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**The Monetary and Fiscal Implications of Achieving Debt
Sustainability.**

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Abstract

This paper examines debt management and specifically the issue of debt sustainability, within the context of its linkages to monetary variables. In particular, it emphasises the importance of the co-ordination of government's operation and financing within the broader scope of the economy's overall objectives. Global trends have tended towards rising public debt, and the question of the sustainability of such debt has raised issues from both the fiscal and monetary perspective. This paper looks particularly at the issues facing developing economies, and tests modelling theory as to the determination of a sustainable level of debt, using data for The Bahamas.

The views expressed in this paper are those of the author and do not necessarily represent The Central Bank of The Bahamas. This paper is a work in progress, and all comments are welcome.

SECTION I: INTRODUCTION

The operations of debt and monetary management present such linkages that the stability of desirable balances in either would be contingent upon dynamics in the other. In fact, to the extent that monetary policy is concerned with influencing the demand and supply of money and credit in an economy, government's requirement for financing can be considered a key variable in meeting such objectives. The literature even suggests split ends to government's operations and financing. To demonstrate, Coghlan (1981) cites Blinder and Solow's (1974) early description of fiscal policy as comprising 'all tax and expenditure transactions of governments as they affect the size of the public debt but not its composition'. Intuitively, it can be reasoned that while the fiscal deficit is a component of fiscal policy, the government's borrowing requirement is arguably a factor of monetary policy.

Coghlan summarised that "the net borrowing need of government is a factor influencing the money supply, and changes might reasonably be thought of as monetary policy, even though they may have resulted from changes in taxation". Hence, the greater the financing need, the larger the impact on money supply--implying that smaller budget deficits afford monetary authorities greater control of the money supply. We will see that for developing countries, in particular, instruments for debt management and monetary policy are the same. Furthermore, if an economy is to achieve macroeconomic stability, market development and growth, then the objectives of these two parameters must be co-ordinated.

This paper will look at debt management within the context of its linkages to monetary variables and thus the viability of government's financing given the economy's overall macroeconomic objectives. In the first Section, the paper presents a structure for debt management objectives,

and in Section Two, a review of the Bahamian paradigm is presented. Section Three briefly discusses objectives for monetary and fiscal policy in the context of debt management issues and in Section Four a framework for debt sustainability is proposed. Within this frame, a simple model is defined in Section Five, and is simulated using data for The Bahamas, upon which projections are made as to appropriate fiscal adjustments to achieve a sustainable debt path. The paper concludes with specific monetary and fiscal co-ordination objectives toward debt sustainability.

SECTION 2: OBJECTIVES OF DEBT MANAGEMENT

By convention, the objectives of debt management are twofold:

1. To minimise long run costs of government's debt; and
2. Macroeconomic stabilisation.

Implicit in these objectives is the need for effective monetary and fiscal co-ordination. Even though budget financing might be accommodated at the least cost to government, at the same time it should not jeopardise the aims of monetary policy nor should the financing of fiscal imbalances create macroeconomic imbalances in other sectors. In practice, however, debt management objectives vary considerably across economies. In fact, one can argue that for a number of economies and for a variety of reasons, specific policy for debt management is more a matter of principle than necessarily practice.

Three constraints to debt management can be identified:

1. The level of economic development,
2. Openness of the economy, and
3. *Development of capital and financial markets*

1. The Level of Economic Development

The inflation rate and the budget deficit are normally used to grade a government's management of the economy. But for developing economies, keeping the cost of government borrowing down can conflict directly with policies to contain inflation.

Developing economies are generally characterised by the dominance of fiscal objectives in economic policy and government influence on monetary authorities, which can facilitate broad

central bank participation in the financing of the government's debt. Government's actions tend to be the most significant determinant of economic development and instruments of monetary and fiscal policy are the same.

On the monetary side, economic expansion can be achieved through a reduction in official rates. These rates to which credit is tied reduce the cost of financing thus making borrowing more attractive. Increased borrowing then is the expected catalyst for greater economic activity. On the fiscal side, economic expansion is achieved chiefly through higher state spending and reduced taxes. Higher spending and lower tax revenues lead to wider deficits and thus a larger borrowing requirement. This borrowing takes place at costs relative to the same official interest rates of the monetary example.

It can be inferred then that government borrowing at minimal costs would automatically create expansionary monetary conditions amid fiscal expansion. From the simple production function $Y = F(K, L)$, productivity and economic growth are functions of capital accumulation. The danger comes therefore when a larger proportion of the expansion is concentrated on non-investment expenditures, an inducement to inflationary conditions.

It is argued therefore that for developing countries, lending rates ideally should be high during periods of fiscal expansion, corresponding to higher costs to the government. In practice, this is defined as counter cyclical debt management—policies that effectively underpin the impact of restrictive monetary policy, thus supporting credit and price stabilising initiatives.

Additionally, developing economies tend to resort to money creation as a means of deficit financing in greater proportions than developed economies. The danger here is in the potential

for excessive growth of the money supply. From the monetarists quantity theory of money, the expectant result would be inflation. When government debt is assumed by the central bank, base money increases and economists agree that, even in a growing economy, if money financing exceeds demand for money assets, an increase in the general price level is expected.

2. Openness of the economy

For open economies, their capacity to effect macroeconomic stabilisation is contingent on their characterisation of openness. For instance, capital mobility assumes high integration between a country's domestic and other foreign capital markets. In this context, the degree of substitutability between domestic and foreign bonds suggests the extent of domestic adaptation to external policies. If domestic capital instruments are to remain competitive, even substitutability between them and foreign counterparts implies some resignation of autonomy over an economy's own macroeconomic objectives. They would have to allow their own securities and the related costs to move at least in tandem with external markets, with minimal or no restrictions from domestic authorities. We can conclude then that, under such circumstances, key debt indicators are exogenously determined [Boothe & Reid, 1992].

Table 1: Openness of The Bahamian Economy

	Exports as a % of GDP	Imports as a % of GDP
1993	53.2%	51.8%
1994	51.4%	53.5%
1995	54.7%	59.3%
1996	56.5%	63.0%
1997	55.4%	63.4%

It can be argued that the issue of openness pits fiscal discipline against policy autonomy. This prompts one to question whether or not openness suggests greater fiscal discipline at the expense of less autonomy. And conversely, whether a lack of openness would discourage fiscal austerity in the more self-governing environment.

3. Development of capital and financial markets

One delineation—and perhaps the most distinct—between the undeveloped markets of developing economies and the advanced markets of the larger industrialised economies, is the existence of a well functioning secondary market. Secondary markets provide a trading forum for a broad range of investors, and define both market interest rates and maturity structures for a menu of financial instruments. In particular, secondary markets for government securities tend to distinguish debt management and monetary policy. Buyers in the primary market, particularly banks, have the choice of responding to monetary developments by effecting changes in their own balance sheets, through the independent purchase, repurchase and/or sale of securities on the open secondary market.

In effect, advanced markets are characterised by the transmission of the desired monetary objectives of central banks, through the financial markets themselves, via various indirect policy instruments, namely, open market operations. Developing markets on the other hand are characterised by lending rates that have been set by government and state owned and operated banking institutions who, along with their private counterparts, have asset bases largely constituted by government bond holdings.

As has been indicated, in developing economies debt and money management instruments coincide, with operations largely restricted by the underdeveloped controlled markets. Key

parameters as to the determination of the effectiveness of markets therefore would include the nature of the determination of interest rates and the depth and diversity of markets or specifically, whether or not a market for debt securities exist.

The Commonwealth Secretariat (1996) suggests the following market liberalising initiatives, in order to broaden the scope and increase the depth of debt management in developing countries:

- Market clearing interest rate: such that money is priced according to demand and supply clearing rates.
- Auction system: which through a bidding process establishes a competitive pricing mechanism.
- Primary dealers: 'market makers' who buy and sell securities and essentially create and maintain markets through active trading.
- Develop secondary markets: facilitates better portfolio selection and repositioning of assets by investors.
- Securities market innovations: tailoring instruments and maturities to meet broader range of investor preferences.
- Institutional participation: broader markets, which would increase turnover and heighten competitive influences.

SECTION 2: THE CASE OF THE BAHAMAS

Within the context of the twofold objective of debt management and given the three constraints identified above, the case of The Bahamas is presented below.

The Bahamas is a small economy, characterised by a high degree of openness and very limited, though developing capital and money markets. It enjoys a fixed 1:1 relationship with the US dollar, and exchange controls limit the movement of capital across national borders. Legislation provides for a government securities market of short-term treasury bills with maturities not exceeding one year and long-term bond instruments of up to sixty years.

On Issues Associated With the Level of Economic Development

Arguably, the minimisation of the cost of borrowing to government is not as key an objective in debt management as is the attainment of an appropriate spacing of debt maturities. Interest rates for the most part are administratively set and are strictly a function of monetary management. The Bahamian Government essentially is a price-taker in financing its deficit spending. It would present to Parliament fiscal budgets well in advance of the start of the respective period, and at that same time request approval to finance a specified proportion of the anticipated budget shortfall, via government bonds, loans, etc. This submission often is made and subsequently approved in the absence of specific expectations of the consequent costs to government, although this becomes a major consideration when the time comes to seek financing.

Further, money creation has not been a problem for The Bahamas. But to illustrate, it would normally be manifested in the following conditions:

1. Banks use their holdings of government securities as collateral to borrow funds,

2. The central bank redeems government paper,
3. The central bank purchases government paper out right.

In the first two instances, banks' capacity to on-lend to customers would be enhanced and in the third, the balancing effect of increased central bank deposit liabilities would in turn increase the money base. The illustration below shows base money as a ratio of external reserves which indicates the extent to which domestic money, and thus the Bahamian dollar, is backed by the accumulated foreign currency reserve of the country.

Table 2: Base Money as a ratio of External Reserves

Monetary Base as % of External Reserves	
1989	116.24%
1990	114.56%
1991	119.04%
1992	137.66%
1993	121.40%
1994	128.74%
1995	135.97%
1996	139.38%
1997	117.18%
1998	91.57%

Statutory requirements create a captive market for government securities. Banks are required to hold a certain proportion of their deposit liabilities in the form of liquid assets. Statistics for the last 10-year period show that more than 65% of banks' required liquid asset was held in government securities (see Table 3 below). The data also indicates a positive relationship

between banks' holding of government paper and liquidity; for example, during times of tighter credit measures and given the lack of eligible liquid assets, banks' tend to allocate more of their portfolios to government instruments. A look at the Central Bank's share of debt financing shows

Table 3: Liquidity and Bank Holdings of Government Paper

	Government Paper (as % of minimum liquid asset req.)	Surplus Liquid Assets	CB holdings of Gov. Paper (as % of total bank holdings)
1989	55.07%	11.03%	45.03%
1990	57.06%	13.98%	51.82%
1991	59.45%	22.84%	54.61%
1992	64.17%	24.05%	56.48%
1993	81.42%	34.44%	30.89%
1994	72.99%	27.12%	40.13%
1995	63.89%	15.04%	50.32%
1996	61.55%	5.57%	51.44%
1997	62.12%	5.86%	37.57%
1998	79.43%	23.72%	2.34%

a drastic reduction in holdings for 1998 to 2.3%, as the Bank sold all of its Treasury bill holdings.

Given so, given the very structure of the Bahamian economy, the direct inflationary effect of deficit financing as suggested in the literature, does not necessarily apply. The Bahamas is a net importer and essentially lacks the concomitant market pricing mechanism of the standard IS:LM model. Any excessive money creating activities therefore, are likely to have a more substantial effect on the balance of payments as per the basic import:export relationship, rather than on

domestic prices. Any direct impact, therefore, would lie in the effects of subsequent foreign exchange outflows on external reserves.

On Issues Associated With Openness

The question of the relevance of exchange controls is a prominent, though intermittently debated, subject in The Bahamas. One proponent for the adoption of the US dollar as the official currency for The Bahamas suggested "the government (as a result) would no longer run up high budget deficits", that citizens exhibit a "basic distrust of the government" and that the "positives" of such a move would extinguish the government's ability "to print its own money". These and other reasons are cited as advantages worth the independence in monetary policy decision-making that would be surrendered. This case however is cited not as validation of merit to its argument, but rather as another illustration of the interconnectedness of monetary and fiscal objectives in The Bahamas, and further to the issue of fiscal discipline mentioned above.

While domestic exchange controls on the current account are largely for administrative purposes, on the capital side there are controls on portfolio transactions and domestic banks are limited in their net foreign currency exposure. Moreover, whereas the dollar for dollar exchange rate holds for current transactions, the exchange for outward investments is higher at B\$1.25 = US\$1.00. These circumstances within the whole context of openness, certainly raise the issue of capital market liberalisation.

On Issues Associated With Capital and Money Market Development

As regards government securities, instruments include mainly 3-6 month Treasury bills and the longer term Bahamas Government Registered Stock (BGRS), with maturities generally not

exceeding 25 years. Treasury bills are issued and rolled-over at discounts by an auction method, and the periodic BGRS are sold at par value at pre-determined interest rates, usually at margins linked to the prime rate. Moreover, "the amounts and timing of the supply of primary issues are dictated by the fiscal and budgetary requirements of the Ministry of Finance rather than by the monetary policy requirements of The Central Bank, even though the Bank acts as registrar and transfer agents for these securities" [Adderley & Justilien, 1998].

The allowable stock of Treasury bills outstanding at any given point in time, by law is contingent on Government's earnings—specifically, up to 25% of Governments Ordinary Revenue. Conversely, the issuance of bonds, while not under volume restrictions, is subject to parliamentary approval.

In total, the Bahamian capital market is a limited one, lacking the range of instruments consistent with developed markets. Trading is restricted to over-the-counter transactions by various 'market-makers', who buy and sell stocks of up to 16 incorporated Bahamian companies, and private placements of central government and other public bonds. However, with the implementation of the Securities Commission of The Bahamas in 1995, and the new securities legislation, The Bahamas has covered a great deal of the ground work towards the establishment of the Bahamas International Securities Exchange (BISX).

SECTION 3: OBJECTIVES OF ECONOMY POLICY

One might say that the ultimate goal of economic policy would be the attainment of conditions that would render circumstances as pareto optimal—i.e., where the economy's resources and output are allocated in such a way that no allocation can make anyone better off without making at least one person worse off [Pearce, 1992].

Monetary policy defines central banks' decisions regarding the control of money supply, interest rates and exchange rate determination. Fiscal policy defines governments' decisions regarding how much they will spend and consequently how this spending will be financed.

We can think of either policy in terms of how it is likely to influence output. In general, money or interest rates can be used to control output. Meanwhile, government spending influences output directly while the financing of that spending has an indirect effect.

In the case of The Bahamas the money credit relationship is at the crux of macroeconomic stability. Credit is extended principally according to the domestic deposit base, but expended mainly on external goods and services. The Bahamas is a net importer, and therefore maintaining the Bahamian dollar exchange rate requires stable credit and other conditions, "while simultaneously allowing the economic development objective to be pursued" [Craig et. al.]. The main instruments used in fulfilment of these objectives include reserve requirements, changes in the Bank discount rate and selective credit controls, supplemented to a large extent by moral suasion.

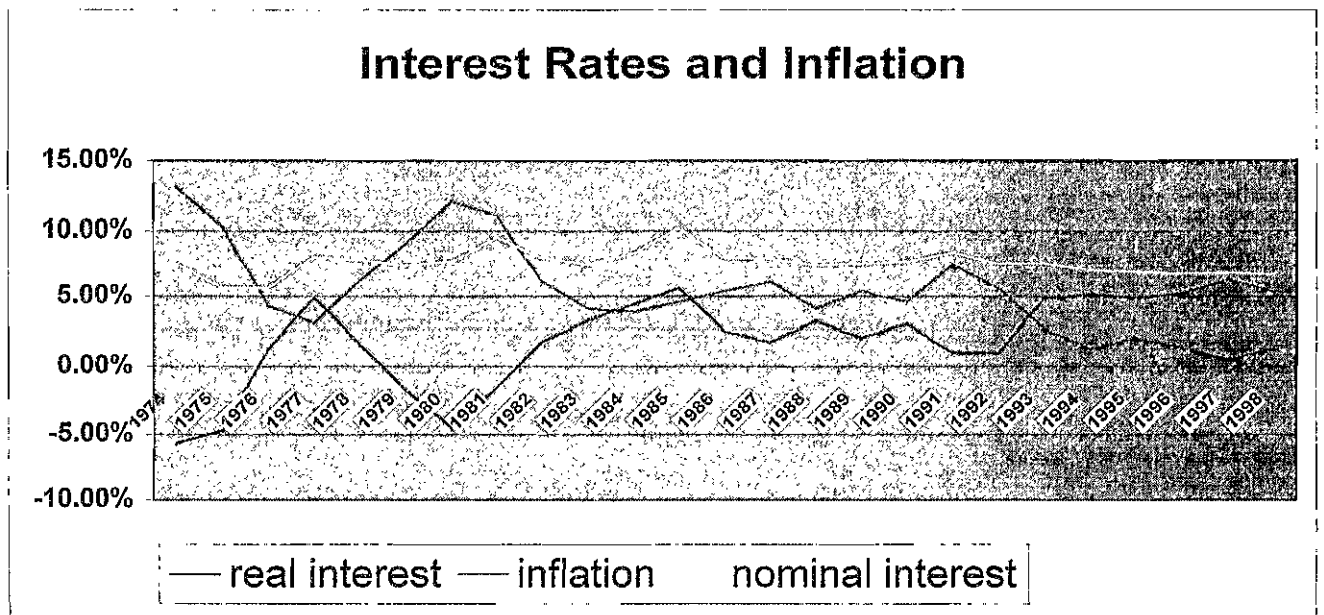
Government spending adds directly to overall domestic production. In fact, over the 1993-1997 period, government consumption expenditure alone accounted for, on average, more than 16% of

GDP. Financing of expenditures is accomplished mainly through taxation, whether spending is funded by current taxes (including inflation tax the product of money creation) or by debt, which implies future taxation. Either way, we would expect that such financing affect output indirectly through its distortion on income and prices.

Notwithstanding, the monetary impact of new government debt is transmitted through the money supply and interest rates. The Government of The Bahamas is the largest single debtor in the country, and its issuance of debt absorbs a considerable proportion of domestic money. Furthermore, as the largest single borrower, it would have a strong influence on where interest rates are set, thus impacting on the determination of benchmark rates.

It can be seen therefore that monetary and fiscal policy can both influence and create fluctuations in aggregate demand. The economy therefore would be best served with effective monetary and fiscal co-ordination.

Chart 1: Interest rates and inflation



SECTION 4: DEFINING DEBT SUSTAINABILITY

In simple terms, the main objective of sustainability, as per public debt management, is the "avoidance of fiscal deterioration without interrupting macroeconomic goals" [Commonwealth Secretariat, 1996]. For the most part, developing economies are characterised by their inability to generate adequate domestic savings, a factor further compounded by underdeveloped financial markets, in a policy environment dominated by fiscal objectives. Alongside high social and infrastructure development needs, these economies lack the breadth in tax base associated with larger developed economies. As a result, the fiscal gap for these economies has significant implications for macroeconomic stability.

Rising public debt in the developing world has been attributed to a number of variables, among them:

- The growing costs in public expenditures, particularly the social component of government's budget, maintaining large civil services, subsidies and entitlements. For smaller developing states, the per capita costs of development spending often far exceeds the comparative statistic for larger economies.
- Limited tax systems. With few 'tax handles' outside of international trade, the capacity to raise revenue in many developing countries is constrained, particularly those with large poor classes and weak administrative structures.
- Rising costs of servicing outstanding debt.
- The impact of external shocks, in particular fluctuations in terms of trade, the basis for much of the revenue base.

Much of the discussion on this 'debt problem' has focused on the concept of sustainability and debt management, with the ultimate aim of keeping the public debt at least within a sustainable range. What therefore would be the parameters for sustainability?

We can characterise and trace general macroeconomic implications of growing deficits and thus growing debt as follows:

1. **Impact on financial system:** Looking specifically at liquidity and bank profitability, we can assess the implied effects through shocks to interest rates, and the availability of credit.
 - Domestic debt is accommodated essentially through a reallocation of assets, as there would be no direct impact on real resources. Investors basically trade their cash and near cash assets for bond holdings. Under these circumstances, reducing such assets in favour of the longer-term claims reduces liquidity, whereas conversion in the other direction would raise it. Monetary authorities in favour of reducing liquidity would respond by relaxing credit controls, and in particular by reducing key interest rates. Authorities desiring greater liquidity would take opposite measures.
 - As regard bank profitability, the imposition of higher reserve requirements would mean that a substantial proportion of banks' money balances is held with the central bank, which carries no interest, although in some economies the monetary authority does offer some remuneration. Banks would then compensate for the resultant 'loss' by broadening their interest margins, i.e. raising lending rates, lowering deposit rates or both, with subsequent effects on credit availability.

2. **Impact on government:** Higher debt means higher debt servicing costs. Since more of government revenues are diverted to servicing the public debt comparatively less is available for economic infrastructure and social welfare and development.
3. **Impact on the external account:** Foreign debt has the immediate effect of raising the stock of external reserves, upon the disbursement of new loan obligations, and the opposite effect once amortisation and interest payments become due. Besides, as economies move towards reducing the foreign component of public debt, the number of outgoing transactions tends to exceed the inflows. At the same time, for economies like The Bahamas that rely heavily on imports, and as regards domestic debt financing, much of credit is expended on the importation of productive and other goods, thus requiring foreign exchange.
4. **Impact on the private sector:** In general, the literature identified the consequent impact as the "crowding-out" of private investment. The rationale is that in market economies, major government borrowing would have the effect of absorbing much of available domestic credit, therefore exerting upward pressure on interest rates. Correspondingly, the cost credit increases, reducing availability for private use.

SECTION 5: TESTING FOR DEBT SUSTAINABILITY

Debt sustainability is a well documented issue and much has been written as to its determination. For instance, within the context of the Overlapping Generations Model (OLG), one view contends that "the current level of debt must be equal to the present discounted value of primary surpluses". Given the dynamic budget constraint:

$$\frac{dB(t)}{dt} = r(t)B(t) + G(t) - T(t) \quad (1)$$

where B = debt, G = government expenditure, T = tax revenue and r the real interest rate is assumed to be positive, in time t .

In the absence of restrictions on government borrowing, the basis for this model is that the path of government spending will ultimately lead to borrowing in order to service existing debt. The constraint imposed then is the "No-Ponzi-Game (NPG) condition"¹, in order that debt does not increase faster than the interest rate.

Another model, put forth by Blanchard and Fischer (1993) more expressly denotes the need for fiscal and monetary co-ordination in debt management. It features components of monetary policy (money and interest rates) and components of fiscal policy (deficits and debt).

As a ratio of GNP, the fiscal deficit δ , is comprised of two parts: the primary deficit δ_0 and the interest expense on existing debt rb , to obtain:

$$\delta = \delta_0 + rb \quad (2)$$

¹ Used principally in the basic infinite horizon model for family consumption.

By convention, the fiscal deficit is the amount by which government's expenditures exceed its receipts, and the primary balance is calculated as the fiscal deficit less interest payments on the debt outstanding. The significance of the latter measurement is that it separates the net discretionary expenditures of a government. It shows the end result of government's operations for the period, independent of the costs associated with previous deficits. For analytical purposes therefore both of these measures are identified.

From the model, financing is achieved in two ways: money financing and debt financing, where α represents the share of the deficit financed through money creation and the remaining $(1-\alpha)$, the share funded by the issuance of new debt. Within this context the following is derived:

$$\frac{dM/dt}{PY} = \alpha\delta \quad (3)$$

$$\frac{db}{dt} = (1-\alpha)\delta \quad (4)$$

where M/PY = money demand

The consequent expression being:

$$\frac{db}{dt} = (1-\alpha)[\delta_0 + rb] \quad (5)$$

Thus given the estimations of α and δ_0 in the model and the importance of r to both money and debt management, the inter-relation of monetary and fiscal variables in debt determination (b) is verified.

The Commonwealth Secretariat (1996) modified this model to apply specifically to the sustainability of domestic debt. In this regard variables are expressed in terms of gross domestic product (GDP) as opposed to the GNP, and the model is simplified to generate benchmark standards upon which policy options can be estimated. The revised version specifies government's budget identity as follows:

$$Z + iB = \Delta S + \Delta B \quad (6)$$

Where Z = the primary deficit, iB the interest paid on total debt outstanding, ΔS = the change in base money and ΔB the increase in total debt outstanding.

From this identity, the following relationship is derived:

$$b = (z-s)/(y-r) \quad (7)$$

Where b = debt to GDP ratio, z = primary deficit to GDP ratio, s = seignorage measured as $(\Delta S/GDP) * h$, where h = inflation, r = real rate of interest, y = rate of growth.

A value of $s > 0$ implies that government has elected to boosting its revenue base via the creation of money, seignorage. Among low-inflation industrialised economies seignorage has accounted "for about 0.5% of GNP in government revenue and in high inflation economies far more" [Blanchard & Fischer, 1993]. But of keen significance in this model, is the association between the growth and real interest rates. In particular, literature has established that if the rate of increase in real interest exceeds the rate of growth of the economy, then the national debt is growing faster than that government's ability to pay it back [IMF, 1996]. Moreover, this is characterised as "fiscal dominance hypothesis", where the money supply becomes endogenous

because the monetary authorities can no longer influence the real deficit [Grant, 1998]. Following this, we would expect therefore that “ y ” is greater than “ r ”.

Apart from the growth rate, there is the level of productivity,; increasing levels of which would be expected to sustain long-term economic growth. Increasing inflation rates on the other hand suggest lower real rates of interest, and makes real servicing of government debt cheaper, although only in the presence of unanticipated inflation and only to the extent that official rates are determined independent of expectations for inflation.

From the model we can deduce that, all other things constant, to achieve a specific debt to GDP ratio:

- greater seignorage would facilitate a larger primary deficit in respect of GDP, while lower levels would suggest greater fiscal restraint.
- an economy that is growing at a faster pace (higher y) would have broader capacity to raise its primary deficit, meanwhile slower or negative growth would necessitate reduced fiscal spending.
- higher real interest rates would require a lower primary deficit whereas the opposite is likely to permit the government more room for expenditure.

The key variable in this model is the debt to GDP ratio (b). The idea is to identify a period in which this ratio would have been deemed most favourable, and then under a specified set of assumptions to evaluate the fiscal path most appropriate in order to achieve such a target again, in future periods.

This model is simulated using data for The Bahamas, in which case, a few modifications are made. In the estimation of Z , the primary deficit, this determination was made based on the interest paid on domestic debt only, as this simulation is concerned primarily with the endogenous component of the country's debt. The variable iB then is replaced by the actual amount of interest paid on Bahamian dollar debt only. As a proxy for changes in high-powered money, ΔS will reflect specifically central bank financing of government's deficit, i.e. advances to government and net purchases of government securities.

B will refer explicitly to the total debt outstanding to central government only, i.e. Government's Direct Charge, upon which this simulation is based. From equation (2), " b " then measures direct-charge to GDP. The real rate of interest is calculated as nominal interest less the rate inflation. The nominal rate used reflects the average interest paid on domestic direct charge for the period, and changes in the retail price index are used as a proxy for the inflation rate.

Estimates for The Bahamas follow in Table 4. Over the 25-year survey, central government's domestic debt has risen steadily, peaking at 34.74% in 1998. The primary balance in most recent periods suggests a trend towards higher government savings, at a time when real interest rates appear to be at their highest and seignorage a non-factor. Growth indicators show a full recovery from the economic recession of the early 90s and a path towards steady real economic growth.

The year selected as the most favourable is 1996, based on The Bahamas Government's objective of maintaining the country's overall fiscal balance at no more than 1.5% of GDP. During this year, the fiscal deficit stood at 1.56% of GDP. Other years close to this mark include 1975 and 1985, which posted comparative values of 1.63% and 1.35% respectively. For 1975 however, the

economy was estimated as having grown by 8.87% and in 1985 the economy expanded by 11.02%—paces perhaps not considered sustainable.

In 1996 on the other hand, the fiscal deficit/GDP ratio was achieved in an environment of more modest but certainly highly favourable growth of 4.20%, a low rate of inflation (1.4%) and real interest (5.24%) that tends to favour the trend of more recent periods and arguably a more realistic outcome when one considers the long-run. The target Direct-Charge/GDP ratio therefore is set at 33.0%.

The assumptions made in respect to s and r in Table 4, is that they correspond to their 25-year averages, while a growth rate of 4.5% is assumed for y . The averages are assumed to be the most desired values for those variables and the chosen growth rate is considered both ambitious and attainable. Equation (7) then, using these values and the target debt/GDP ratio derives as follows:

$$0.33 = (z - 0.002) / (0.045 - 0.0205)$$

$$\therefore z = 0.0083$$

The intuition then is that in order for the debt to be deemed sustainable, the acceptable size of the primary deficit relative to the size of the economy is 0.83%. Any deviations from this therefore, suggest the need for fiscal adjustment. Comparative values lower than 0.83% would suggest room for broader fiscal expansion. This might entail broadening and deepening of social and administrative services and greater infrastructure investment. A disadvantage though to added expenditure, recurrent expenditure in particular, is that the size of government is permanently increased. The capacity to absorb external shocks, be they trade related or even disaster related,

would be significantly curtailed. Alternatively, it could also allow the government to take more radical steps in the liberalisation of tariffs and other trade duties.

Conversely, higher ratios suggest a need for some fiscal tightening. The government might decide then to cutback on its development works, which might be the easiest expenditure of significance to cut without directly disrupting the country's social landscape. Since most recurrent spending is dedicated to maintaining the civil service, paying subsidies and various other income transfers. The alternative to spending cuts of course is deficit reduction through tax financing, i.e. increase in taxes.

Table 4: Modelling Debt Sustainability For The Bahamas

Year	b	z "-" = a surplus	S	r	y
1974	0.1202	0.0331	0.00136	-0.0562	-0.0408
1975	0.1178	0.0098	0.00000	-0.0468	0.0887
1976	0.1261	0.0152	0.00032	0.0130	0.0547
1977	0.1517	0.0153	-0.00016	0.0492	-0.0098
1978	0.1494	0.0161	0.00012	0.0161	0.0526
1979	0.1512	-0.0032	0.00045	-0.0178	0.0517
1980	0.1655	-0.0052	0.00163	-0.0448	-0.1578
1981	0.1668	0.0260	-0.00054	-0.0156	0.0328
1982	0.2073	0.0365	-0.00020	0.0186	-0.0507
1983	0.2478	0.0284	0.00018	0.0330	-0.0245
1984	0.2457	-0.0041	0.00017	0.0443	0.0086
1985	0.2281	-0.0026	-0.00030	0.0560	0.1102
1986	0.2249	-0.0070	0.00003	0.0256	0.0642
1987	0.2048	-0.0061	0.00051	0.0179	0.0456
1988	0.2227	0.0209	-0.00008	0.0325	-0.0498
1989	0.2230	0.0207	0.00077	0.0209	0.1059
1990	0.2467	0.0075	0.00031	0.0305	-0.0041
1991	0.2817	0.0171	0.00029	0.0101	-0.0270
1992	0.3023	0.0068	0.00023	0.0104	-0.0210
1993	0.3276	0.0063	-0.00019	0.0479	0.0520
1994	0.3343	-0.0132	0.00011	0.0515	0.0090
1995	0.3327	-0.0127	0.00006	0.0486	0.0030
1996	0.3301	-0.0028	0.00004	0.0524	0.0420
1997	0.3473	0.0131	-0.00003	0.0628	0.0300
1998	0.3474	-0.0012	-0.00025	0.0533	0.0250
25 year Avg.	0.2321	0.0086	0.0002	0.0205	0.0156

In the twenty-five year survey, the primary deficit in respect of GDP exceeded this recommended value on thirteen occasions, including most recently 1997 (1.6%) where the fiscal deficit measured among the highest, at 3.71%—more than twice the government's target.

Primary surpluses were noted in 9 periods and in the 3 remaining years, and although deficits were realised, these were below the 0.83% threshold. Notably though, the 25-year average at 0.86% was just above the proposed target value.

To illustrate the same with respect to the fiscal deficit, we can rewrite the budget identity (1) as follows:

$$F = \Delta S + \Delta B \quad (8)$$

From which we would derive:

$$b = (f - s) / (h + y) \quad (9)$$

Where h refers to inflation.

Using the assumed values for s and y, at the target b of 33.0%, inflation is measured as 2.13% or equivalent to the average rate of price increase over the 1992-1998 period, which marks the term since The Bahamas ushered in a new government. We obtain therefore a fiscal deficit of 2.21%.

The table below shows the calculated f for different values of y.

Table 5: Testing the Fiscal Deficit

Target b	Assumed s	Assumed y	Assumed H	Calculated f
33.00%	0.02%	6.00%	2.13%	2.70%
33.00%	0.02%	4.50%	2.13%	2.21%
33.00%	0.02%	2.50%	2.13%	1.55%
33.00%	0.02%	2.00%	2.13%	1.38%

The IMF estimates growth for 1999 at 6.00% which, all things considered, would require a fiscal deficit not exceeding 2.70% of GDP. Further, the model is simulated using two other estimations for growth: the growth rate attained in the final year of survey 1998 of 2.5% and the average growth over the 1992-1998 period of 2.0%. It would appear from such estimations then that given the objectives of The Bahamas' Government, the choice of a target fiscal deficit to GDP ratio of 1.5% is a realistic goal, at least as far as limiting the size of the Bahamian dollar to no more than one third of the economy's total domestic production.

Table 6: Testing the Primary Deficit

Target B	Assumed s	Assumed y	Assumed R	Calculated z
33.00%	0.02%	6.00%	2.05%	1.32%
33.00%	0.02%	4.50%	2.05%	0.83%
33.00%	0.02%	2.50%	2.05%	0.17%
33.00%	0.02%	2.00%	2.05%	0.003%

Substituting growth rates at 2.5% and 2.0% in the original simulation (7) yields z values of 0.0017 and 0.0002, i.e. primary deficit limited to 0.17% in the first instance and practically a balanced primary budget in the second. Both are very restrictive outcomes for the government, which can only be reconciled with lower real rates of interest.

Correspondingly, it must be noted that this model for The Bahamas is within the context of interest rates that have been administratively determined. As has been demonstrated and indicated in the text, we can ascertain that, all things considered, higher real interest rates would

of course restrict the discretionary portion of government's fiscal budget, by requiring a lower primary deficit to GDP ratio. What then might induce higher interest rates? Capital account liberalisation that would suggest greater openness, or a deepening of domestic capital and money markets which might impose a liberalisation of domestic interest rates?

To illustrate, r in the model of 2.05% is replaced with the most recent (September 1999) inflation indexed coupon rate on 10-year US Treasury Bonds of 3.875%. If local investors had the option of Bahamas Government Bonds and US Treasury Bonds, then we would at least expect comparative returns on local bonds if the government is to maintain its market. The Bahamian example then is revised as follows:

$$0.33 = (z - 0.00019) / (0.045 - 0.03875)$$

$$\therefore z = 0.0023$$

At a growth rate of 4.5% the allowable primary deficit then would be no more than 0.23%. It can also be demonstrated that growth rates below 3.8% would require nothing short of primary surpluses.

CONCLUSION

In general, debt sustainability requires conditions such as a sound fiscal environment, a stable flow of money and credit and external integrity, in a macroeconomic environment conducive to steady economic growth.

Application of the model used is best suited for the examination of specific fiscal planning, and sustainability measured by the capacity of that plan to maintain debt at its desired level in respect of domestic output. Debt would be deemed unsustainable then if during the period, fiscal adjustments must be made in order to contain growth in the debt.

From the model and the literature presented, it can be concluded that debt sustainability is not just achieving a specific level of debt, but requires co-ordinating factors of growth and monetary policy in order to maintain debt at a level conducive to the economy's overall macroeconomic objectives. An economy might have a comparatively low debt to GDP ratio, but in an environment high in seignorage and at low real rates of interest because of high inflation. In contrast, an economy with a comparatively high debt to GDP ratio can maintain such a position, given stable values in other variables and within the context of high real economic growth.

This paper has demonstrated that the real rate of interest is a key link in monetary and fiscal management, confirming that in order to generate the most favourable outcomes for the national economy, fiscal policy must be projected within the context of the wider economic environment and alongside consideration of key monetary variables. This includes the interest rate, the supply of money and credit and, particularly in the case of The Bahamas, the demand for external reserves.

Although money creation might not be a problem for The Bahamas, from the base money and external reserve relationship (Table 2), we can see the importance of keeping the growth of the money supply in line with aggregate demand. Large increases in the monetary base with no corresponding movements in the external sector would be highly detrimental to the economy's ability to maintain the exchange rate.

Appendix 1: Expenditure on Gross Domestic Product

Expenditures on GDP, as a % of GDP					
	1993	1994	1995	1996	1997
Government final consumption expenditure	14.3%	16.7%	15.8%	15.8%	18.0%
Private final consumption expenditure	69.6%	67.3%	67.7%	66.7%	63.1%
Gross capital formation	19.6%	21.2%	23.2%	25.6%	28.5%
Exports of goods and services	53.2%	51.4%	54.7%	56.5%	55.4%
Less: imports of goods and services	-51.8%	-53.5%	-59.3%	-63.0%	-63.4%
Statistical discrepancy	-4.9%	-3.1%	-2.1%	-1.7%	-1.6%
Expenditure on GDP	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix 2: Government's Operations & Financing

<u>(B\$M)</u>	1975	1976	1977	1978	1979	1980	1981	1982
1. Revenue & Grants (a+b+c+d)	<u>118.3</u>	<u>129.3</u>	<u>136.8</u>	<u>164.0</u>	<u>202.1</u>	<u>244.1</u>	<u>282.2</u>	<u>273.5</u>
a. Tax Revenue	96.3	109.7	118.7	139.9	175.6	201.2	207.7	207.8
b. Non-Tax Revenue	22.0	19.6	18.1	24.1	26.5	43.0	74.5	65.7
c. Capital Revenue	---	---	---	---	---	---	---	---
d. Grants	---	---	---	---	---	---	---	---
2. Expenditure (d+e+f)	<u>132.2</u>	<u>152.6</u>	<u>164.5</u>	<u>197.0</u>	<u>210.3</u>	<u>251.9</u>	<u>344.4</u>	<u>351.7</u>
d. Current Expenditure	113.8	129.0	136.0	157.6	178.8	208.1	243.7	262.0
e. Capital Expenditure	13.8	22.5	23.7	28.3	26.3	38.8	45.6	40.3
f. Net Lending to Public Corps.	4.6	1.1	4.9	11.1	5.2	5.0	55.1	49.4
Fiscal Deficit (1-2)	(13.9)	(23.3)	(27.7)	(33.0)	(8.2)	(7.8)	(62.2)	(78.2)
	1983	1984	1985	1986	1987	1988	1989	1990
1. Revenue & Grants (a+b+c+d)	<u>298.2</u>	<u>333.4</u>	<u>376.8</u>	<u>398.9</u>	<u>436.3</u>	<u>432.6</u>	<u>448.0</u>	<u>489.3</u>
a. Tax Revenue	244.7	266.4	318.2	339.1	380.2	383.5	394.2	430.0
b. Non-Tax Revenue	53.5	67.0	58.6	59.7	56.1	49.1	53.9	59.3
c. Capital Revenue	---	---	---	---	---	---	---	---
d. Grants	---	---	---	---	---	---	---	---
2. Expenditure (d+e+f)	<u>366.6</u>	<u>350.0</u>	<u>405.2</u>	<u>411.1</u>	<u>450.8</u>	<u>519.0</u>	<u>550.7</u>	<u>549.0</u>
d. Current Expenditure	293.7	324.5	354.3	365.6	397.4	437.1	470.8	474.5
e. Capital Expenditure	20.6	18.8	51.7	54.5	64.5	76.8	90.9	57.7
f. Net Lending to Public Corps.	52.4	6.7	(0.9)	(9.0)	(11.1)	5.2	(11.0)	16.8
Fiscal Deficit (1-2)	(68.4)	(16.6)	(28.4)	(12.2)	(14.5)	(86.4)	(102.7)	(59.7)
	1991	1992	1993	1994	1995	1996	1997	1998
1. Revenue & Grants (a+b+c)	<u>490.4</u>	<u>534.2</u>	<u>531.7</u>	<u>609.9</u>	<u>669.7</u>	<u>686.4</u>	<u>729.5</u>	<u>761.8</u>
a. Tax Revenue	424.0	481.0	476.0	544.9	594.8	615.3	658.2	681.4
b. Non-Tax Revenue	66.4	53.2	55.5	60.9	60.9	70.6	69.9	79.5
c. Capital Revenue	---	---	---	0.5	9.3	0.0	0.8	0.5
d. Grants	---	---	---	3.6	4.1	0.5	0.5	---
2. Expenditure (d+e+f)	<u>604.1</u>	<u>614.7</u>	<u>622.0</u>	<u>642.7</u>	<u>682.5</u>	<u>749.7</u>	<u>865.1</u>	<u>842.2</u>
d. Current Expenditure	504.9	523.9	531.4	556.7	588.2	650.0	699.1	724.8
e. Capital Expenditure	60.9	68.4	50.8	48.8	70.3	69.6	130.4	82.0
f. Net Lending to Public Corps.	38.3	22.5	39.8	37.2	24.1	30.1	35.5	35.4
Fiscal Deficit (1-2)	(113.7)	(80.6)	(90.4)	(32.8)	(13.0)	(63.3)	(135.6)	(80.9)

Appendix 3: The National Debt

B\$M	1975	1976	1977	1978	1979	1980	1981	1982
1. Direct Charge (a+b)	<u>127.2</u>	<u>149.8</u>	<u>184.1</u>	<u>202.5</u>	<u>234.9</u>	<u>243.1</u>	<u>281.0</u>	<u>351.7</u>
a. Foreign Currency	64.0	56.3	69.4	59.9	53.9	40.8	87.7	147.9
b. Bahamian Dollar	63.2	93.4	114.6	142.6	181.0	202.3	193.3	203.8
2. Contingent Liabilites	22.3	22.7	34.7	30.4	40.4	58.8	78.8	92.0
National Debt (1+2)	149.5	172.5	218.7	233.0	275.2	301.8	359.8	443.7
	1983	1984	1985	1986	1987	1988	1989	1990
1. Direct Charge (a+b)	<u>426.5</u>	<u>443.4</u>	<u>478.2</u>	<u>528.9</u>	<u>527.9</u>	<u>574.4</u>	<u>670.3</u>	<u>773.2</u>
a. Foreign Currency	162.2	155.1	146.7	168.2	144.2	130.6	131.5	139.3
b. Bahamian Dollar	264.2	288.3	331.5	360.7	383.7	443.8	538.7	633.9
2. Contingent Liabilites	78.8	68.4	67.3	81.4	78.7	86.5	117.4	146.0
National Debt (1+2)	505.3	511.9	545.5	610.4	606.6	660.9	787.6	919.2
	1991	1992	1993	1994	1995	1996	1997	1998
1. Direct Charge (a+b)	<u>870.5</u>	<u>952.4</u>	<u>1,064.7</u>	<u>1,136.3</u>	<u>1,165.8</u>	<u>1,235.1</u>	<u>1,374.7</u>	<u>1,431.5</u>
a. Foreign Currency	147.4	145.9	167.3	148.8	155.6	133.4	144.7	133.7
b. Bahamian Dollar	723.2	806.4	897.4	987.4	1,010.3	1,101.8	1,230.0	1,297.7
2. Contingent Liabilities	303.9	342.1	350.9	342.7	329.0	313.8	318.6	332.9
National Debt (1+2)	1,174.5	1,294.5	1,415.6	1,479.0	1,494.8	1,548.9	1,693.4	1,764.4

Appendix 4: Direct Charge, Primary Deficit and Central Bank Financing

	Direct Charge (B)	Primary Deficit (Z)	Central Bank Financing (S)
1974	108.2	29.786	9.367
1975	127.2	10.549	-0.022
1976	149.8	18.067	8.772
1977	184.1	18.507	-6.322
1978	202.5	21.862	2.563
1979	234.9	-5.047	7.705
1980	243.1	-7.606	19.764
1981	281.0	43.757	-8.229
1982	351.7	61.986	-5.698
1983	426.5	48.851	7.436
1984	443.4	-7.431	8.055
1985	478.2	-5.398	-13.598
1986	528.9	-16.527	1.176
1987	527.9	-15.781	21.755
1988	574.4	53.802	-5.141
1989	670.3	62.346	42.790
1990	773.2	23.435	21.197
1991	870.5	52.883	12.257
1992	952.4	21.385	13.122
1993	1,064.7	20.541	-22.454
1994	1,136.3	-44.961	29.000
1995	1,165.8	-44.427	9.424
1996	1,235.1	-10.460	10.959
1997	1,374.7	51.899	-22.566
1998	1,431.5	-4.819	-79.895

Reference Titles

- Adderley, J. L. and J. Justilien (1998): The Government Securities Market and its Role in Supplementing Monetary Policy in The Bahamas, Paper presented at the XXX Annual Monetary Studies Conference (1998).
- Aiyagari, S. Rao and Ellen R. McGrattan (1998, The optimum quantity of debt, *Journal of Monetary Economics*, Vol. 42, pp 447-469.
- Alberto, Alesina and Roberto Perotti (1995), The Political Economy of Budget Deficits, *IMF Staff Papers*, Vol. 42. (1), pp 1-32.
- Blanchard, Olivier Jean and Stanley Fischer (1993), Lectures on Macroeconomics, Published by the Massachusetts Institute of Technology.
- Boothe, Paul and Bradford Reid (1992), Debt Management Objectives for a Small Open Economy, *Journal of Money, Credit, and Banking*, 24 (1), pp. 43-60.
- Coghlan, Richard (1981): Money Credit and the Economy, Published by George Allen & Unwin Ltd.
- Coleman, Rozlyn (1996) Confronting Budget Deficits, *Economic Issues (IMF)*, 3.
- Cottarelli, Carlo (1993), Limiting Central Bank Credit to the Government - Theory and Practice, *IMF Occasional Paper* 110.
- Craigg, Wendy et al. (1997), The Evolution of the Financial Sector in The Bahamas. In: Clarke, Laurence and Donna Danns (1970-1996) eds, pp. 69-142, Caribbean Centre for Monetary Studies.
- Economic and Legal Advisory Services Division, Commonwealth Secretariat (1999), Effective Domestic Debt Management in Developing Countries
- (1996), An Analytical Framework for Assessment of Domestic Public Debt.
- (1996), Domestic Public Debt Management, An Overview.
- (1996), Fiscal Developments and the Evolution of Domestic Public Debt.
- (1996), Measurement of Domestic Debt and Sustainability.
- Fischer, Stanley (1993), The role of macroeconomic factors in growth, *Journal of Monetary Economics*, 32 (3), pp.485-512.
- Fuller, Neil (1991), Principles of Macroeconomics, Published by Tudor Publishing.

- Grant, Kaylene T. L. A. (1998), Fiscal deficit financing and base money management, *Money Affairs*, Jul-Dec 1998, pp 193-218
- Lachman, Desmond (1994), Budget Deficits and the Public Debt in Sweden: The Case for Fiscal Consolidation, *IMF Staff Papers*, Vol.41 (3), pp 502-516.
- Lindgren, Carl-Johan (1991), The Transmission from Direct to Indirect Instruments of Monetary Policy. In: Downes, Patrick and Reza Vaez-Zadeh, IMF, Chapter 21, pp 307-325.
- Macmillan Dictionary of Modern Economics, 4th Edition 1992, General Editor David W. Pearce.
- Montiel, Peter (1991), The Transmission Mechanism for Monetary Policy in Developing Countries, *IMF Staff Papers*, 38 (1), pp.83-108.
- Sargent, Thomas J. and Neil Wallace (1981), Some Unpleasant Monetarist Arithmetic, *Federal Reserve Bank of Minneapolis Quarterly Review*, Fall, pp 1-17.
- Ter-Minassian, Teresa (1996), Borrowing by Subnational Governments: Issues and Selected International Experience, IMF/PPAA/96/.