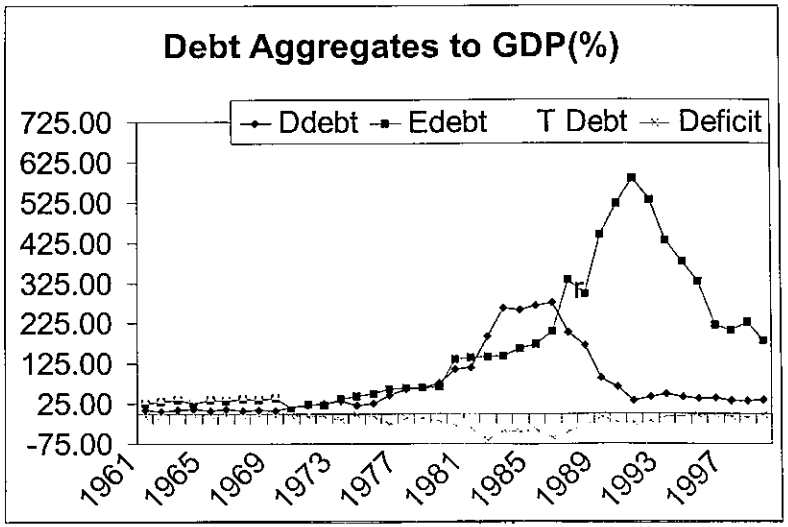
shocks. In the 1980s economic performance deteriorated further. Demand policies were expansionary, the real exchange rate appreciated, and the government relied increasingly on price controls and quantitative restrictions on trade. These policies resulted in a decline in GDP by 2.8 percent a year over 1980-88, a dramatic increase in debt to about $1.9 billion or about six times GDP.

Since 1989, the total stock of debt increased steadily and peaked at 617 percent of GDP in 1992. Of this, external debt accounted on average for 94.7 percent or 584.5 percent of GDP although through reschedulings, debt forgiveness and stock of debt operation, this component of the debt at the end of 1999 had been reduced to about 179.35 percent of GDP. Over the same period, external interest payments also declined from 28.7 percent to approximately 10 percent of recurrent expenditures. Similarly, domestic debt also fell from 90 percent of GDP in 1989 to 34 percent of GDP in 1999. Although domestic interest payments declined from 38 percent to about 17 percent of recurrent expenditure over the same period, since 1993 the higher cost of borrowing has switched from external to domestic debt.

Much of the growth in the domestic public debt until 1992 was caused by deficit financing of the overall fiscal balance. Since then sterilisation of excess liquidity in the banking system and, indirectly, accumulation of gross international reserves through foreign exchange retention have been the major determinants of its growth.

During the eighties, Government revenue collections were low. Revenues averaged about 33 percent of GDP due in part to (i) small revenue base; (ii) low tax compliance; (iii) poor tax administration; and (iv) negative GDP growth rates. At the same time, expenditures were not contained. Personal emoluments and capital expenditures increased by 40.7 percent and as a result the overall fiscal balance deteriorated. Over the same period, the deficit of the overall balance averaged about 25 percent. In the absence of access to external financing, especially before 1990, the main recourse to financing the deficit was through the sale of government securities, i.e., treasury bills and debentures. As a result, the domestic debt which stood at G$5.3 billion at end 1985 rose rapidly to about G$18.8 billion in 1992. From Figure 1, the impact of the fiscal balance on public debt in the eighties is clearly visible. Since 1992, central government fiscal balances have improved. The deficit as a percentage of GDP now stands below 3 percent.

Figure 1



One of the major consequences of Guyana's economic difficulties in the late 1970s was the

incapacity to service its external indebtedness. This resulted in an accumulation and capitalisation of arrears. In the absence of access to international financing, and with low levels of export earnings and depleted foreign exchange reserves, the stock of external public debt ballooned to about US$1.96 billion at the end of 1992.

Since then, Guyana's external debt burden has been generally declining and the debt structure has also changed. First, the Economic Recovery Program and subsequent policies, which together moved Guyana towards a market economy with sound macroeconomic management, generated significant growth in GDP and exports. GDP growth averaged 5.6 percent per year during 1992-99, while domestic exports went up from US$363.5 million to US$504.7 million. Second, debt and debt service reduction efforts carried out by the Government together with the donor community resulted in a significant change in the debt structure and a reduction in debt service obligations. In spite of these developments, Guyana's public debt and scheduled debt service payments remain high.

5.2 *Non-Parametric Tests*

The data for Guyana covers the period 1960 to 1999 and is of annual frequency. Table 6 contains the rank correlations coefficients for the full sample period and for sub periods 1960-1980, 1970-1992, and 1981-1999. The periods were chosen based on the above discussion and a chart inspection of the various series. The test statistics indicate that the correlation excess debt growth and excess money growth over the entire 1960-99 period is highly significant, with correlation value between 0.37 and 0.5. At the same time, the overall correlation between excess debt growth and inflation, though of a smaller magnitude, is also significant. The sub period results are also consistent with those for the overall period.

Table 6– rank correlation of excess debt with excess money and prices (growth rates)

	Debt and Reserve Money	Debt and M 1	Debt and Prices
1960 – 99			
Spearman	0.502**	0.594**	0.398*
Kendall	0.366**	0.430**	0.285*
1960 – 80			
Spearman	0.517*	0.576**	0.477*
Kendall	0.347*	0.400*	0.337*
1970 – 92			
Spearman	0.451*	0.606**	0.431*
Kendall	0.335*	0.438**	0.313*
1981 – 99			
Spearman	0.499*	0.687**	0.626**
Kendall	0.389*	0.526**	0.474**

* Significant at 5% level

** Significant at 1% level

These correlation tests are supportive of the monetisation relation. Over the entire 39-year period money and debt growth correlated, and although this overall correlation is also consistent with other scenarios that are unrelated to the monetisation relation, the finding of a significant relation in the individual sub-periods is indicative of causal path by which

increase in money growth. The coefficients are larger than those found for Barbados and with a much higher level of significance. Next, we try to assess whether there is a significant relation between debt growth and inflation for Guyana. The results are presented in Table 8. The test statistics provide weak support for the inflation-debt, that debt growth is independently associated with inflation. Both the sum of debt coefficients and the long-run impact coefficient are insignificant. However, the LL-ratio test statistics is significant in the monetary base equation which would indicate a short-run association between the two series.

Given the important role that external debt played in the economic evolution of Guyana, we decided to disaggregate total public debt into domestic and external debt and investigate the separate influences on inflation. The results are also contained in Table 8. The hypothesis that increases in external debt influences inflation above and beyond that caused by increase in money growth in accepted in the monetary base equation. However, not support for the hypothesis was uncovered in the money supply equation or in the analysis for domestic debt.

Table 8 – The effect on debt growth on inflation

Long-run impact Coefficient		Sum of debt Coefficient		LL-ratio-statistics	
Total Debt					
Base	M1	Base	M1	Base	M1
0.0203	0.239	0.0723	0.0056	0.893*/1	-
(0.0678)	(1.084)	(0.7445)	(0.0662)		
External Debt					
Base	M1	Base	M1	Base	M1
0.201*	-0.915	0.094*	0.044	-	-
(1.952)	(-1.189)	(1.996)	(0.831)		
Domestic Debt					
Base	M1	Base	M1	Base	M1

debt influences monetary policy. However, this would need to be confirmed in the regression analysis.

The high significant correlation result between excess growth of government debt and inflation, both with in the sub-periods and throughout the entire 1960-99 period, is the major difference in findings between the Barbados case and the Guyana case. However, care must be taken in making any inferences concerning the inflation-debt relation, since that relation is predicated on a constant money stock. That is, any influences above that cause by the growth in money. The test of the inflation-debt relation must await the regression analysis presented in section 5.3. These statistics suggest that it is very likely that we will uncover an association between increases in excess debt growth, and increases in excess money and inflation.

5.3 *Parametric Tests*

The results from the estimation of equation 4, over the period 1960-99, are summarized in table 7.

Table 7 – The effect of debt growth on money growth

Long-run impact Coefficient		Sum of debt Coefficient		LL-ratio statistic ††	
Base	M1	Base	M1	Base	M1
0.585**	0.477**	0.821*	0.654**	5.725*/1	4.573*/1
(7.401)†	(2.954)	(5.315)	(2.315)		

** Significant at 1% level

* Significant at 5% level

The results supports the hypothesis that an increase in debt growth is associated with an

0.006	0.034	0.02	0.009	-	-
(0.123)	(0.155)	(0.123)	(0.156)		

** Significant at 1% level
* Significant at 5% level
The numbers in parentheses are the t-statistic

To extend the empirical analysis we also estimated a variant of equations 4 and 5 by replacing the debt variable with the government budget deficit as a percentage of GDP at market prices. Tables 9 and 10 contains the results for thee influences of the deficits on money growth and inflation, respectively. From the results, government budget deficits in Guyana exerts a significant positive long-run effect on both measures of money growth, with the strongest influence being on the monetary base. There is also an intern effect on money growth as indicated by the LL-ratio statistic. The analysis also uncovered a long-run association between deficits and inflation, at least at the 10 percent level.

Table 9 – The effects of government budget deficits on money growth

Long-run impact Coefficient		Sum of debt Coefficient		LL-ratio statistic ††	
Base	M1	Base	M1	Base	M1
1.089**	0.909*	1.389**	0.404*	11.119*/1	9.579*/1
(4.997)†	(4.364)	(5.822)	(3.122)		

** Significant at 1% level
* Significant at 5% level

Table 10 – The effects of government budget deficits on inflation

Long-run impact Coefficient		Sum of debt Coefficient		LL-ratio statistic ††	
Base	M1	Base	M1	Base	M1
0.615	0.491	0.205	0.135	-	-
(1.833)†	(0.892)	(1.974)	(0.981)		

** Significant at 1% level
* Significant at 5% level

It may be argued that government budget deficits have a contemporaneous effect on money growth. We have, therefore, also estimated equation 4 with the current values of the explanatory variables included. The results are quite similar to the conclusions which followed from Table 9. To save space the regression outcome is not shown.

6. Conclusion

We have examined the macroeconomics of government budget to determine what impact, if any, do increases in budget deficit and hence public debt, have on increases in money growth. We have utilised data for two Caribbean countries and hope to extend to study to include Jamaica.

In the non-parametric tests we find significant support to the proposition that increases in public debt growth in excess of the growth in real income, are associated with increases in money growth in Barbados and even at a stronger level in Guyana. We also find evidence of an association between public debt and money growth in the regression equations for both territories.

However, for Barbados, we find no discernible support for any long-run association between increases in public debt and inflation beyond that caused by the effect of debt growth on money growth. While for Guyana, we found that increases in the external component of total public debt have a long-run impact on inflation apart from that related to the growth in money.

These results can be interpreted as evidence in support of the hypothesis that debt growth plays a causal role in monetary policy over long periods although there maybe other reasons why debt and money may be correlated. It may even play such a role, lasting a decade or less, as in the case of Guyana.

Table 1Ratio of Selected Aggregates to GDP

	Domestic Debt	*External Debt*	*Total Debt*	*Deficit*
1972	20.26	9.02	29.28	4.15
1973	18.59	13.24	31.83	10.12
1974	21.28	6.68	27.96	5.83
1975	22.57	6.29	28.86	3.08
1976	26.47	5.76	32.23	7.82
1977	31.40	4.02	35.42	9.32
1978	28.74	9.06	37.80	3.22
1979	26.27	9.37	35.64	3.92
1980	21.44	10.67	32.11	5.84
1981	25.00	15.20	40.20	9.07
1982	26.65	16.09	42.74	6.74
1983	27.19	17.77	44.96	3.87
1984	28.45	17.61	46.06	5.80
1985	29.88	20.36	50.25	5.76
1986	31.04	25.61	56.64	5.32
1987	30.13	29.54	59.67	8.79
1988	30.81	30.63	61.43	4.63
1989	30.17	29.31	59.48	2.28
1990	34.42	28.98	63.40	8.37
1991	38.48	28.84	67.32	1.85
1992	45.74	27.93	73.67	1.92
1993	57.83	25.18	83.01	2.46
1994	60.67	24.24	84.91	1.24
1995	55.99	22.80	78.79	0.91
1996	58.24	21.62	79.86	3.79
1997	56.45	19.40	75.85	1.45
1998	54.56	17.19	71.75	0.97

Figure 1a

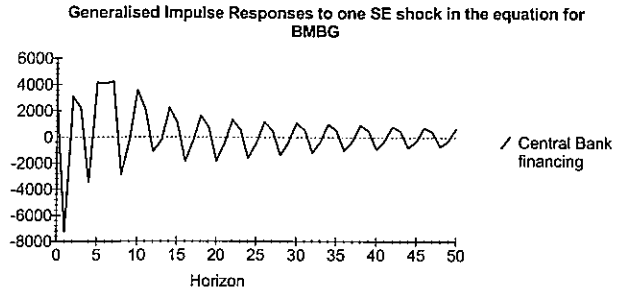


Figure 1b

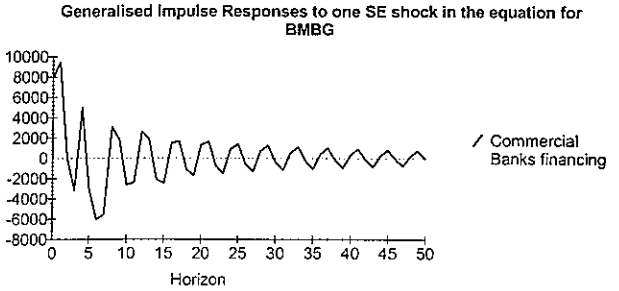


Figure 1c

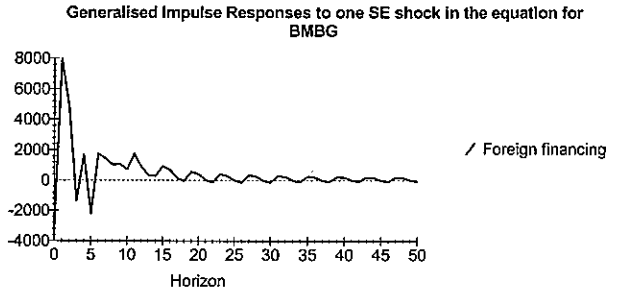
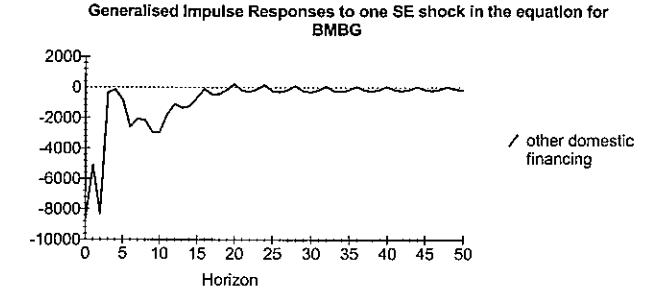


Figure 1d



BGB Growth rate of Barbados monetary base M

SE Standard Error

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