ECONOMIC RESILIENCE WITH AN EXCHANGE RATE PEG: THE BARBADOS EXPERIENCE, 1985-1998

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1. Introduction

Throughout the entire period of international financial instability, beginning with the end of the Bretton Woods arrangements in the 1970s, and continuing through periods of commodity price instability, international debt crisis and a series of international financial crises, a few small island economies of the Caribbean have maintained fixed exchange rate regimes and achieved substantial real economic growth with low inflation and an absence of chronic balance of payments difficulties. Countries in this group include Aruba, the Bahamas, Barbados, Belize, the Netherlands Antilles and the countries of the Organisation of Eastern Caribbean States (OECS).[1] These countries' experience contrasts with that of their neighbours – the Dominican Republic, Haiti, Guyana, Jamaica and Suriname – where the record is more typical of emerging economies: repeated or chronic balance of payments crises, bouts of inflation and a series of exchange rate crises.

As a result of failed exchange rate based stabilisation programs in the 1970s and 1980s, the view gained prominence that fixed exchange rate systems are generally unsustainable, and countries should establish regimes based on other anchors. This view was reinforced by the financial crises of the 1990s, which showed the vulnerability of fixed exchange rates to speculative attack, which might be the result of policy error, but might equally well be the result of contagion or herd behaviour. This poses a real dilemma for open economies where domestic prices are predominantly determined by international prices, and in view of the ease of international financial transfers. These countries need to maintain pegged exchange rates, to contain inflation and reduce the volatility of foreign financial flows. Because there is friction in international capital flows,

[1] Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines. The British Virgin Islands and Anguilla are Associate Members.

domestic monetary intervention will have some effect on interest rates, but interest rate policy has typically been used to defend an exchange rate parity, as the only way to achieve an inflation target. In the face of strong domestic monetary expansion – in open economies, typically the result of fiscal expansion - the available interest rate discretion is insufficient to bring either the exchange rate target or the inflation objective within reach, as excess money provokes higher spending (including spending on imports) and increased demand for foreign asset holding.

The experiences of countries which have sustained an exchange rate peg is helpful in addressing this dilemma. It is now accepted that the credibility required to achieve monetary stability must be sought in careful design of the institutions involved in the conduct of monetary policy. Moreover, these institutional arrangements must be tailored to the circumstances of individual countries. The most promising institutional arrangements experimented with in the past decade are inflation targeting (for countries with flexible exchange rates) and currency boards and monetary unions (as a way of anchoring the exchange rate). The Caribbean offers another example, based on the Barbados experience, of an institutional arrangement which suits the circumstances of open economies because it permits the use of fiscal policy to sustain the exchange rate anchor, using a forecasting framework that targets the level of foreign exchange reserves. This framework was employed successfully in implementing an adjustment strategy which minimised the costs of adjusting to a major balance of payments crisis in 1991/92.

In the next section of this paper we set out the conceptual framework which provided the underpinnings for the formulation of fiscal and monetary policy in Barbados during the period 1985 to 1998. This was the period during which the arrangements described in the paper came to maturity, and it also includes the most severe balance of payments crisis in the Barbadian economy in the post-war period, which provided the acid test of the robustness of the policy framework. The third section describes the institutional framework. A key component of the process was the forecast model, which provided the mechanism for addressing time inconsistencies in the execution of policy and the appearance of the economic outcomes; the fourth section discusses the model, its theoretical basis, how it evolved, its current structure, the behavioural relationships embodied in it, how it is used in practice and its forecast performance. The fifth section describes the process of policy decision and monitoring of economic performance, illustrating both how it was meant to work, and how it functioned – very imperfectly – in practice. We end with an assessment of the strengths and weaknesses of the arrangement.

2. The Conceptual Framework

In a country which has maintained a credible exchange rate peg, the simple Polak-type identity for the monetary sector is a useful starting point for the formulation of policy:

$$NFA + NDA = MO$$

where NFA are net foreign assets, NDA, net domestic assets and MO, the supply of money. Fiscal policy may be used to adjust both the NDA and the NFA in response to an excess supply of money. The size of the fiscal deficit, and the extent to which it is financed from abroad, will determine the NDA and NFA directly, and there will be indirect effects via the changes in income and spending that result from the fiscal changes.

The NFA are the outcome of the current account of the balance of payments and long term capital flows. There is negligible portfolio switching between foreign and domestic financial assets when the expected exchange rate change is zero because the peg is a credible one. In those circumstances the open capital account maintains interest rate parity, apart from transaction and information costs. The regime is threatened with collapse if the credibility of the exchange rate is called into question. It must therefore be sustained by ensuring foreign exchange reserves which are targeted at levels that are considered adequate in any foreseeable economic circumstance. Moreover, because of the open capital account, reserves cannot be sustained by capital controls, administrative allocation or rationing.

What is required are institutional arrangements which allow the central bank to target the level of foreign exchange reserves, by ensuring that demand falls short of the supply of foreign exchange by a sufficient margin. Under such circumstances market mechanisms may be relied upon to sustain an unchanged peg. This was the framework for policy in Barbados during the period under review, with the use of a forecast model, close coordination between the monetary and fiscal authorities, and public discussion of the monetary, fiscal and balance of payments outlook. The system was severely tested during a balance of payments crisis which came to a head in 1991/92, and it proved robust. The adjustment strategy, based on the exchange rate anchor, involved fiscal contraction, wage adjustment and temporary credit controls to allow time for the fiscal measures to take effect.

The Central Bank of Barbados used a quarterly model which targeted the level of foreign exchange reserves 18 months ahead,[2] by determining the fiscal balance that was consistent with those targets. The model's theoretical underpinnings, described in Worrell (1992), recognise that Barbados' openness is a structural phenomenon. The country specialises in the production of an exportable good, tourism services, which is consumed by citizens only in trivial amounts. Furthermore, the country's imports cannot be substituted by local production, for want of physical resources and skills, or for reasons of economies of scale. There are therefore no expenditure switching possibilities, and foreign exchange spending can be adjusted only by changing aggregate expenditure.

Government tax and spending policies are the only effective tool for altering aggregate expenditure, through their impact on disposable income, government's demand for public utility and other domestic services, changes in the provision of government services, and the payment of social benefits. There is some scope for interest rate adjustment because capital markets are not perfect: information is costly and not shared equally by all participants, and there are costs in transferring finance between currencies. However, in practice expenditure was not sufficiently sensitive to react to interest rate changes within the range which these frictions would allow. Therefore fiscal policy got little support from the use of indirect instruments of monetary policy, which were in principle available.[3]

[2] The quarterly forecast was embedded in an annual five-year perspective forecast.

3. Institutional Arrangements

Using fiscal policy to defend the exchange rate involves the resolution of three issues by use of appropriate institutional arrangements: competing objectives for fiscal policy must be reconciled; since it takes time for fiscal measures to be put in place, decisions on fiscal correction must be taken well before the target date, and an allowable range must be permitted for the target; fiscal adjustment may involve real costs, and there must be arrangements for achieving a public consensus on the distribution of the burden of adjustment.

Firstly, institutional arrangements appropriate to the country's circumstances must be developed to reconcile the objectives of fiscal policy. In the short to medium term when the potential growth rate is given, the size of the fiscal deficit is determined by the foreign reserves target at the fixed exchange rate, and government's infrastructural, distributional, employment and other objectives of fiscal policy must be adjusted to fit within this envelope, through changes in budgetary allocations and tax changes. In Barbados this was accomplished through a process of budgeting, negotiating and decision making between government's spending ministries and the Ministry of Finance, which is responsible for taxation and budgeting.

[3] Since the inception of the treasury bill auction in the mid-1970s the treasury bill rate has always been market determined, and the central bank has keyed its discount rate on the result of the auction. The bank has offered repurchase options since the 1970s as well, but their use has been rare, and never for immediate liquidity needs (see Worrell, 1997).

Secondly, this process was conducted in close coordination with a macroeconomic forecasting exercise, jointly between the Ministry of Finance and the Central Bank, to set a fiscal target consistent with the balance of payments objective. From this forecast scenarios were developed, showing how alternative fiscal deficits affected the balance of payments, and a course of action was recommended to government. Once a decision was taken on the size of the fiscal deficit and the measures by which it was to be achieved, these were incorporated into the forecast, to derive the implied targets for foreign exchange reserves. The Central Bank and the Ministry of Finance then needed to agree on the combined fiscal and foreign reserves targets, and to publicise them as a means of securing credibility for the economic policy framework.

Thirdly, it was necessary to adjust the forecast – and fiscal policy, if necessary - to take account of unanticipated shocks. Foreign exchange reserves are the only short term shock absorber available to small open economies. An essential element in the institutional mechanism for their effective use in this role is to determine what implications there are for the balance of payments in the medium term, that is, what changes in foreign exchange reserve projections would result, if fiscal policy remained unchanged after the shock. If the projected level of foreign exchange reserves is inadequate, Government and the Central Bank have to agree on the fiscal policy changes needed to restore an acceptable foreign reserves target.

The difficulty of reconciling these objectives, and the failure of many countries which have tried, has led some to conclude that the only fixed exchange rate regimes sustainable by small open economies are "hard pegs", such as monetary unions and currency boards. However, there are success stories with the maintenance of pegs that were sustained during periods of international and domestic uncertainty. It is admittedly difficult to generalise about the conditions that are necessary and sufficient for success. The Barbadian experience illustrates one possibility for a successful policy framework.

The elements of the Barbadian decision making framework bear a surprising resemblance to those of the Israeli inflation targeting framework (Leiderman, 2000). They both feature targets set in consultation between the central bank and the fiscal authority at the time of the annual budget, a medium term quarterly forecasting framework, publication of the objectives of policy and discussion of the associated policies. A critical difference is that areas of disagreement between the fiscal authorities and the central bank are not made public in Barbados, for fear that the existence of such disputes might undermine the credibility of the adjustment strategy.[4]

The greatest difficulty has been in securing the degree of fiscal restraint required for achieving the foreign exchange reserve target. It has been equally difficult to avoid overspending euphoria during times of positive shock – such as the commodity price boom of the mid-1970s – as it has been to obtain sufficient tightening in the face of adverse external shocks. It was also difficult to secure fiscal adjustment sufficiently in advance of a potential balance of payments crisis. The institutional arrangements in place in Barbados proved capable, producing the required amount of fiscal adjustment whenever it was necessary. However, on at least one occasion adjustment was not effected in a timely fashion, and supplementary measures were needed to buy time for the fiscal actions to take effect.

The essential elements in the Barbados policy making framework included the forecasting system, a joint technical policy formulation committee of the Central Bank and the Ministry of Finance, the budget allocation, reconciliation and monitoring process, and a process of informed public debate. The forecasting system consisted of a forecasting model with sufficient detail to reflect real output determinants, price

[4] The similarity of regimes should not be surprising. Leiderman admits that inflation targeting, in an open economy like Israel's, looks very much like anchoring the exchange rate, except that it does allow the central bank discretion in how it reacts to short term pressure on the balance of payments. Whereas countries with pegged exchange rates must commit reserves however strong the pressure – thereby risking a run on the reserves – the Israeli central bank may allow some currency depreciation instead. The room for manoeuvre is limited, however. If exchange rate depreciation is persistent the inflation target may be compromised.

formation and balance of payments, fiscal and monetary outcomes. The model was supplemented by quantitative economic studies, which helped to inform judgmental evaluation of the forecasts. They included studies in the incidence of taxation, external competitiveness, the interest sensitivity of deposits and credit, import propensities, the determinants of inflation, and factors influencing export structure and growth. The body which came to be established to formulate policy, known as the Joint Economic Group (JEG), was chaired by the Governor of the Central Bank, and included the Director of Finance and Economic Affairs, the Director of Research at the Central Bank, the Government's Chief Budget Analyst, the Central Bank's Chief Economist responsible for the economic forecast, the Director of Banking who managed the Central Bank's monetary operations and other senior officials of the Bank and the Ministries of Finance and Economic Affairs. The JEG met fortnightly to monitor economic developments on the basis of inputs from economic research and analysis, monetary operations, foreign exchange operations and fiscal accounts. It made recommendations on budget limits at the outset of the budget planning cycle, and recommendations on fiscal and monetary adjustments whenever it was considered necessary thereafter. Once every quarter a policy paper was prepared for the Central Bank's Board of Directors, and the JEG's Government members kept the Minister of Finance up to date on the group's deliberations. The Minister of Finance managed the budget allocation and reconciliation process, and the Chief Budget Analyst oversaw its implementation. Conflicts were resolved, not always to the satisfaction of all concerned, within this mechanism. During at least one extended period, recommended policies were not implemented, resulting in costly policy error. However, on this occasion the views of the JEG members were unanimous, both Central Bank and Government. The conflict was not typically between the Central Bank and the Ministry of Finance technicians; at the technical level there has been unanimity between the institutions throughout the period under review. Rather, errors have been the result of failure to implement recommendations agreed by technicians on both sides. The process of public information and debate has proved the ultimate sanction that produced the required fiscal adjustment, though in the instance previously alluded to that adjustment was too long delayed. The Central Bank publishes monthly data on inflation, foreign exchange reserves, and monetary aggregates, and produces quarterly reports and news briefings on economic performance and prospects, including growth, fiscal performance, government borrowing, employment and the balance of payments. Once a year the Ministry of Economic Affairs presents an economic report. This information has provided the material for public debate which has become more informed over the years.[5]

In practice the system evolved over time, and never exactly matched the prototype. However, in principle it was meant to operate as follows. At the beginning of the budget preparation period the JEG would agree a forecast scenario for an 18 month period, incorporating existing tax policies, spending commitments and capital projects. Based on detailed projections of output, exports, imports, capital flows, inflation and financial balances, the level of foreign exchange reserves is projected. If that level were thought to be unacceptably low, the JEG would recommend a reduction in the fiscal deficit. On the basis of this recommendation the Ministry of Finance would initiate budget discussions with spending ministries, based on an upper limit to expenditure, consistent with the target fiscal balance. At the conclusion of these discussions the Minister of Finance decides on tax changes and changes in project and other expenditure. Theses changes are then incorporated into the forecast to produce a revised target for foreign exchange reserves. The Minister of Finance announces the foreign reserves target – usually in terms of import cover, rather than a dollar amount – in the course of his general prognosis for the economy, incorporated into his budget speech. The Governor of the Central Bank subsequently discusses the prospects for achieving the target at the Central Bank's monthly press conference on the economy.

[5] The vehicles promoting this debate have included two daily newspapers, radio and TV, trade unions and employer associations, business management service companies and the local society of economists, which published its own economic forecast, intermittently.

This process functioned in a fashion remarkably similar to the process of inflation targeting. Fiscal discipline was obtained via a transparent link between the fiscal deficit – and its financing – and the level of foreign exchange reserves, in much the same way that monetary policy is linked to inflation in the inflation targeting framework. In both cases the authorities are induced to take early action to correct deviations from a forecast target by the fear of social sanctions from an informed public. The authorities lose credibility, well ahead of the target date, if policies are seen to be inconsistent with the target. Such a forward looking mechanism is essential, to address the time-inconsistency problem, a problem which is equally troublesome for the implementation of fiscal as of monetary policies. There is a longer lag between the decision to take corrective action and the implementation of measures in the case of fiscal adjustment, than is the case for monetary measures, which can be implemented swiftly. However, the impact of monetary measures appears with a lag, whereas tax and spending measures begin to bite as soon as they are implemented.

It is also true that fiscal policy seems a very blunt instrument, compared to monetary policy. Tinkering with the tax system causes inefficiency, and frequent changes in spending programs are disruptive to the provision of public services. However, in the open economy the authorities have no choice but to use this instrument for adjustment, since monetary policy is ineffective. The Central Bank may have to target the upper limit of the range of probable foreign reserve outcomes in order to compensate for the inability to fine-tune policy responses.

Just as in the inflation targeting framework, ensuring and preserving the reputation of the Central Bank proves to be vital in a system which focuses on the maintenance of adequate foreign exchange reserves. Security of tenure for the Governor and the Bank's decision making board, administrative autonomy for the Bank and regular reporting requirements are important elements in establishing a reputation for professional dispassionate judgement. As is now widely recognized, it is also vital that the Central Bank have staff of high technical calibre, and spokespersons of the highest professional standing. Moreover, it is equally important that the Ministry of Finance be authoritative and highly regarded for the technical quality of its output, since its role is so much more influential than that of the monetary authority.

4.0 The Medium-Term Forecast Model

4.1 Objectives

The Medium Term Forecasting Model - hereafter labelled MTFM - broad objective is to identify and analyse causal relationships of macroeconomic variables necessary for the understanding of the workings of the Barbadian economy. That is, it examines the causes of changes in output, balance of payment imbalances, fiscal deficits, inflation, etc. and focuses on those factors which are susceptible to domestic decisions, mainly government policy. The MTFM also projects the domestic economy performance contingent on external factors and assesses the impact of alternative policies as well as explores the implications of structural change. Thus it will answer such short-term government policy questions as "what size of a fiscal deficit may be allowed, if a certain foreign exchange target is to be achieved?" or such medium-term policy questions as "what is the risk of a foreign exchange crisis over the next five years?"

4.2 Evolution

As some of the objectives mentioned above were the same as in earlier models, the MTFM developed naturally from two decades of previous modelling research in Barbados. Craigwell and Walker (1993) and Craigwell et al (1996) provide a comprehensive survey of this literature, thus only a brief outline is given here. The first experimenters constructed models which were small in size and distinguished between tradeables and non-tradeables. However, those models, when estimated, performed poorly due in the main to the high degree of aggregation of the monetary and balance of payments relationships. As a result, none of the early models were used to answer specific policy questions.

Later, detailed models that incorporated all the major accounts - Real, Monetary, Fiscal and the Balance of Payments were developed. One such model was the "Economic Outlook", which was comprehensive but largely judgmental. No attempt was made to incorporate economic inferences explicitly into the accounting framework. The MTFM uses this latter observation as a point of departure. It incorporates economic inferences into the accounting framework using a computerised spreadsheet, namely LOTUS. By utilising a computerised spreadsheet one can get more specific on the nature of the different markets yet still retain a framework that provides some internal consistency. In the computerised spreadsheet the data can be easily manipulated to create different scenarios, therefore allowing various 'policy experiments' to be undertaken.

4.3 Theoretical Underpinnings

The MTFM is based on the two-sector variant of the models espoused in Khan et al (1991) on developing countries. That is, it stresses the crucial role played by the demand for money and monetary disequilibrium in the behaviour of such macroeconomic variables as prices, output and the balance of payments. It recognised that the money supply is not entirely under the close control of the authorities and suggests that the domestic component of the money supply should be the focus of the authorities. And because in small economies with thin capital markets the growth of domestic credit is closely linked to the government's borrowing constraints, there is a role for fiscal policy in this model as well.

4.4 Basic Structure of the MTMF

The MTFM is a very flexible framework that can be extended and refined. It is explicitly a model of an export-led economy where: estimates of output of non-tradeables depend on tradeables and other factors such as relative prices and monetary expansion; non-price competition can be accommodated through quality enhancement, improved marketing, product differentiation; fiscal effects can be incorporated through trade and tariff reform, income tax reform, debt management, government wages and employment policies; and the relationship between money, expenditure and the balance of payments can be captured.

The MTFM consists of the four major accounts - real, monetary, fiscal and balance of payments - and has a few behavioural equations and numerous identities. The behavioural equations were informed by sectoral studies conducted over many years (see Craigwell et al (1994) for details). The MTFM is a quarterly model that provides five-year-ahead projections.

Important features of the forecasting process of the different sectors are given below: greater details on this and the estimating process can be found in the *Research Department's Manual of Economic Operations (1999).*

Real Sector

Output is divided into tradeables and non-tradeables. With respect to tradeables, separate forecasts are developed for tourism, manufacturing, sugar and non-sugar agriculture and fishing, incorporating both price and non-price factors. The forecasts of long-stay tourism uses a two-sep procedure. First, the demand for Barbados tourism is projected using a regression model with real output in the visitors' home countries as the sole determinant. Secondly, supply effects, non-price strategies and market specifics are introduced to modify the estimates derived from step one. Specific account is taken of expansion in hotel capacity in Barbados, and the upgrade of hotels and facilities, increases or decreases in airline seat capacity, intensification of marketing expenditures, changes in productivity and improved service quality. Cruise forecasts are obtained from the Caribbean Tourism Organisation and from the Marketing Division of the Barbados Port Authority.

The projections for manufacturing are also based on a two-step procedure. The forecast begins with a projection based on recent trends. This baseline projection is then modified to take account of trade and tariff reform, the latter being largely judgmentally determined.

Non-sugar agriculture forecast is also done using a two-step procedure - an initial forecast is constructed based on a 5-year moving average and then adjusted utilising information from the officials of the various industries. The projections for sugar are based on data supplied by the sugar management company.

The non-traded sector consists of seven non-tourism services sectors - construction, wholesale and retail, business and other services, transportation, storage and communication, electricity, gas and water, mining and quarrying and government. All, except government, use trend forecasts adjusted to reflect changes in expected market conditions. Forecasts for government are based on the assumption that this sector will grow by one percentage point each year.

To get nominal GDP a forecast of the GDP deflator is required. This is constructed using a 5-year moving average of the consumer price index and then adjusted to reflect any changes in expected market prices.

Balance of Payments

The balance of payments projections are derived from the output forecasts. Export growth reflects recent trends in the nominal GDP data for the various sectors. Imports are generated from the forecast of nominal GDP and adjustments for elasticity changes. Freight is projected at 10% of imports while insurance is 1% of imports. Travel credits are derived using nominal tourism value added and inflation, while travel debits are on a historical ratio to domestic exports and travel credits. Transportation is based on 10% of imports and then adjusted to reflect movements in net passenger fares. All other services are projected using a trend equation. Transfers and income credit are also projected from trends while income debits used the debt profile figures and then are adjusted to reflect outflows of dividends and profits, as well as compensation of employees. Public sector capital is generated from projections on disbursement and amortisation payments obtained from the Central Bank and the Ministry of Finance. Projections from private sector capital are provided by some

hotels and public utilities in addition to registrations captured by the Exchange Control Department of the Central Bank.

Fiscal Sector

Government tax revenues are projected according to total and sectoral GDP components and inflation, adjusted for the impact of tax reform and divestment. Current expenditures (and its components) are projected according to the rate of inflation and the wage rate. Capital expenditure is a residual since a targeted fiscal deficit of 2% is usually assumed. The fiscal system has three sources of funding expenditure. Central Bank lending which should not exceed the amount derived from the financial sector, foreign borrowing identified by government (net of amortisations) and tax revenues.

Monetary Sector

This sector indicates how much finance may be available for government to fund its deficit. Commercial banks accumulate deposits and other monetary liabilities. Projections of the monetary liabilities are on a regression equation that involves, real GDP, prices and interest rates. Most of these funds are lent to the private sector. Forecasts for credit to the private sector is a residual item which may be manipulated based on judgement and the expected net international reserves outturn. It is assumed that the finance which remains in the banks after satisfying the loan demand is deposited at the Central Bank. These 'net claims' plus net international reserves are elements of the Bank's 'monetary base'. Thus, these forecasts enable one to deduce the liquidity changes in the banking system, from which once can infer the availability of non-inflationary financing for government.

4.5 *The Model in operation*

In order to illustrate the operations of the model, three examples are presented here. The first two look at the model's role in guiding both short-term and medium-term government policies, while the third demonstrates, in more detail, how the model can be used to evaluate the effects of a change in one or more policy variables.

Example one: Guiding short-term government policy

The question being asked here is what size of a fiscal deficit may be allowed if a specific foreign exchange target is to be achieved? To proceed, first estimate domestic deposits and derive the monetary base usung of the assumed reserve/deposits and currency/private sector liabilities ratios. Then derive the change in the net domestic assets (NDA) of the Central Bank which is equal to the change in the net international reserves (NIR) of the Central Bank (the foreign exchange target) less the change in the monetary base. Holding the other components of the NDA constant, the difference in the change in the NDA is assumed to be credit to government and available for domestic financing of the deficit.

Next, treating the NIR of the commercial banks as a constant, credit to the private sector is estimated. Now, given the NIR of the commercial banks and private sector liabilities, the NDA of the commercial banks is generated and since credit to the private sector is already known, credit to government is derived.

Now to the financing table. Assuming non-banks financing is equal to zero, total domestic financing is obtained as the sum of funds from the Central Bank and commercial banks. This, along with foreign financing, determined by the government's external debt service profile, give the maximum allowable fiscal deficit.

As a consistency check, the balance of payments (BOP) table can be used to evaluate what this implies for imports. In the BOP table, exports of goods and services are generated from the forecast of output of tradeables and inflation. Then project private capital flows. This, together with the required Government flows from the public sector investment programme give the capital account balance. The level of imports that is consistent with the fiscal outcome is estimated as the sum of the exports of goods and services and the capital account balance less the change in the NIR. If the implied imports/GDP ratio is unstable when compared to trend, then there maybe a need to rethink the foreign exchange target.

Example two: Guiding medium-term policy

Suppose government wants to ascertain the risk of a foreign exchange crisis in the medium-term. This can be done by allowing the change in the NIR to be generated by the system and evaluate its feasibility. First, forecast government revenue and expenditure to obtain the fiscal deficit. Then go to the monetary table and forecast liabilities to the private sector and domestic deposits, deriving the monetary base and the change in net domestic assets in the process. Credit to the private sector is then projected, and on the basis of this, credit to government from the commercial banks is obtained.

In the financing table foreign financing is given (again by projecting government's external debt service profile) and credit to government from the commercial banks is known. Therefore, credit to government from the Central Bank falls out as a residual. Now enter this in the Central Bank accounts and derive the change in the NIR by assuming that the other components of the NDA remains constant.

If the change in the NIR is inadequate, that is, less than three months of imports, several options are available including: (1) reducing the overall deficit either via the revenue or expenditure equation, (2) reducing credit to the private sector - via the adjustment factors that relates to this equation, or (3) revisiting the public sector capital flow accounts and assume a higher level of borrowing. This iteration process can be continued until a satisfactory level of reserves is obtained.

Example three: The effects of a change in monetary and fiscal policy.

Scenario one: Suppose the monetary authority wants to evaluate the effects on the forecasts of 2000 of a 1% increase in the cash reserves requirement ratio at the start of the same year. Table 1 shows the initial and resulting forecasts of this change for some selected macro variables. The increase in the ratio takes $36.44 million out of the banking system as indicated under 'due from Central Bank' in the commercial banks' summary accounts. This is reflected in the monetary base of the Central Bank which expands by a similar magnitude. In turn, the amount of loanable funds of the commercial banks is reduced and as a result , banks decrease their credit to government by $36.62 million. This implies that unless an assumption is explicitly made in the forecasting model concerning foreign financing or the deficit is constrained, then the Central Bank would have to take up the slack as indicated by the rise in net credit to government in the monetary authorities' summary accounts ($36.47 million) and also in the financing table. There is no significant impact on credit to the private sector because of the adequate level of liquidity in the system at the time of this simulation. But an assumption could also be made about tightening liquidity conditions which would then force the model to make some of the adjustment via the 'credit to the private sector' variable.

Scenario two: Table 2 presents the case of an increase in government expenditure and its impact on the system. Suppose the wages and salaries bill rose by 4%, which is approximately $26 million, as outline in part A of the Table. This produces a deficit of equal magnitude. The result is the standard 'crowding out effect', with the expansion in government expenditure drawing on the resources of the private sector causing credit to the private sector to decline (Part C). In the model the entire change in expenditure

is financed by the private sector. However, this could be altered so that the Central Bank foots part of the bill, suggesting that the reduction in private sector credit would be smaller.

4.6 Forecast Performance

As mentioned in Section 4.4, the Central Bank produces an 'Economic Outlook' document at the end of each quarter which is based on the forecasting model and contains annual and quarterly projections. To assess its accuracy a comparison is made between what was forecast for the year at two different points, the end of March and the end of September, with the actual out turn for that respective year. This is done only for the change in real GDP, private sector credit and liabilities, the fiscal deficit and international reserves for the years 1980 to 1999; this allows for an assessment of the forecasting accuracy in the four major sectors over time. It should be noted that it is somewhat difficult to develop criteria by which accuracy of projections in all sectors may be judged but a 'fixed error margin' of 10% is adopted for all areas implicitly assuming that the size of an error carries the same significance in different areas. Note also that since these sectors are interrelated the error in one sector may compound the error in another. Further note that the absolute size of a variable influences the percentage changes for the errors, for example, the fiscal deficit in 1994 and 1995 show very large errors when the fiscal deficit is relatively low. Unfortunately there is no easy way to normalize these changes.

It is clear from Figures1a - 1e that the projections have deviated somewhat from the actual outcome for all variables except private sector credit. The forecast error for the change in private sector credit, except for 1993, ranged between 0 and 2 per cent. Nineteen ninety-three was an exceptional year for credit flows as adjustments were made for a finance company conversion into a full-scale commercial bank and the liquidation by Government of debt issued under letters of comfort.

For the variables with 'incorrect' projections, these are likely to have been affected by one time shocks similar to that that made the 1993 credit out-turn difficult to predict. For example, back-pay of wages could influence the fiscal sector in an unexpected way. More important to note, however, is that forecasts of the deficit tended not to make assumptions about future wage increases in the same way that forecasts about the level of international reserves ignored the impact of future foreign borrowing. Since these variables are interrelated deviation in one variable may influence another variable. For example, the 1990 fiscal deficit may have been worse than expected because of a weaker than anticipated revenue performance.

Generally, the forecast errors have diminished over time suggesting that there has been a continuous improvement in the forecasting accuracy at the Bank. Somewhat surprising however, is that for GDP and the fiscal balance, the forecasts made at March seem to be better than the forecasts made in September. This implies that the more information available the worse the forecast and may suggest that Government is constantly updating and changing their economic expectations.

Table 1 - Effects of a percentage point increase in the cash reserves ratio

($million)	Before	After	Change
Part A			
Monetary Authorities' Summary Accounts			
Net international reserves	942.6	942.6	0.00
Net domestic assets	-415.5	-379.1	36.47
Net claims on public sector	-524.3	-487.8	36.47
Central Government (net)	-518.5	-482.0	36.47
Monetary Base	527.0	563.5	36.47
Currency in Circulation	290.3	290.3	0.03
Bank's cash and Bankers' Deposits	236.7	273.2	36.44
Part B			
Commercial Banks' Summary Accounts			
Net Claims on Central Bank	234.1	270.6	36.44
Due from Central Bank	236.7	273.2	36.44
Net domestic assets	2657.7	2621.6	-36.13
Net claims on public sector	543.3	506.6	-36.62
Central Government (net)	782.8	746.1	-36.62
Rest of Public Sector	-239.5	-239.5	0.00
Credit to private sector	2646.9	2647.4	0.49
Part C			
Fiscal Projections			
Overall Fiscal Balance	-24.5	-24.3	0.15
Domestic Financing	-206.7	-206.9	-0.15
Central Bank	-325.5	-289.0	36.47
Commercial Banks	38.4	1.8	-36.62
Total Financing	24.5	24.3	-0.15

Table 2 - Effects of a 4% increase in Government's wage bill

($million)	Before	After	Change
Part A			
Fiscal Projections			
Total Revenue	1731.7	1731.7	0.00
Tax Revenue	1616.3	1616.3	0.00
Total expenditure	1758.0	1784.0	26.00
Current expenditure	1491.4	1517.4	26.00
i) Wages & Salaries	646.1	672.1	26.00
ii) Goods & Services	194.1	194.1	0.00
iii) Interest	220.8	220.8	0.00
iv) Transfers & Subsidies	430.5	430.5	0.00
Overall Fiscal Balance	-26.4	-52.4	-26.00
Part B			
Monetary Authorities' Summary Accounts			
Net international reserves	942.6	942.6	0.00
Net domestic assets	-415.5	-415.5	0.00
Net claims on public sector	-524.3	-524.3	0.00
Central Government (net)	-518.5	-518.5	0.00
Rest of Public Sector	-5.8	-5.8	0.00
Monetary Base	527.1	527.1	0.00
Part C			
Commercial Banks' Summary Accounts			
Net international reserves	100.8	100.8	0.00
Net domestic assets	2658.0	2658.0	0.00
Net claims on public sector	545.1	571.1	26.00
Central Government (net)	784.6	810.6	26.00
Rest of Public Sector	-239.5	-239.5	0.00
Net Claims on Financial System	-193.1	-193.1	0.00
Credit to rest of financial system	82.4	82.4	0.00
Liabilities to rest of financial system	275.5	275.5	0.00
Credit to private sector	2645.3	2619.3	-26.00

Figure 1a

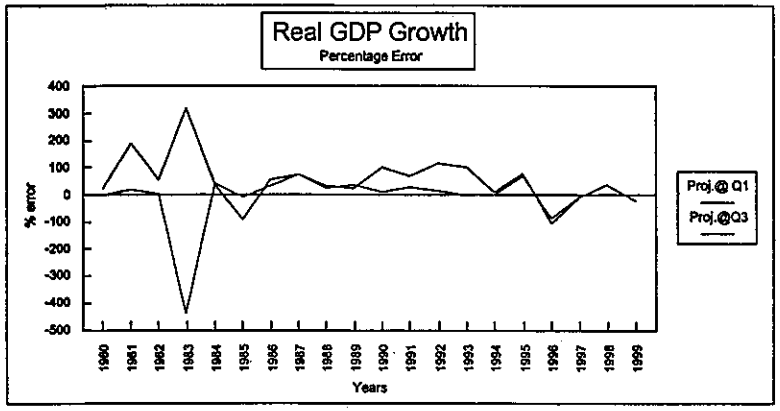


Figure 1b

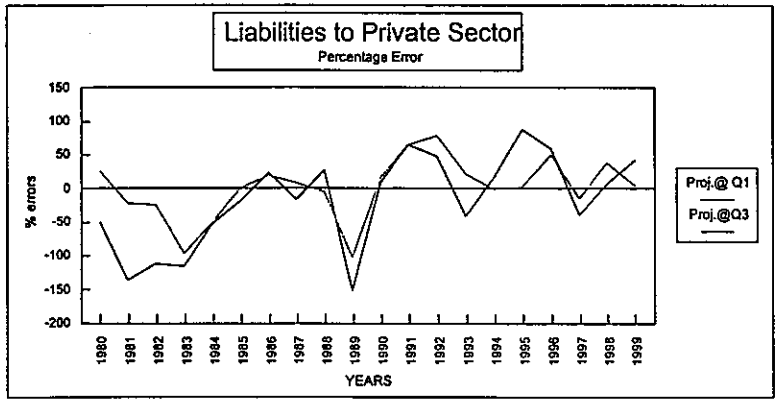


Figure 1c

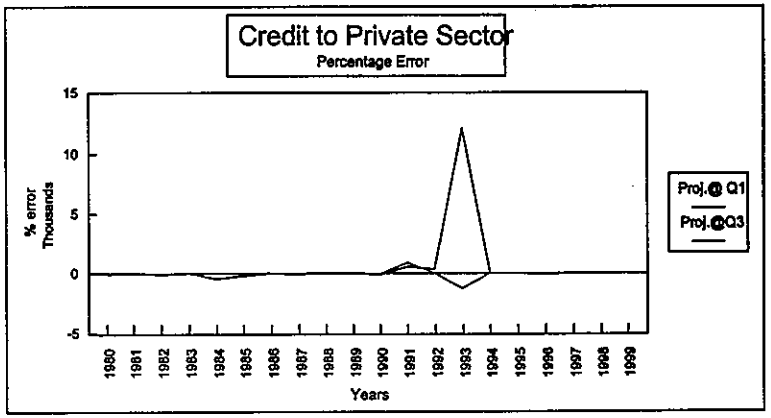


Figure 1d

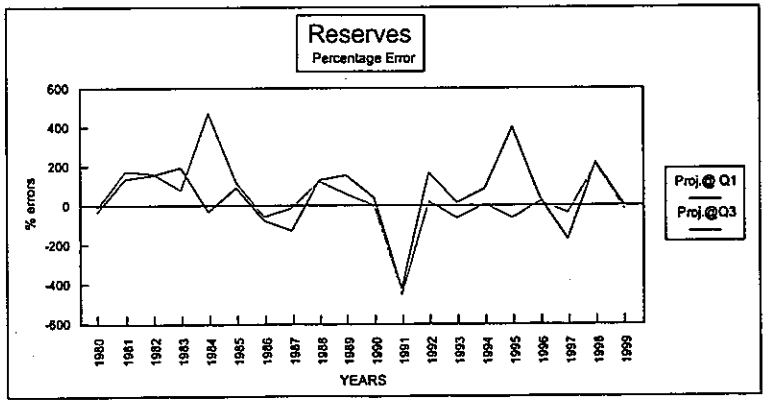
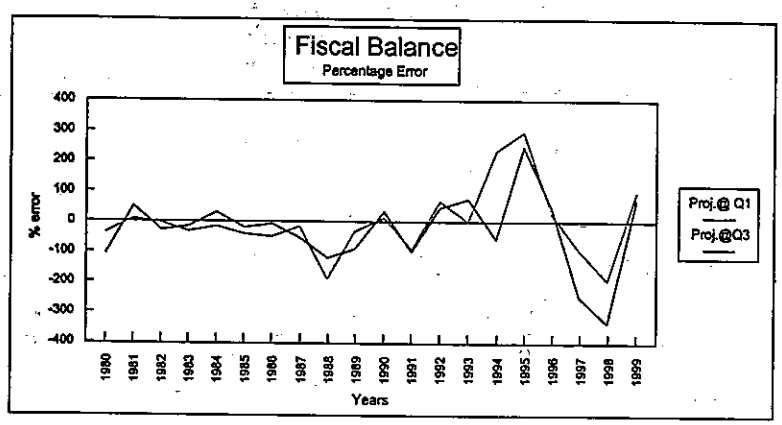


Figure 1e



Policy Decisions and Short Term Monitoring of Economic Performance

Short term monitoring and forecasting were crucial to the success of macroeconomic management in Barbados during the review period. The monitoring mechanism proved particularly useful during the negotiations for, and monitoring of, the 1991-1993 stabilisation programme with the IMF. By that time it was well-developed with a number of highly specialised components.

One mechanism was a fortnightly meeting to discuss economic developments which brought together the Research Department's technicians as well as senior representatives from the Exchange Control, Banking and Currency Departments as well as, on occasion, the Governor of the Bank and/or his advisers. This meeting was at first chaired exclusively by Research Department economists, on rotation. However, as time progressed, the chairmanship was extended to other Departments in an effort to guarantee attendance and build support for a broad-based discussion of the crucial issues. The fortnightly meeting was also an important component of the training for young economists, since the preparation for the meeting forced them to acquire a broad understanding of the underlying economic relationships. Moreover, at the end of each meeting there would often be a discussion on some major topic.

In support of the fortnightly meeting, the Research Department provided statistics on movements in net foreign reserves, which included net foreign assets held by commercial banks. It also circulated data on the significant balance sheet items for the

banks and on central bank lending to the centr ; government by way of short-term advances, (Ways and Means) and holdings of Treasury Bills and Debentures. The Exchange Control Department's Report included information on significant trade and non-trade foreign exchange transactions, in particular, inflows of foreign investment capital and repayme :t of foreign debt. The Report from the Banking and Currency Department focussed on foreign currency transactions with the banks and Central Bank credit to the sugar industry and other productive sectors. The importance of this session was to allow the technicians to understand the sources and uses of foreign exchange, how these were impacting directly on the assets and liabilities of commercial banks and indirectly on their ability to finance government operations as well as the implications for deficit-financing.

The concerns which surfaced during fortnightly meetings were highlighted by way of communications to the Bank's Monetary Policy Committee (MPC), which brought together senior management and a few technicians. The MPC, in turn, made recommendations to the Bank's Board of Directors. This monitoring system was enhanced through vertical integration, inasmuch as the Director of Research (and later the Deputy Governor with responsibility for Research and Information) was present at fortnightly meetings, as well as meetings of the Monetary Policy Committee and the Board of Directors. It was this system which allowed for the speedy detection of, and response to, a number of problems which surfaced during the period. For example, it was at fortnightly meetings that the difficulties relating to the illiquidity of Barbados' balances with the (now defunct) Caricom Multilateral Clearing Facility were first highlighted.

Another important tool in the process was the quarterly "Economic Outlook" which documented the Research Department's efforts at making macroeconomic projections. This document, which dated from the early 1980s had by 1985 included statistical tables on the monetary sector, real GDP, Government Operations, the balance of payments and international economic trends. The problem with the "Outlook" was that the projections were very often judgmental. The forecasters could defend the numbers intuitively through years of experience and because there was not a great deal of instability in many of the series. As work continued on building a forecasting model the forecasters were eventually able to produce statistics with which they and technicians from the multilateral institutions, were more confident.

This then was the monitoring capability available to the Central Bank and the Ministry of Finance and Economic Affairs when they decided, early in 1991, to work in close collaboration to monitor the economic crisis in the country. The two institutions formed a Joint Economic Group (JEG) which negotiated with the IMF, discussed, and sensitzed others to, forecasts, outcomes and policy issues and eventually managed the stabilisation programme. The JEG comprised the Governor of the Central Bank, the Deputy Governors, the Senior Adviser to the Governor and the management of the Research Department. Government officials included the Director of Finance and Economic Affairs, the Permanent Secretaries with responsibility for Finance and

Economic Affairs, the Manager of the Public Investment Unit and the Chief Budget Analyst. After the programme begun, the IMF's Resident Representative also attended meetings.

While the JEG relied heavily on the existing system of monitoring one of its successes was the ability to generate and manage a new set of data. When the decision was taken to make a formal application to the IMF the data requirements were enormous. In addition to quarterly projections on developments in the real, financial, fiscal and external sectors there were requests for data on public enterprises and foreign financing. Moreover, it was necessary to supply quarterly statistics (including forecasts) on the volume, price and value of major exports of goods and services in support of the request for resources under the Compensatory and Financing Facility.

The other factor which informed the statistics - gathering was the need to meet quarterly performance criteria for the Standby Arrangement with the IMF. These related to borrowing by the non-financial public sector, the overall government deficit, the net domestic assets (NDA) of the Central Bank, Medium and Long-Term External Borrowing and the Net International Reserves (NIR) of the monetary authorities. The data were circulated each week as a set of tables at first entitled "The IMF Tables" but later renamed "The Weekly Report of the Banking System".

The new set of tables appeared first in late 1991. Table 1 showed the Net International Reserves (NIR) of the Monetary Authorities on a weekly basis. This approach to the measurement of foreign reserves was a major departure from the earlier practice which summed the net foreign assets of the Central Bank, Central Government and the commercial banks. The new concept excluded the commercial banks' assets, on the grounds used by balance of payments compilers, that they are neither owned nor controlled by the Central Bank. Further, the NIR excluded any liabilities to the IMF. Essentially, the NIR measure was an attempt "...to identify reserves accumulation which is independent of borrowing from the Fund and therefore shows how reserves have been affected by underlying economic developments". (Codrington 1994, p15).

The Net Domestic Assets of the Monetary Authorities were shown in the next table. The major components followed the usual equation for foreign reserves accumulation, NFA = MB-NDA where NFA is the net foreign assets of the monetary authorities, MB refers to the monetary base and NDA denotes net lending to the central government. The major usefulness of this table was to highlight Central Bank lending to the Central Government. It was important to keep this under constant review, since it had been at the source of the problem in the first place. Lending to Government was facilitated by way of Treasury Bills, short-term advances and Debentures. It was therefore necessary to ensure that the Bank did not hold Treasury Bills if the banks could and that short-term advances did not get out of hand because of weak budgetary control processes in the various ministries of Government. The Table also included data on medium and long-term foreign borrowing in support of the balance of payments.

Another table showed a foreign exchange cash flow on a weekly basis and how it determined trends in the NIR. The JEG was not starting from ground zero in this regard. During the first quarter of 1991, the Central Bank had set up a committee of its management to monitor the foreign exchange situation and one of the results of its work was a foreign exchange budget. This was at first a basic one-page projection of foreign exchange movements. However, in line with the growing complexity of the situation it developed into a detailed statement on sources and uses of foreign exchange. Later, under management by the JEG, it incorporated data on short-term credit lines and specifics on transactions by the Central Bank and Government.

A particularly useful statistic in the cashflow table was the net foreign exchange transactions with commercial banks which showed how much foreign exchange was generated from normal private sector activity. The banks could only sell foreign exchange to the Central Bank if they had excess and, in similar manner, would only seek to purchase from the Bank if the demand by the public could not be met from their own reserves. From a close examination of the transactions with the banks it was possible to pick up the seasonal trends in reserves movements, and make inferences about gross foreign exchange earnings from tourism, sugar and other sources.

The table on Treasury Bill transactions sought to bring more transparency to, and better management of, this crucial government security. The Research Department already published, in its monthly Economic and Financial Statistics, data on the average treasury bill rate, the amounts applied for, and allotted at tender and the total outstanding by institutional holder. The new table provided data on the amounts maturing during any period, the numbers subscribed to and sold by, the Central Bank as well as the tender rate spread. JEG members were therefore well equipped to time the frequency of Treasury Bill auctions with Government's financial requirements, to manipulate the tender rate in order to effect the cost to Government.

The other useful tables dealt with commercial bank liquidity. This had implications for Government's net borrowing from the Central Bank (the NDA), the demand for credit in support of traded and non-traded activities and commercial banks' decisions regarding financial transactions with their head offices. One table displayed the cash reserve position of each bank, indicating, in particular, if any one was in a short position or in breach of the statutory requirements. The second table provided similar statistics on holdings of government securities. A third table showed the excess liquidity ratio, i.e. the ratio of excess holdings of cash and stipulated securities to total deposits in commercial banks. A reduction in the excess liquidity ratio signalled a tightening in liquidity which could constrain real economic activity. An expansion in liquidity had implications for the banks' ability to finance imports with the eventual effects on the NIR. By analyzing the allocation of liquidity between cash and securities the JEG could make recommendations regarding which tool of monetary policy would be most effective at any point in time.

Apart from the Weekly Report prepared by the Bank, the Ministry of Finance and Economic Affairs supplied very useful data on Government operations. The Chief

Budget Analyst prepared a very comprehensive coverage of Government's revenue and expenditure on a monthly basis with reconciliation items to bring the number in line with those produced by the IMF, which excluded the activities of certain government entities. The Resident Representative helped to provide statistics on the operations of the non-financial public enterprises; this helped JEG to understand how these entities were affected by Government expenditure and the fiscal deficit.

The JEG promoted a holistic approach to the management of the economic crisis and allowed for more attention to be paid to the crucial role of fiscal policy. At first the JEG met every other Monday but as the foreign exchange crisis deepened meetings became more frequent - sometimes several times a week. Meetings focussed on any issue which touched on the situation at hand. This kind of structured approach was clearly not new to those members who routinely attended fortnightly and MPC meetings.

During the height of the crisis, – from about mid-1991 to about March 1992 – enthusiasm among JEG members was very high. It was the only place where the technicians came together on a regular basis to discuss all the issues and offer solutions. More importantly, the members were driven by a desire to see the stabilisation programme succeed, as evidenced by the creativity and energy which were devoted to achieving the quarterly performance targets. For example, in an attempt to meet the early targets for the NIR, (which proved to be difficult) the JEG employed a plethora of mechanisms, including the manipulation of the Bank's short-term credit lines, the divestment of Government's shares in certain private entities, and the mobilisation of financial support from the local private sector.

The attainment of the performance targets for the end of December, 1991 boosted support for the programme in Washington and it was approved by the IMF in February 1992. All the funds available under the Compensatory and Contingency Financing Facility and a part of the resources from the Standby (about $116 million) were immediately available. This development, which removed the difficulty in getting foreign exchange, in turn resulted in increased confidence in Government policies. Not surprisingly the performance targets for March 1992 and June 1992 were comfortably achieved.

After June 1992, complacency started to set in. During 1992, the foreign reserves rose for the first time in four years and when real GDP grew during the first six months of 1993, it was the first such increase since 1989. There was a feeling that the worse was over and the level of urgency and dedication among JEG members waned. Individual attendance, especially of key members, became infrequent and the flow of information suffered. There was little enthusiasm for pursuing the entire package of structural reforms which had been agreed. An attempt was also made at implementing an Enhanced Surveillance Programme, whereby the IMF would monitor economic developments and there would be agreed performance criteria, but no further financing. Nothing came of this initiative; the collaborative approach was over. The JEG floundered because its members appeared unwilling or unable to maintain the

necessary discipline to closely monitor macroeconomic developments in a structured way unless they were forced to do so by a crisis.

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