CYCLICALITY AND FISCAL POLICY IN THE CARIBBEAN[1]

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ABSTRACT

Using alternative measures of the output gap, this paper shows that the increase in public debt in selected Caribbean countries is partially related to the ratchet effect of asymmetric fiscal deficits over successive business cycles. Three different estimates of the output gap for ten Caribbean countries are used to calculate structural balances for these economies. Fiscal policy in the Caribbean appears to be generally pro-cyclical, due in part, to the pro-cyclicality of revenue. Consequently, estimates of automatic fiscal stabilizers appear to be extremely low, limiting their use for countercyclical policy. This observation provides further support for enhanced fiscal effort to create room for countercyclical policy and to deal with the effects of inevitable natural disasters.

JEL Classification: E62: Fiscal policy
E32: Business fluctuations, cycles

Key words: Fiscal policy, Structural balance, Business cycles

[1] The views expressed herein are those of the author and should not be attributed to the IMF, its Executive Board, or its management.

Cyclicality and Fiscal Policy in the Caribbean

I. Introduction

This paper examines the fiscal performance of selected Caribbean countries by looking at the structural primary and overall balances. In recent years, the fiscal performance of the majority of Caribbean countries has been uneven, resulting in very high public debt levels that are among the highest in the world (Sahay, 2006, Duttagupta and Tolosa, 2006). The steady rise in debt levels is due, in part, to expenditure pressures resulting from exogenous shocks, but is also related to slippages in discretionary fiscal policy.

In recent years, a growing number of countries have begun to calculate the structural balance to help improve fiscal performance within a medium-term framework. There is increased emphasis on the fiscal impulse, defined as the change in the structural balance as a measure of the fiscal stance. Some countries have incorporated structural balances into fiscal rules to gives greater control over the public debt, and reduce the volatility of the economy. The use of structural balances give some flexibility to fiscal rules which have been criticized for creating fiscal inflexibility especially in an economic downturn or exogenous shocks (for example Buiter et al, 1993). The structural balance rule practiced by Chile specifies that the government should run a structural surplus of 1 percent of GDP. The European Union Stability Pact and the UK fiscal rules are usually viewed as less stringent forms of this class of fiscal rules. Such rules seek to give more flexibility to respond to cyclical movements, but they add complexity to fiscal operations and are not easily understood by the public.

A related issue is the use of automatic stabilizers in view of wide scepticism about the use of discretionary fiscal policy. The high public debt ratios in the Caribbean begs the question about the size of automatic stabilizers and whether they could be used in the event of a spill-over of the impending global slowdown to these economies.

The outline of the paper is as follows. Section II discusses the theory and evidence on the cyclicality of fiscal policy. Section III discusses a method of estimating the structural balance and presents estimates of the structural balance and measures of procylicality for selected Caribbean countries using different measures of the output gap. Section IV discusses the size of automatic stabilizers in the Caribbean and the final section discusses the implications of these results and some concluding remarks.

2 Cyclicality and FiscalPolicy

Fiscal policy is defined as pro-cyclical if it is expansionary during an upswing in the business cycle and contractionary during a recession. Such fiscal policy tends to raise macroeconomic volatility by magnifying

output swings; reduce investment in both capital goods and human capital; and is inimical to growth and the fight against poverty (IDB, 1995, World Bank, 2000, IMF, 2005). On the contrary, fiscal policy is countercyclical if it moderates cyclical fluctuations—the fiscal impulse is positive during a cyclical downturn and negative during an upswing.

There is a wealth of evidence in both developed and emerging market countries on the procyclicality of fiscal policy. The European Commission (2001) observed that fiscal deficits were higher during recessions but were not reduced commensurately during upswings. These findings were also confirmed by Balasonne and Francese (2003) for the OECD, and also by Kaminsky, Reinhart and Vegh (2004) for Latin America. Dos Reis, Manasse and Panizza (2007) argue that although procyclical fiscal policy is counterintuitive to neoclassical theory which suggests tax policy should smooth tax distortions and expenditure over the business cycle as well as the Keynesian inclination to use tax policy to dampen the business cycle rather than to magnify it. In emerging market economies the prevalence of procyclical fiscal policy is explained by the following:

- Borrowing constraints. Gavin and Perotti (1997) argued that government expenditure was higher in booms and lower in recession because capital flows have a strong cyclical component, rising in the upswing and sudden deceleration in a slump. The findings of Kaminsky, Reinhart and Végh (2004) that Latin American sovereign ratings follow a similar pattern support this notion.

- Institutional factors. Institutional frameworks like the structure of local government (Braun and Di Gresia, 2003), institutional quality (Calderon, Duncan and Schmidt-Hebbel, 2005) and concentration of power (Atikoby and others, 2004) have been shown to affect the level of procylicality. More decentralized local government, low quality institutions and more concentrated political power are associated with more procyclical fiscal policy.

Many countries have adopted fiscal rules to reduce procyclicality of fiscal policy, achieve more predictability in government expenditure, reduce the deficit bias and control the growth in public debt. These range from general rules that establish a framework for fiscal operations as in the UK and New Zealand to numerical rules, which specify targets to be achieved. IMF (2005) observes that a growing number of countries have passed fiscal responsibility laws to help improve fiscal performance. However, country experiences with these rules have been mixed. Countries with rules that focus on the fiscal framework rather than numerical targets, and where there is a strong commitment to fiscal prudence, tend to have greater success in improving fiscal performance.

Fiscal rules, by de-linking expenditure decisions from short-term variations in revenue, can lead to a more stable and predictable path for expenditure and the public debt. Expenditure would not rise as quickly in

the upswing and fall less rapidly in the downswing. As noted above, it has been observed that budget deficits are asymmetric across the business cycle rising during recessions but not falling as much during booms. Thus averaged over the business cycle the budget deficit will be higher. As a consequence, public debt levels would experience a ratchet effect. A fiscal rule, which averages budget deficits over the cycle, would avoid the deficit bias and help maintain better control over the public debt.

Why could discretion yield superior results? The case against fiscal rules rests on the fact that they may unnecessarily restrain virtuous politicians; provide incentives for creative accounting and off-budget funds; and may not be effective in controlling debt levels.

- Unnecessary constraints. Empirical evidence seems to suggest that fiscal rules may be endogenous—they are put in place by prudent politicians to guide policy rather than to control. Such is the conclusion of the IMF (2005) and Manasse (2006), which, if correct, would suggest that fiscal rules are unnecessary. As discussed below in the context of a structural balance rule, they could have harmful effects.

- Creative accounting and off-budget funds. In a country where the budget framework is weak and not fully transparent, fiscal rules can create incentives for creative accounting, especially where commitment to the rule is weak (Milessi-Feretti, 2004). There is also a tendency to move expenditure into off-budget funds or public enterprises when the rules do not cover the entire public sector. IMF (2005) argues that the rules should cover the widest definition of the public sector to prevent such occurrences.

- Ineffective control of debt levels. Control over the budget deficit or even the public sector deficit is not sufficient for control over the public debt. The deficit is but one of the elements that pushes up the public debt. Other elements include exchange rate changes, banking system crises, and contingent liabilities (like unfunded liabilities of pension systems). Campos, Jaimovich and Panizza (2006) find that Latin American and Sub-Saharan Africa have the largest difference between the change in debt and the deficit. In the case of Latin America and the Caribbean, the change in debt was on average 7½ of GDP higher than the deficit during the period 1995-05.

- Errors in decomposition of economic cycles. A structural balance rule can have harmful effects if errors are made in the decomposition of the cyclical and structural components and the rule is strictly applied. For example, if output grows quickly and is attributed to structural increases, the rule would imply that spending should be increased permanently. However, should the output increase be reversed, the

government would be stuck with higher, difficult to reverse expenditure outlays. This suggests that governments should be conservative in estimates of structural growth and revenue.

Evidence on the cyclicality of fiscal policy

The evidence on the cyclicality of fiscal policy has been mixed. Using a sample of developed and developing countries, Kaminsky, Reinhart and Vegh (2004) find that fiscal policy has been procylcical in developing countries and but countercyclical in developed countries. Moreover, lower middle-income developing countries were found to exhibit the highest level of procylicality. In a sample of 49 countries, Manasse (2006) modelled fiscal rule as a dummy variable to explain the primary deficit, along with the output gap, public debt to GDP and other control variables. He finds that fiscal policy is weakly procyclical and that the presence of a fiscal rule makes it more countercyclical. In separate studies for 99 countries and for US States, Fatàs and Mihow (2003, 2006) and Fatàs (2006) find that government spending is an important source of volatility and for US states, budgetary restrictions are associated with lower expenditure volatility. However, Jaimovich and Panizza (2006) using instrumental variables to correct for the endogeniety between fiscal policy and GDP growth, find that in developed countries, fiscal policy is countercyclical and the procyclical behaviour for developing countries is non-existent, contrary to earlier studies.

Tests of the structural balance rule are even fewer and more difficult to implement because only a few countries have adopted such rules. Dos Reis and Guerson (2006) tried to shed some light on this by simulating a structural balance expenditure rule for five Latin American countries using a vector autoregression (VAR) framework. They find that if expenditure were set at a fixed percentage of long-run (structural) government revenue, the volatility of output would always be lower. While the VAR framework is based on past data (ignoring the future implications of the rule) and assumes that the elasticities are constant, it provides useful pointers about the effects of structural balance rules.

3. Structural Balances in the Caribbean

The structural balance (cyclically adjusted balance) is defined as the budgetary position that would have been observed if the actual output coincided with potential output. It removes the cyclical elements from the fiscal position, so that it abstracts from temporary changes in economic activity. It therefore requires revenue and expenditure to be cyclically adjusted, which is equivalent to multiplying the actual level of these variables by the output gap and the respective output elasticities.

Several uses have been identified for the structural balance, some of which are not appropriate. Blanchard (1990) identifies the following uses of the structural balance:

- An index of discretionary fiscal policy. It abstracts from the automatic fiscal responses like taxes to changes in income and debt payments to changes in interest rates. However, a decision to do nothing in the face of shifts in the tax base can be regarded as discretionary.

- Permanent fiscal stance. Since it abstracts from cyclical fiscal responses, the structural balance is usually viewed as the permanent fiscal stance. However, where there are structural breaks, the structural balance may not accurately disaggregate structural cyclical components.

- An indicator of how fiscal policy affects the economy. This is erroneous since the structural balance cannot trace out the full effects of fiscal changes in the economy. These impacts will also differ with the structure of the economy, hence the need for a fully fleshed out general equilibrium model.

- An index of fiscal sustainability. This interpretation too can cause problems since the debt dynamics depend on other variables (interest rate, growth etc).

- A policy goal. Blanchard (1990) argues that a constant structural balance is good for stability in both the short and the long run. This is equivalent to the rules versus discretion debate in monetary economics. However, there can be room for discretion in response to supply shocks for which automatic stabilizers may dampen the response.

While the concept is theoretically simple, the implementation poses some difficulties, not the least of which is estimating the output gap. The difficulties arise from disentangling what is structural and what is cyclical in output changes, and estimating elasticities when there are discretionary policy changes.
Theoretically, the structural balance can be defined in nominal terms as follows:

$$B_{s,t} = R_{s,t} - E_{s,t} \tag{1}$$

where B is the overall balance, R is revenue and E is expenditure, the subscript s denotes structural, the subscript t time.

Revenues are assumed to depend on output with a constant elasticity ε and expenditure, is assumed to have an output elasticity of η. Structural revenues are the level of revenues when output equals its potential and is given by:

$$R_{s,t} = AY_{s,t}^{*\varepsilon} \tag{2}$$

Combining equations (1) and (2) yields:

$$B_{s,t} = R_t\left(\frac{Y_t^*}{Y_t}\right)^{\varepsilon} - E_t\left(\frac{Y_t^*}{Y_t}\right)^{\eta} \tag{3}$$

Calculation of the structural balance therefore requires an estimate of the output gap and output elasticities of revenue and expenditure. The output gap is used to cyclically adjust revenue and expenditure.

Calculation of the output gap requires a decomposition of output between trend and cycle where the output gap is equivalent to the cyclical component. Several methods have been advanced for decomposing trend and cycle[2]. They are all subject to significant errors, especially towards the end of the sample (Dos Reis. 2007). Most filters are symmetric and require observations on either side of the period being estimated, for example Hodrick-Prescott (HP) loses accuracy towards the end of the sample. Forecasts of future observations to get around this introduce further errors into the estimate. Some asymmetric filters (Christiano-Fitzgerald) try to use only the observations available to estimate the most recent data. As new data become available and the trend is revealed, the estimate becomes more accurate. In the exercise below, the output gap is computed using two methods, the Hodrick-Prescott filter and Baxter-King band pass filter. Estimates of the output gap based on the Christiano-Fitzgerald filter were also computed but the results were similar to the other two.

[2] Appendix 1 discusses the calculation of the output gap in greater detail.

Estimation of revenue and expenditure elasticity is also problematic. Estimates of the elasticities are obtained by regression analysis which can be subject to structural breaks and aggregation bias. For example if changes in output affect the different components differently, the elasticities can offset each other.

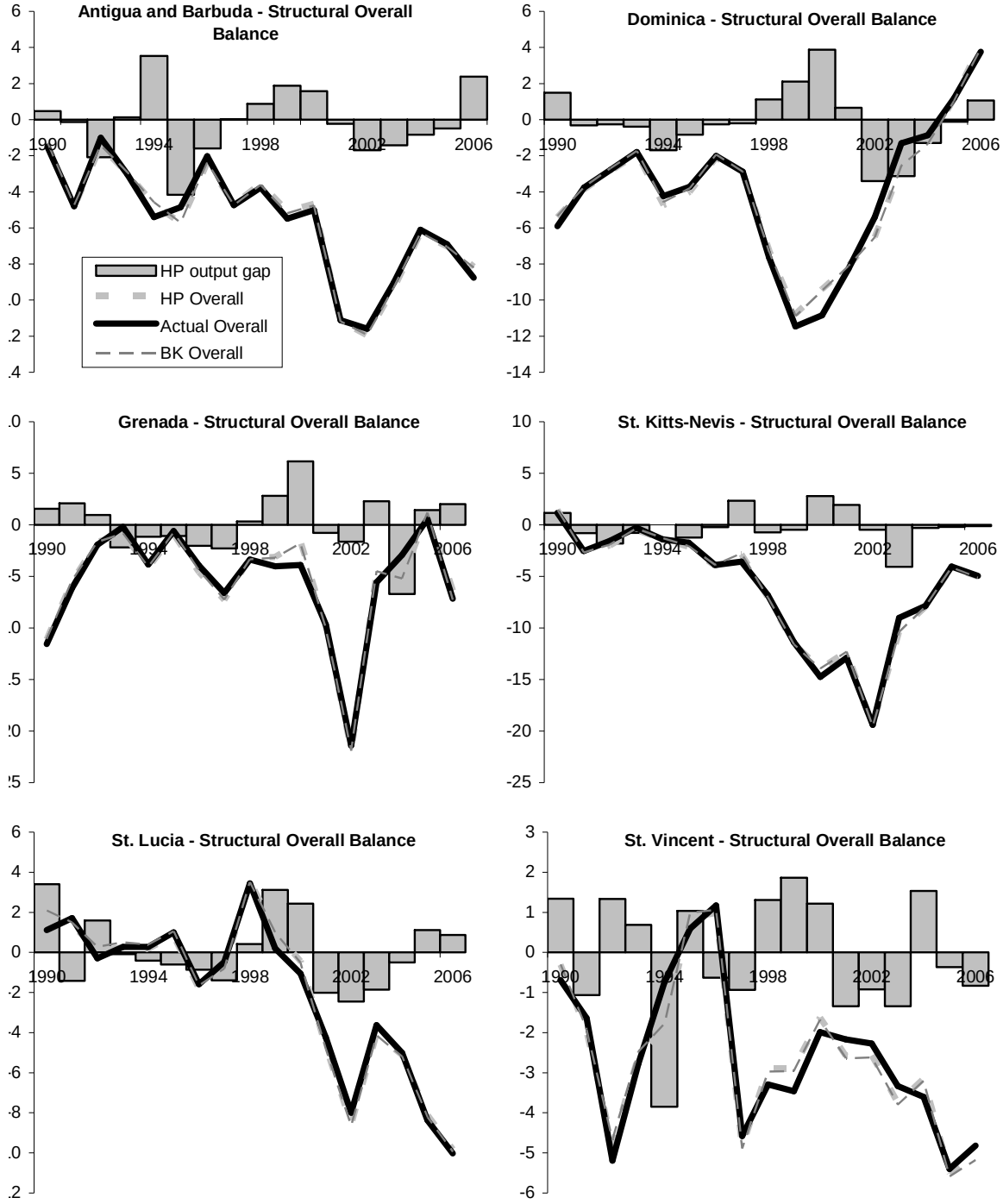
In the analysis below, the output elasticity of revenue is estimated by regression analysis. Major tax policy changes were controlled for in the revenue series[3]. The elasticity $\varepsilon = 1.1$ is lower than estimates for Latin American countries (around 1.5) which were not controlled for tax policy changes (for example Alberola and Montero, 2006). Instrumental variables estimators were also used to correct for an endogeniety between taxes and income. These estimates of ε were almost identical with the panel fixed effects estimate which would suggest that there is no significant contemporaneous feedback from taxes to income. The output elasticity of expenditure is assumed to be zero, consistent with an assumption of exogenous government expenditure.

The impact of inflation, volatile interest rates and real exchange rates are not directly accounted for. The structural balance can be affected by inflation through the fiscal drag on revenue as nominal incomes are pushed into a higher tax bracket, and the Tanzi effect, which reduces the real value of tax revenue. Volatile interest rates in emerging market economies can have a non-trivial effect on the budget. However, these can be circumvented by focusing on the primary balance. Real exchange rate effects on the fiscal can be significant with a large stock of foreign currency denominated debt by pushing up government outlays.

Data for the analysis is extracted from the World Economic Outlook Database of the International Monetary Fund. The data covers six ECCU economies (Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines) and four other Caribbean Territories (Barbados, Belize, Jamaica and Trinidad and Tobago). The Bahamas and Guyana were excluded from the analysis because of gaps in the fiscal and public debt data for these two countries. The sample period for the regression runs from 1990 to 2006, because data on the public debt for a number of countries was only available from that date. The output gaps were however estimated for the period 1983-2006. The central government is used as the unit of analysis for the data on revenue, expenditure and interest payments, while the public sector is used for the debt variable.

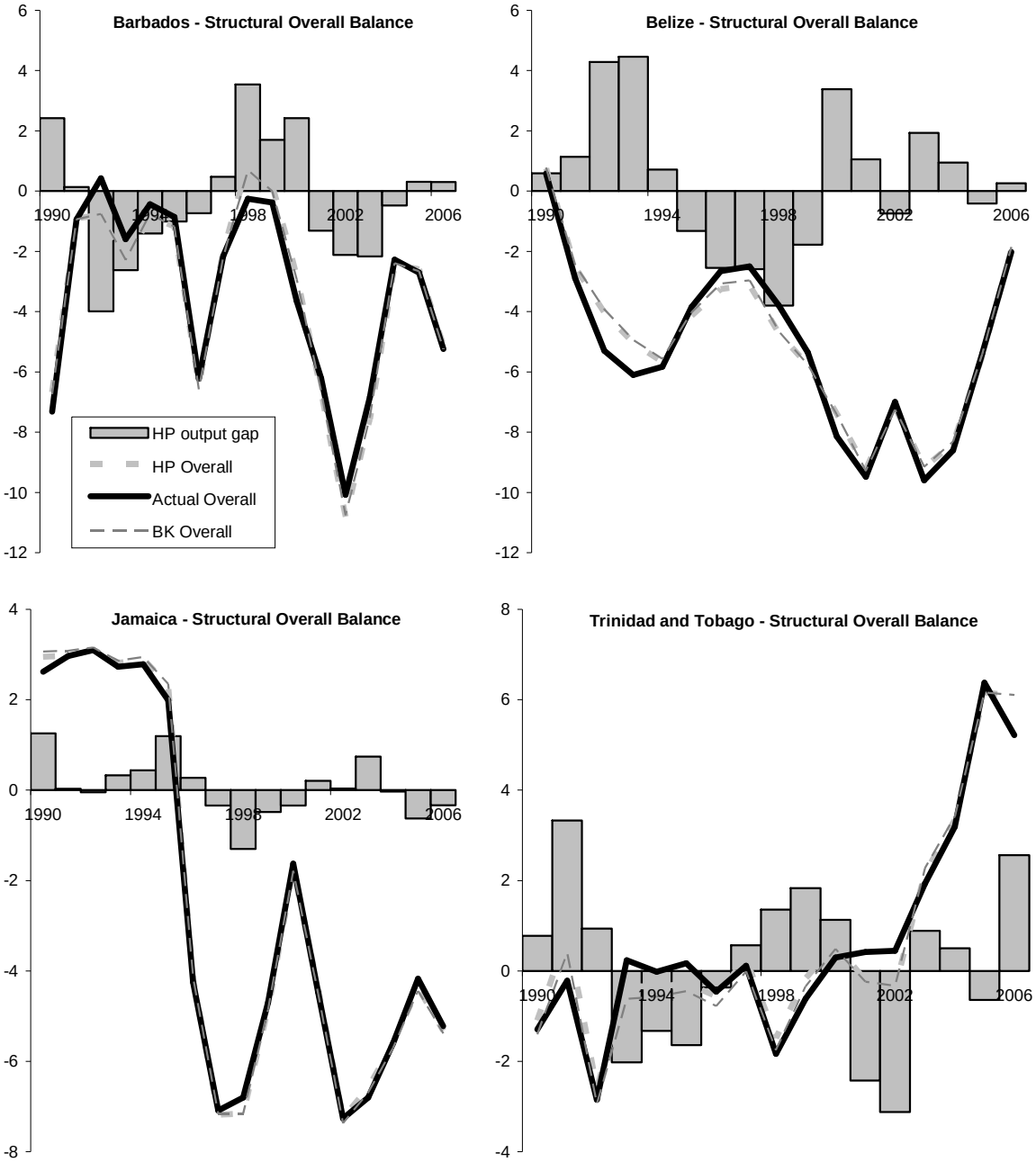
[3] There were significant tax reforms in the Caribbean during the sample period 1990-2006, including the introduction of VAT in some countries, the phased reduction of the common external tariff and income tax reform.

Figure 1. ECCU: Overall Structural Balance, 1990-2006



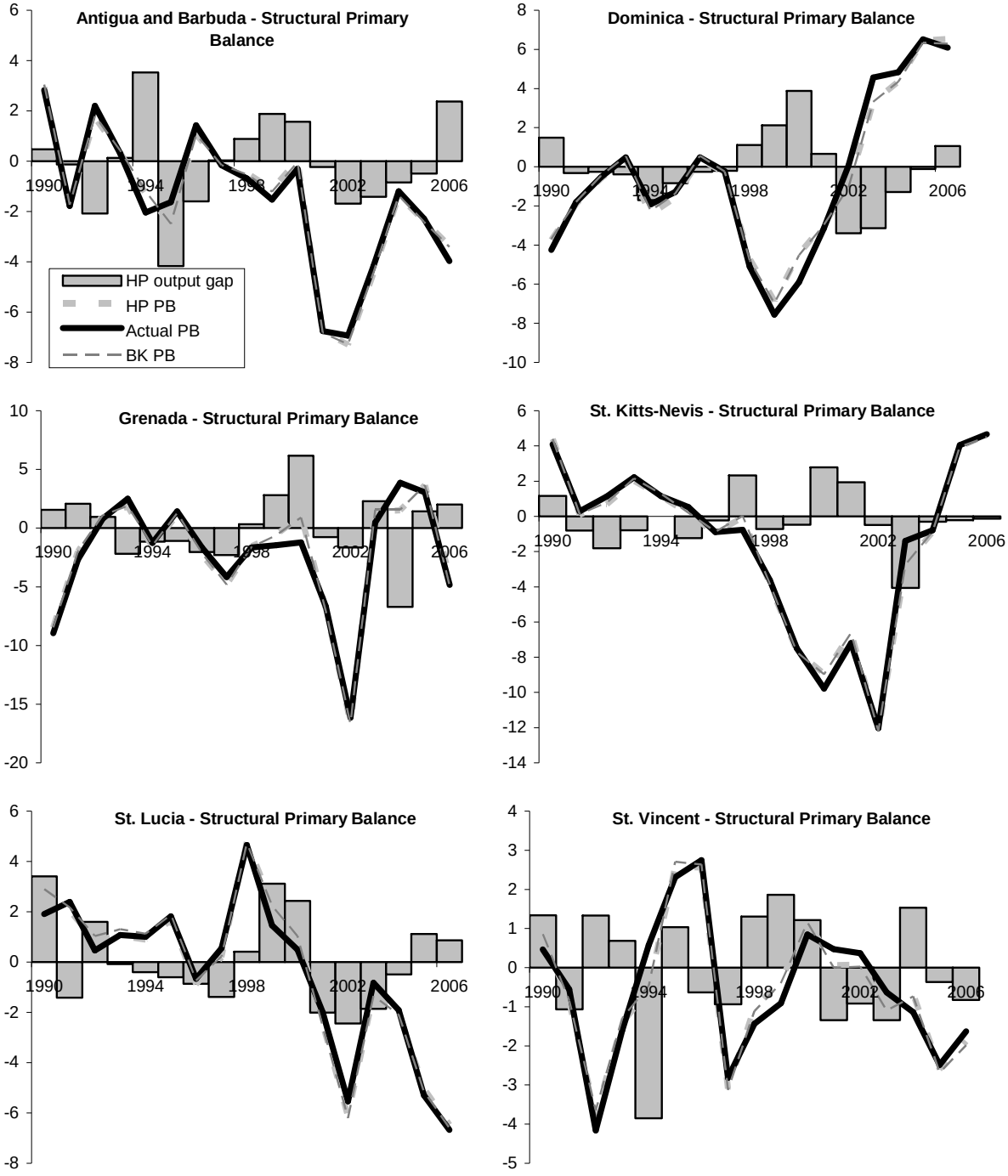
Sources: IMF World Economic Outlook Database, and author's calculations.

Figure 2: Overall Structural Balance for Selected CARICOM Countries,1990-06



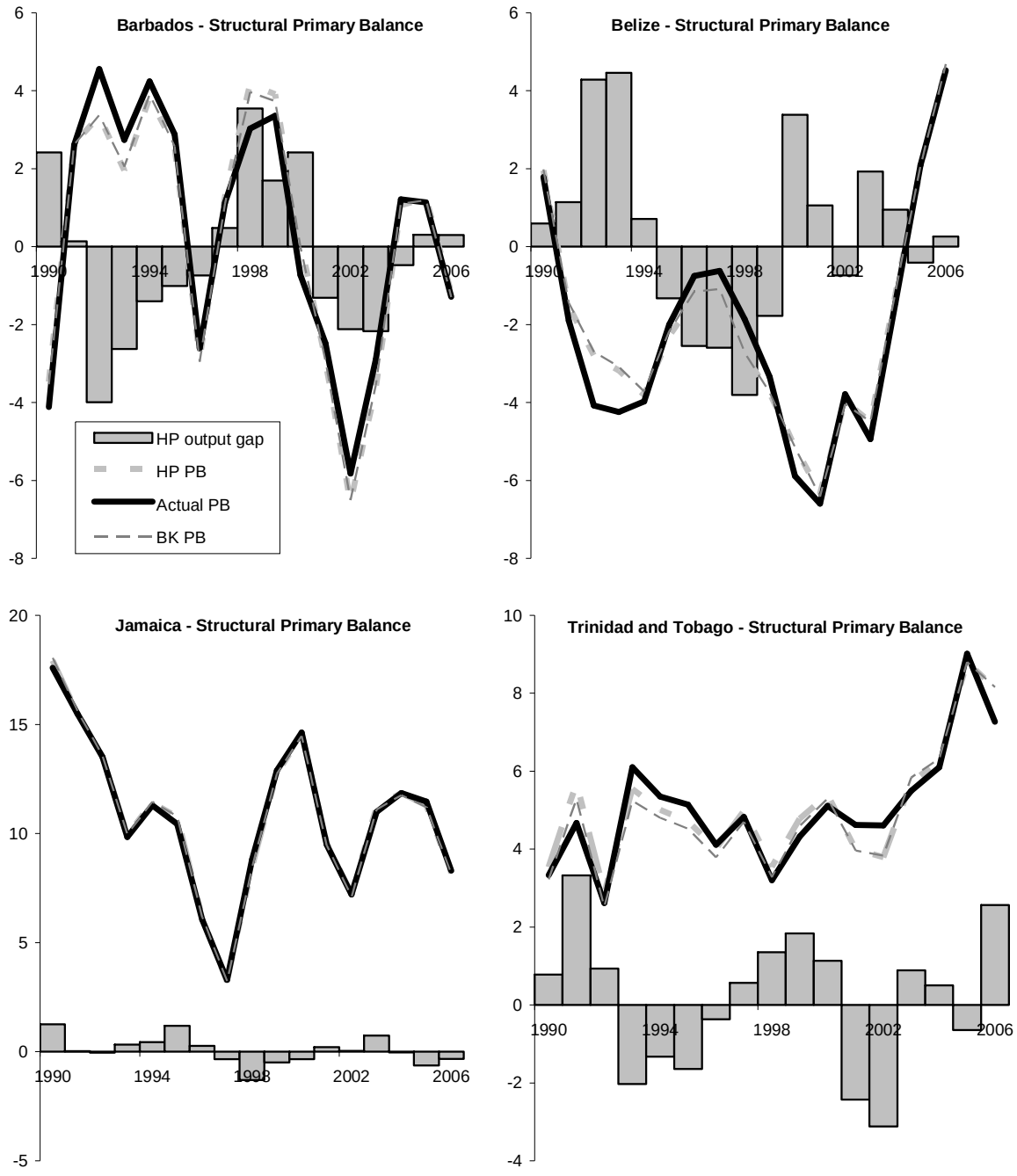
Sources: IMF World Economic Outlook Database, and author's calculations.

Figure 3. ECCU: Structural Primary Balance, 1990-2006



Sources: IMF World Economic Outlook Database; and author's calculations.

Figure 4: Primary Structural Balance for Selected CARICOM Countries,1990-06



Sources: IMF World Economic Outlook Database; and author's calculations.

The results show that in most countries, there has been some divergence between the actual and structural balances, implying that a part of the recent fiscal improvement is due to cyclical factors. Figures 1 and 2 show the overall structural balances computed by using the output gap derived from the HP and Baxter-King methods and the actual overall balance. All series are generally close because output gaps have been usually small; however, there have been periods of significant divergence during some periods. The greatest divergences are observed in Belize, Dominica, St. Vincent and the Grenadines, and Trinidad and Tobago. The most dramatic pro-cyclical performance is observed in Belize where deficits appear to be higher during periods of positive output gaps (actual output higher than trend) and deficits are smaller when the output gap is negative. This is in contrast to Barbados where fiscal policy appears to be mildly countercyclical, with larger deficits during periods of negative output gaps and smaller deficits when output is above potential. Following the 2001-02 recession during which fiscal performance deteriorated, the subsequent upswing saw improved fiscal positions in most Caribbean countries except for St. Lucia, and St. Vincent and the Grenadines.

A similar pattern holds for the structural primary balance. As noted earlier, the primary balance is a more useful indicator of structural fiscal performance because it abstracts from interest rate changes, which may be a major source of short-term volatility in emerging market economies. The path indicates that the primary balance has generally deteriorated during upturns in the economy and improved when economy moved into recession (figures 3 and 4). Such a broad picture is consistent with a pro-cyclical fiscal policy. However, the improvement in the structural primary balance has not been as much as the deterioration over successive cycles. This is contrary to the observations of the European Commission (2001) and Balassone and Francese (2004) about the European Union and OECD countries respectively. It is also consistent with the findings of Akitoby et al (2004), which show that the short-term response government spending to output is positive (pro-cyclical) except for wages and salaries, but not statistically significant.

The procyclicality suggested in the charts is corroborated by empirical analysis. Kaminsky, Reinhart and Végh (2004) propose a simple test for procylicality of fiscal policy. They argue that the behaviour of government expenditure and the tax rate are the only unambiguous indicators of procyclicality. However, information on the tax rate is usually difficult to compile. They constructed an index that sums the growth of government expenditure (or its individual components) during periods when output growth is above its median and deducts the sum of expenditure growth during periods when output growth is below the median. If the difference is positive, then fiscal policy is procyclical, if it is negative then fiscal policy is countercyclical, and if the difference is zero then fiscal policy is acyclical. Table 1 calculates the Kaminsky-Reinhart-Végh index for the 10 countries in the sample. All of the countries except Grenada appear to have pursued procyclical

fiscal policies over the period 1990-06. Trinidad and Tobago, Belize and Antigua and Barbuda appear to be the most procyclical, while Dominica, St. Kitts-Nevis and St. Vincent and the Grenadines have indices less than 1, close to being acyclical.

Table 2. Panel Unit Root Test 1/

Variables		Levels LLC		IPS		First difference LLC		IPS
Output gap	GAP	-7.750	***	-8.698	***	-12.388	***	-13.643
Debt to GDP ratio	DEGDP	-3.971	***	-0.402		-7.401	***	-3.589
Nominal effective exchange rate	NEER	0.658		0.189		-3.907	***	-5.332
Terms of Trade	TOT	-1.672		-1.271		1.330	***	2.179

LLC: Levin, Lin and Chu t -test
IPS: Im, Peseran and Shin W-stat
*** significant at 1 percent level
** significant at 5 percent level
* significant at 10 percent level

Source: Authors' calculations.

These results suggest that in most Caribbean countries fiscal policy has been generally pro-cyclical, implying a ratchet effect on the public debt levels. The paper tests this hypothesis by estimating the accumulation of public debt over the business cycle. Changes in the public debt to GDP ratio are regressed on the output gap and a vector of other variables that affect the public debt levels, including natural disasters, the exchange rate and the terms of trade. The output gap will have a positive coefficient for procyclical fiscal policy, a negative sign for countercyclical policy and zero for acyclical fiscal policy. The coefficient of natural disasters is expected to be positive and nominal exchange rate is expected to have a positive impact on the debt to GDP ratio, as a depreciation would increase the stock of external debt valued in domestic currency. Panel unit root tests are used to determine the order of integration of the variables. The results of the unit root tests, using Levin, Lin and Chu (LLC) test for a common unit root and the Im, Peseran and Shin (IPS) test for individual unit roots are presented in table 2. All variables except the output gap are non-stationary in levels, but their first differences are stationary (i.e. integrated of order 1). The null hypothesis, that the data does not contain a common unit root is rejected for the nominal effective exchange rate, but cannot be rejected for the individual countries. The output gap is stationary in levels and first difference.

The model is estimated using panel regression analysis. The estimated equation is of the following form:

$$D_t = \alpha + \beta Y_t + \gamma R_t + \varepsilon_{it}$$

Where D_t is the debt-to-GDP ratio, Y_t is the output gap and R_t is a vector of control variables (including natural disasters, the terms of trade and the nominal effective exchange rate) and α, β and γ are constants. ε_{it} is a disturbance term that is defined as follows:

$$\varepsilon_{it} = \mu_i + \upsilon_{it},$$

where μ_i denotes the unobservable country specific effects on the disturbance term, and υ_{it} denotes the remainder of the disturbance. The regression is estimated using the fixed effects model, which assumes constant coefficients for the country specific effects. In particular, μ_i is time invariant and accounts for any country-specific effects that are not included in the regression, while υ_{it} is assumed to be independently and identically distributed with a zero mean and constant variance. As a result of an incomplete data set, the regression was estimated as an unbalanced panel with 10 cross sections representing the countries and 141 total observations. Natural disasters were included in the regressions as a dummy variable that takes on the value of 1 in years when the respective country experienced a natural disaster and 0 otherwise.

Table 3 shows that the level the output gap has statistically significant positive effect on the public debt ratio, but the first difference has a negative impact. The positive coefficient of the level of the output gap is consistent with procyclical fiscal policy. However, a worsening of economic activity (an increase in the first difference) brings about countercyclical policy response. Natural disasters and the exchange rate are both significant and carry the theoretically expected signs[4].

Next, the output gap is separated in positive and negative observations. The positive series takes on the value of the output gap when it is positive and zero otherwise. Similarly, the negative series takes on the value of the output gap when it is negative and zero otherwise. If fiscal policy is countercyclical a negative output gap would correspond to periods of increasing debt, while a positive output gap would correspond to slower increases in debt levels. Running the regression with these two series yields some very interesting results. It confirms that the public debt ratio increases during an expansion more than it contracts during a recession. The coefficient on the positive output gap is 2.5, and statistically significant, implying that a 1 percent increase

[4] The terms of trade is not statistically significant in any of the equations and is therefore dropped from the equation.

in the output gap when output is above potential will increase the debt to GDP ratio by 2.5 percent of GDP. On the other hand, when output is below potential, an increase in the output gap will reduce the debt to GDP ratio by 0.7 percent (this coefficient is also statistically insignificant). Over several cycles, the public debt ratio would rise because of this ratchet effect.

Table 3. Regression Results for Change in Public Debt Ratio 1/

Variables		Panel Fixed Effects		Panel Fixed Effects	
Constant	C	1.488	***	-0.872	
		(2.61)		(-0.95)	
Output gap	GAP	0.883	***		
		(2.45)			
Change in output gap	DGAP	-1.10	***	-1.064	***
		(-3.73)		(-3.94)	
Positive output gap	POS			2.463	***
				(4.24)	
Negative output gap	NEG			-0.740	
				(-1.21)	
Disasters	DISR	1.934	*	2.514	***
		(1.81)		(2.49)	
Nominal effective exchane rate	NEER	-0.179	***	-0.170	***
		(-2.73)		(-2.73)	
Summary Statistics					
	R^2	0.27		0.34	
	Adj. R^2	0.19		0.27	
	F-statistic	49.16		70.47	
	S.E.	10.2		10.1	
	DW	1.76		1.78	
	Sample	1990-06		1990-06	
	Observations	141		141	
	Crossections	10		10	

*** significant at 1 percent level
** significant at 5 percent level
* significant at 10 percent level

Source: Authors' calculations.
1/ Bracketed numbers are the t-statistics.

4 The size of Automatic Stabilizer

The procyclicality of fiscal policy in many emerging market economies has exaggerated macroeconomic volatility. Evidence on the destabilizing effect of activist fiscal policy is growing, including Gavin et al. (1996) and Fatàs and Mihov (2001, 2004). This, along with the lack of strong evidence that activist countercyclical policy has been successful, has resulted in the prescription for greater use of automatic stabilizers to reduce macro economic fluctuations (Auerbach, 2002 and Auerbach and Feenberg, 2004). The Maastrich Treaty and

the EMU Stability and Growth Pact are based on the sentiment that automatic stabilizers should be the main tool for ensuring that over the medium term, the fiscal position is close to balance or in surplus.

Should Caribbean economies forsake discretionary fiscal policies and allow automatic stabilizers to work? This decision depends critically on the size of the automatic stabilizers given the limited scope for monetary policy under fixed exchange rate regimes to reduce economic fluctuations. Traditionally, the tax system and unemployment programmes have been seen as the two major levers through which automatic stabilizers work. Barbados is the only Caribbean country that has an effective unemployment programmes, which virtually negates the expenditure side automatic stabilizers. Accordingly, the sensitivity to output changes of the tax system determines the effectiveness of fiscal stabilizers. On the other hand, the size of the government sector in Caribbean countries provides some scope for automatic fiscal stabilizers as the larger the government sector the greater the potential stabilizing power of fiscal policy. The empirical evidence in OECD countries has shown that the size of government is an important indicator of automatic fiscal stabilizers, however the opposite result holds in Latin American countries (Suescún, 2007).
The automatic response of the budget to changes over the business cycle can be defined as:

$$AS = (B^{y} - B^{*})/Y^{*} \quad (4)$$

where B^{y} and B^{*} are the actual and cyclically adjusted budget balance and Y^{*} is potential GDP. Following Suescún (2007) we estimate the response of automatic stabilizers to a change in cyclical conditions using the equation:

$$AS_t = \alpha + \beta CY_t + \delta Z_t + \zeta_t \quad (5)$$

where CY_t is the output gap, Z_t is a vector of control variables, which includes the terms of trade and the debt to GDP ratio, ζ_t is the error term. The parameter of interest is β, which should be negative. The equation is estimated using instrumental variables to correct for endogeneity between revenue stabilizers and the output gap.

The results show that the automatic stabilizers in the Caribbean are statistically significant but very small (table 4). A rise in the out-put gap of one percent will result in a decline in revenue of less than one-third of one

percent of GDP. The estimates are broadly similar across all three estimation methods. They are also consistent with the magnitude of automatic stabilizers in developing countries and much lower than developed countries where the calls for the use of automatic stabilizers are strongest. The terms of trade was not statistically significant in any formulation and was dropped from the equation.

The small size of automatic stabilizers suggests that countries would need to depend on discretionary fiscal measures to undertake countercyclical policy. However, given the high debt levels and tight fiscal positions in most countries, only Trinidad and Tobago appears to have sufficient room to undertake countercyclical fiscal policy. Most other countries would need to enhance efforts to create fiscal space to smooth out macroeconomic fluctuations and to address natural disasters that are so much a part of the Caribbean environment.

Table 4. Regression Results for Automatic Stabilizers 1/

Variables		Panel Least Squares		Panel 2 -Stage Least Squares		Panel GMM	
Constant	C	-0.043		-0.067		-0.067	***
		(-1.54)		(-1.82)		(-1.82)	
Output gap	GAP	-0.294	***	-0.279	***	-0.279	***
		(-62.0)		(-11.4)		(-11.4)	
Public debt ratio	DEGDP	0.001	*	0.001	*	0.001	***
		(1.90)		(1.99)		(1.99)	
Summary Statistics							
	R^2	0.97		0.96		0.96	
	Adj. R^2	0.96		0.96		0.96	
	F-statistic	359.5	***	…		…	
	S.E.	0.105		0.109		0.002	
	DW	2.08		2.14		2.14	
	Sample	1990-06		1990-06		1990-06	
	Observations	141		141		141	
	Crossections	10		10		10	

*** significant at 1 percent level
** significant at 5 percent level
* significant at 10 percent level

Source: Authors' calculations.
1/ Bracketed numbers are the t-statistics.

5 Conclusion and Policy Implications

The use of structural balance and the fiscal impulse as a measure of the fiscal stance can help to improve fiscal performance, reduce pro-cyclicality in government expenditure and reduce output volatility. Contrary to both neoclassical and Keynesian theories, a wealth of empirical evidence points to the pro-cyclicality of government expenditure. Focusing on the structural balance could help avoid the ratcheting effect on expenditure over the business cycle. In addition, it would provide greater predictability to government expenditure and reduce the deficit bias over the business cycle, which tends to push up debt levels over time.

Structural balances estimated for the Caribbean indicate that generally fiscal policy has been broadly pro-cyclical. Three different methods were applied to estimate the cyclical component of output (output gap). The structural deficits appear generally close to the actual because output gaps have been small, but there have been periods of divergence between the two in most countries. The primary deficits appear to have increased during periods of expansion, but have improved in most countries since 2001. There appears to be an asymmetric response of the public debt ratio over the business cycle—the ratio increases faster when output is above potential. These results are consistent with other studies which show some procyclicality in government expenditure but lower than in most Latin American countries.

Caribbean authorities should try to reduce the pro-cyclicality of fiscal performance. This could help avoid a deficit bias over the business cycle and help to control debt. They should also focus on improving the medium-term budgetary framework to reduce economic volatility from this source. The empirical results for the Caribbean suggest that a part of the fiscal improvement since the 2001 recession could be a result of cyclically higher economic activity, hence there should be some caution in making medium-term expenditure commitments based on recent revenue increases in view of a possible downturn in the U.S. economy and the sensitivity of Caribbean economies to the U.S. cycles. The automatic stabilizers appear to be very small and would be of little use for countercyclical policy.

The authorities would need to depend more on discretionary fiscal policy to reduce macroeconomic fluctuations. However, most countries have very little fiscal space at this time to conduct countercyclical policy and therefore there is a need for fiscal effort, including reprioritizing expenditure to create room to undertake such policies.

Further work in this area could refine the estimates of the elasticities and simulate the effects of different fiscal rules in a general equilibrium framework. The estimate of the elasticities can be refined by disaggregating tax revenue and adjust for major discretionary tax changes, like the introduction of VAT and the lowering of the CET. The effect of fiscal policy and structural balance rules on the economy can best be assessed with a fully specified general equilibrium framework. The IMF's global integrated monetary and fiscal (GIMF) could be useful in evaluating the effects of fiscal rules on Caribbean economies.

Appendix I Calculation of the Output Gap

The calculation of the output gap is one of the most controversial aspects of business cyclical analysis. It requires decomposing the output series into its trend (potential output) and cyclical components. If there is seasonality the seasonal component must also be extracted. There are several methods of decomposing economic time series into trend and cycle. The two most widely used methods are to calculate potential output using a production function or filtering the series. In this paper, the filtering method is used, comparing the results of two different methods to measure the robustness of the estimates.

The Hodrick-Prescott Prescott (HP) filter is the most extensively used method of calculating potential output. It can be summarized as follows:

Let y_t (where t = 1, 2,……..T) denote the logarithms of a time series. The series y_t consists of a trend component, denoted by τ and a cyclical component, denoted by c such that $y_t = \tau_t + c_t$. The HP method chooses a positive value of λ, that yields a trend component that will minimize

$$\min \sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_{t+1} - \tau_{t-1})]^2$$

The first term of the equation is the sum of the squared deviations $d_t = y_t - \tau_t$ which penalizes the cyclical component. The second term is a constant λ that multiplies the sum of the squares of the second differences of the trend component. This second term penalizes variations in the growth rate of the trend component. The larger the value of λ, the higher is the penalty. Hodrick and Prescott recommend that, for quarterly data, a value of $\lambda = 1600$ is reasonable. For annual data, a value of λ between one and 100 should be used. In this paper a value of 6.5 is used.

Baxter and King (1995) proposed an ideal band pass filter that extracts components of the time series with periodic fluctuations between six and 32 quarters or two to eight years. They note that since the shortest detectable cycle in annual time series data is one that lasts two years, the annual business cycle filter passes components with cycle length between two and eight years. Consequently, the band-pass filter is equivalent to a high-pass filter, which removes low frequency components of greater than 8 years, and allows high frequency components to pass through. That is, the band-pass filter eliminates the trend components of the data, leaving behind the cycle. It can be shown that the exact band-pass filter is a double-sided moving average of infinite

order with known weights. However, applying this filter requires a dataset of infinite length, but in practice, it is necessary to use an approximation.

The Baxter-King (BK) and Christiano-Fitzgerald (CF) are alternative approximations of the band pass filter. In the time domain, the impact of BK filter on a time series y_t is given by the finite moving average $\bar{y}_t = \sum_{j=-K}^{K} a_j L^j y_t$. To find the weights a_j it is necessary to solve the minimization problem:

$$\underset{a_j}{Min}\, Q = \int_{-\pi}^{\pi} \left|\beta(\omega) - a(\omega)\right|^2 d\omega, \quad \text{s. t. } a(0) = 0.$$

Where $|\beta(\omega)|$ is the 'ideal' filter gain with cut off frequencies of ω_1 and ω_2. The restriction ensures that the filter has trend reducing properties. Based on experience with U.S. data, Baxter and King recommend using the following parameters K = 3, $\omega_1 = 2\frac{\pi}{8}$ and $\omega_2 = \pi$.

Christiano and Fitzgerald (2003) developed a filter that is similar to the BF filter but uses a slightly different approximation for the infinite-order moving average. It corrects for some of the disadvantages of the BK method and can be estimated asymmetrically (i.e. does not require the same number of observations on either side of centre of the moving average.

All three filters are implemented in EVIEWS, which is used for the estimates in this study.

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