IDB WORKING PAPER SERIES Nº IDB-WP-780

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February 2017

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Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library
Wright, Allan.
Fiscal rules: toward a new paradigm for fiscal sustainability in small states /
Allan Wright, Kari Grenade, Ankie Scott-Joseph.
p. cm. — (IDB Working Paper Series ; 780)
Includes bibliographic references.
1. Fiscal policy-Caribbean Area. 2. Finance, Public-Caribbean Area. I.
Grenade, Kari. II. Scott-Joseph, Ankie. III. Inter-American Development Bank.
Country Department Caribbean Group. IV. Title. V. Series.
IDB-WP-780

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Abstract

This study contends that Caribbean countries cannot adequately surmount their fiscal and debt challenges in the absence of binding rules that are geared toward entrenching fiscal discipline, curbing fiscal procyclicality, and improving budget transparency and credibility. Distilling global lessons and taking due cognizance of Caribbean countries' idiosyncrasies, the paper explores key technical, operational and institutional issues in the design, implementation, and monitoring of fiscal rules that might be relevant for Caribbean countries that currently do not have legislated rules. Results from simulations carried out to determine welfare effects and the extent of volatility of key macroeconomic variables under various fiscal rules scenarios suggest that of the different types of simulated fiscal rules, expenditure rules perform best in terms of reducing macroeconomic volatility, and in that regard, appear to be the most welfare enhancing. This is believed to be the first study to carry out such a simulation exercise for Caribbean countries. The findings of the study evince useful insights for policymakers on how to improve the design and conduct of fiscal policy for better fiscal and, by extension, development outcomes.

JEL Codes: E62, H60
Key Words: Fiscal rules, fiscal institutions, Caribbean

1. Introduction

The Caribbean[1] has had a serious fiscal and debt problem for some time now. Analysing fiscal performance in the 1990s, the World Bank notes, "In almost every Caribbean country, public sector debt is an issue, with public sector debt levels rising sharply since 1997 from already high levels" (2005: 33). The Caribbean's debt problem is a multi-causal one; the Caribbean Development Bank (2013) provides a comprehensive exposition. Of the myriad causes of rising debt in the Caribbean, fiscal mismanagement, manifested by persistent deficits and unbridled growth in public expenditure, appears to be one of the most important.

The fiscal and debt challenge has become more acute, especially post-2008. Indeed, the global economic and financial crisis exacerbated the fiscal problem in most Caribbean countries. The simple average of the countries' overall deficit[2] of 5.5 percent of GDP in 2009 was three times the average ratio in 2007. Consequently, public debt leapt to an average of 71.0 percent of GDP in 2009, six percentage points higher than the average ratio in 2007. Moreover, the procyclical fiscal stance adopted by most Caribbean countries because of limited or no fiscal space meant that there was little or no cushion from the economic blow delivered by the global crisis. At end-2015, estimates for the ratios of public debt and fiscal deficit for the sample countries averaged 81.1 percent and 3.6 percent of GDP, respectively.

Apart from the cyclical fiscal deterioration and the consequent damage to medium-term sustainability, the global crisis exposed fundamental fiscal-structural weaknesses. Entrenched institutional fragilities appeared to have aided and perpetuated fiscal procyclicality; Mercer-Blackman and Seerattan (2014) and Samuel (2009) find empirical support for this. In addition to the procyclicality problem, institutional shortcomings tend to compromise budget credibility. Grenade (2015) points out that, based on the findings of several Public Expenditure and Financial Accountability (PEFA) reports, in many countries, budget credibility and transparency tend to be lacking (as evidenced by the number of supplementaries that are presented to Parliament after Budget approval). Moreover, slippages in discretionary fiscal policy are particularly evident in the lead-up to a general election.

Improving fiscal governance and strengthening institutions are imperative not only to curb fiscal procyclicality and reduce indebtedness, but also to restore medium-term fiscal sustainability to better support socioeconomic development. This study argues for a new fiscal-

[1] The sample countries for this study are Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.
[2] Refers to central government deficit.

structural culture, which, of necessity, requires transformative shifts in fiscal practices, policies, and institutions, ultimately for better fiscal and, by extension, development outcomes.

Against this backdrop, this study examines issues surrounding the applicability, design, and adoption of fiscal rules for Caribbean countries as one transformative shift toward a new fiscal-structural culture. Indeed, the Caribbean's fiscal performance, especially over the past two decades, has drawn attention to the need to strengthen fiscal discipline, promote credibility, and entrench countercyclical fiscal policy through mechanisms such as fiscal rules. Given the persistence and scale of the fiscal and debt problem in many Caribbean countries, the authors view the urgent adoption of fiscal rules as a critical development priority for the Caribbean.

Fiscal rules are mechanisms that are enforced to constrain fiscal policy. Schaechter et al.'s (2012) criteria for the qualification of a fiscal mechanism indicate that: fiscal rules must have numerical targets/ceiling/floor that are set on one or more government budgetary aggregates (expenditure, revenue, budget balance, and/or public debt) and bound in legislation and fiscal arrangements (Kopits and Symansky, 1998). The rules can be revised only on a low-frequency basis and must be binding for at least three years (medium-term budgetary frameworks that can be changed annually are not considered).

From the outset, it is important to underscore that fiscal rules are not a panacea; indeed, they cannot guarantee fiscal sustainability, but they have become a popular mechanism by which to anchor fiscal policy, infuse fiscal discipline, and promote credibility. Rules can reduce the likelihood of fiscal policy being subjected to misplaced and sometimes myopic plans of governments. The adoption of fiscal rules, particularly, but not exclusively by developing countries, has increased in recent years. According to Schaechter et al. (2012), the number of countries using one or more fiscal rules increased from five in 1990 to 76 in 2012.

Of the 12 sample countries in the study, Jamaica and Grenada are the only ones with legislated fiscal rules. Jamaica's fiscal rules legislation was enacted on 21 March, 2014, and Grenada's on 1 January, 2016. Appendix A provides details of the fiscal rules for both countries.

It is worth mentioning that five countries that are members of the Eastern Caribbean Currency Union (ECCU)—Antigua and Barbuda, Dominica, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines—operate with de facto rules, which have been recommended by the Eastern Caribbean Central Bank (ECCB). The ECCB is the common monetary authority/central bank for the ECCU. However, the supranational rules are not legislated or enforced; rather, they are viewed as indicative fiscal targets that ECCU member countries should strive to achieve. At the end of 2015, all five ECCU countries were in breach of the de facto rules. Grenada, which is a member of the ECCU, established its own fiscal responsibility

framework as part of its comprehensive, home-grown structural adjustment program, supported by the International Monetary Fund (IMF) through a 36-month Extended Credit Facility program that started in June 2014.

Fiscal responsibility frameworks and fiscal rules are subject matters of immense interest in the Caribbean currently, as countries consider how to ensure long-term fiscal and debt sustainability in light of the Region's fiscal and debt challenges. This study contributes to ongoing policy discussions on the importance of having a rules-based framework for fiscal policy. It is motivated by the urgent need for pragmatic, evidence-based solutions to promote a new structural-fiscal culture in the Caribbean, in which fiscal discipline in entrenched, fiscal procyclicality is curbed if not totally replaced by countercyclical policies, and transparency and credibility of budgets are fundamentally improved. This study examines global good practices and distills lessons pertaining to key technical, operational, and institutional issues surrounding fiscal responsibility frameworks in general, and fiscal rules specifically, which might be relevant for policy makers in the Caribbean. It also quantifies potential economic and welfare impacts of simulated fiscal rules. To the best of our knowledge, this is the first study to do this for Caribbean countries and as such, it adds value to the extant Caribbean literature as the simulation results answer a key question of whether different types of fiscal rules matter for economic performance and welfare.

The remainder of this study proceeds as follows. Section 2 discusses some general fiscal-structural issues of Caribbean countries. Drawing on this discussion, Section 3 discusses key technical, operational, and institutional issues in the design, implementation, and monitoring of fiscal rules that might be relevant for Caribbean countries that currently do not have legislated rules. For the two countries that do have legislated fiscal rules, it is much too early to assess their respective impacts on fiscal/economic outcomes (this will be the focus of a follow-up study). In the absence of an impact assessment, Section 4 uses a small open economy real business cycle (RBC) model to undertake a simulation exercise in a heuristic attempt to assess the potential impacts of fiscal rules on selected macroeconomic variables as well as on consumer welfare. Section 5 discusses the results of the simulations and Section 6 concludes.

2. Fiscal-Structural and Institutional Context in the Caribbean: Snapshot

The causes and consequences of the Region's fiscal and debt problem are subject matters that have received rapt attention both in the policy arena and in academia over time, but especially in recent times because in many countries, the problem has become more acute, as Table 1 shows. For brevity, however, this study does not provide a detailed trend analysis of fiscal performances of Caribbean countries, interested readers can consult various Article IV Assessments of the IMF for this. Instead, this study zeros in on a few key fiscal-structural and institutional issues that are less discussed in various fiscal expositions of Caribbean countries.

Table 1: Snapshot of Fiscal Performance

	Overall fiscal balance (percent of GDP)				**Gross public debt (percent of GDP)**			
	2000	***2005***	***2010***	***2015***	***2000***	***2005***	***2010***	***2015***
Bahamas	-0.5	-2.3	-4.3	-4.4	24.5	29.3	43.2	65.7
Barbados	-3.1	-3.2	-7.9	-7.6	39.9	46.1	70.2	103.0
Belize	-9.0	-3.5	-1.7	-5.2	82.3	95.9	83.2	76.3
ECCU^	-6.5	-4.8	-3.9	-1.9	69.3	91.3	90.3	83.2
Guyana	-3.0	-8.5	-2.8	-1.2	120.2	116.1	65.3	48.8
Jamaica	-0.8	-3.3	-6.3	-0.4	91.8	119.3	142.0	124.3
Suriname	-4.8	-1.0	-3.1	-8.8	38.3	28.8	18.5	43.3
Trinidad & Tobago	0.3	4.0	-3.6	-9.5	54.9	36.8	33.8	51.0
Simple Sample Average	-3.4	-2.8	-4.2	-4.9	65.2	70.5	68.3	74.5

Source: Authors' calculation based on data from the IMF's World Economic Outlook, April 2016.
Notes: ^ means simple average of the six countries: Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines.

Persistent fiscal deficits and large public debt in the Region are partly a reflection of procyclical fiscal policy, where governments spend excessively during booms and are forced to retrench during downturns. Indeed, the narrowing of the fiscal deficit ratios since 2010 in many of the countries is a result of fiscal consolidation/ austerity undertaken amidst acute economic weaknesses. However, political and socioeconomic realities thwart large-scale fiscal

consolidation in downturns, resulting in a ratchet effect in public debt (Grenade and Wright, 2013). Empirical evidence for the Caribbean suggests that multipliers are generally positive but quite low. Excluding Barbados and Guyana, Ruprah and Melgarejo's (2013) results show that the fiscal multipliers are positive but weak (less than one); nevertheless, they are statistically significant. Guy and Belgrave (2012) find that the cumulative multipliers are less than 0.3 after 24 quarters in a sample of Caribbean countries and they are negative in some. Fiscal multipliers[3] of government consumption, government investment, and tax revenue were estimated for the Eastern Caribbean Currency Union (ECCU). The results suggest that only the government investment multiplier is positive and less than one (0.60) (Gonzalez-Garcia, Lemus, and Mrkaic, 2013).

The Region's fiscal and debt problem also reflects institutional weaknesses relating to limited capacity for effectively managing public expenditure and matching this with revenues. In addition, systems for revenue and expenditure forecasting and debt management remain weak and ineffective in a number of countries, particularly as they relate to containing contingent liabilities. The PEFA Framework was established to improve benchmarking and monitoring of progress of national public financial management (PFM) systems. The Framework identifies six critical dimensions of performance of an open and orderly PFM system and assesses donor performance. The core dimensions are: credibility of the budget; comprehensiveness and transparency; policy-based budgeting; predictability and control in budget execution; accounting, recording and reporting; and external scrutiny and audit compliance issues. Deficiencies abound across all dimensions.

Fiscal decentralisation in a number of the countries has exacerbated the subnational PEFA governance challenges where implementation is inconsistent and capacity is weak at the subnational level (USAID, 2014). Budgeting is a political process, and announcing that reforms are underway is far easier than carrying them out (Wescott, 2009); thus, budget planning is a major weakness across the region. Political considerations have at times undermined the impact of reform implementation (DFID, 2014). Recording and reporting capabilities have affected the predictability of funds and commitment controls. PFM systems tend to lack a strong channel through which accountability can be ensured. Some countries lack robust PEFA plans and monitoring and evaluation frameworks that limit the scope to coerce accountability for results.

[3] The multiplier is the ratio of the rise in GDP relative to the size of the policy intervention (the reduction in taxes and/or increase in government purchases). A multiplier of one means that GDP increases by the size of the fiscal intervention.

The Caribbean has been unable to link development strategies and plans to medium-term fiscal planning and current year appropriations and execution. There are also significant gaps in budget credibility, as several countries consistently execute budgets that differ significantly from approved budgets. Comprehensiveness and transparency are also problematic areas. Moreover, there exist challenges in procurement planning and execution, and poor linkages between budget preparation, procurement planning, and execution systems. Oversight and governance of procurement, weak monitoring of contract compliance, noncompliance with bidding processes by procurement agencies, and non-transparent bidding processes are additional areas where most countries face challenges.

3. Strengthening Fiscal Frameworks in the Caribbean: Key Considerations and Lessons

As discussed in Section 2, the fiscal and debt problem has been engendered in part, by weak fiscal institutions and frameworks that have failed to curb, and in some cases perpetuated, fiscal indiscipline and chronic fiscal procyclicality. To restore the medium- tolong-term sustainability and credibility of fiscal policy, comprehensive reforms are required, particularly, but not exclusively, fiscal-structural reforms. Growth-enhancing reforms (not dealt with in this study) are needed also. This current study contends that given the strong political-economy roots of the Caribbean's fiscal woes, if the Region is to truly surmount its acute fiscal and debt challenge, there must be a fundamental modification of the institutions that support the design and conduct of fiscal policy. Accordingly, fiscal rules must be an integral part of countries' fiscal-structural reform agenda. The authors hold the view that a resolute commitment to fiscal rules will help to bolster confidence in countries' fiscal policies and frameworks, with broader positive effects on sustainability and, ultimately, economic growth and development.

3.1 Fiscal Rules: Guiding Principles

Before delving into an indicative operational framework for Caribbean countries (in Section 3.2), it is useful to first examine some guiding principles that countries should consider in deciding whether to adopt fiscal rules. These include: (i) objective(s) of the rules; (ii) type(s) of rules and coverage; (iii) design issues; (iv) implementation modalities; (v) institutional arrangements; and (vi) timing. Each is dealt with in turn.

(i) Objectives

The ultimate objective of fiscal rules is to promote sustainable growth, while at the same time controlling deficits and limiting debt accumulation. However, as Anderson and Minarik (2006: 7) point out, the ultimate objective is supported by at least two proximate ones: (i) long-term fiscal responsibility and sustainability; and (ii) short-term macroeconomic stabilisation. The authors caution that "the apparent superiority of any rule on the basis of one criterion is not a sufficient justification for adoption." Governments also implement fiscal rules to foster policy coordination between different levels of government, contribute to the reduction of uncertainty about future fiscal policy developments, control the size of government, and promote cyclical stability. By extension, fiscal rules can foster economic stabilisation, as they allow the fiscal accounts to adjust to variations in economic activity. Ambiguities in the objectives and definition can lead to ineffective enforcement; hence, a fiscal rule and its objective should be clearly defined.

Fiscal rules are essential since unconstrained fiscal policy may be perceived as systematically deviating from desirable policies. In practice, procyclical and/or unsustainable policies can be biased because of the political economy; that is, myopia, re-election concerns, fiscal illusion, distributive conflicts, and coordination failures. Strong rules can potentially inflict higher political costs. The effectiveness of a rule may be enhanced if it is enforced by a politically independent body (Inman, 1996). The main argument is that fiscal rules are hard to modify or amend once they are enshrined in law or constitution and are characterised on a statutory basis.

In the context of Caribbean countries, a delicate balance must be struck between the short-term and long-term objectives in the creation of any fiscal rule(s). For the highly-indebted, fiscally-constrained, and low-growth countries, the need for an economically viable and politically palatable balance between macroeconomic stabilisation and debt restraint will be critically important.

(ii) Type and Coverage

The four main types of fiscal rules are debt rules, budget balance rules, expenditure rules, and revenue rules (IMF, 2009; Schaechter et al., 2012). The most frequently used rules are the budget balance rules and debt rules. Debt rules set a specific numerical target for public debt as a percentage of GDP. This rule is useful when monitoring and measuring economic

performance are simple. Budget balance rules focus on an overall budget balance, structural or cyclically adjusted balances, or an average balance "over the cycle" of the economy. This rule helps in reducing the budget deficit and supports the convergence of the debt-to-GDP ratio to a desired level. This allows policymakers to identify and control the variable that has repeatedly contributed to debt. The expenditure rule limits total, primary, and current spending. In general, this rule is applied to control the size of government. Revenue rules are aimed at boosting revenues or decreasing tax burdens by setting revenue ceilings or floors (Schaechter et al., 2012). The combination of rules adopted correlates with the fiscal challenges of an economy. Indeed, the types of rules depend on the variable(s) to be constrained, be it public debt, expenditure, overall balance, revenue, or a combination of those. IMF (2009: 20) suggests that the variable to constrain should depend on the following factors: "(1) objective; (2) controllability and provision of clear operational guidelines for fiscal policy; and (3) transparency and ease of monitoring."

There are merits of each type of rule. Balanced budget/overall deficit rules can be advantageous since they can: (i) tighten asymptotic properties of debt; (ii) directly address the deficit bias; and (iii) be simple and transparent. Debt rules are capable of directly tackling debt sustainability, can be transparent and simple, and can accommodate large shocks if debt is well below a defined ceiling. Revenue rules impose limits on revenues with a view to containing the size of the public sector/tax burden and allocate ex-ante revenue windfalls (e.g., due to surprisingly high growth). This rule is useful as it can reduce procyclicality in good times.

However, against these merits are demerits. Fiscal rules are opposed on two theoretical grounds: (1) automatic stabiliser can be hindered and (2) economic growth can be depressed. Automatic stabilisers are elements of the budget that tend to increase revenues during an expansion and increase expenditures during a recession. When automatic stabilisers are allowed to operate, the budget automatically generates surplus during an expansion and deficit during a recession. Thus, stabilisation advocates argue that rules are not desirable since they can limit decision makers' ability to adopt necessary stabilisation policies during periods of exogenous shocks and thus hinder automatic stabilisers. The depressed-growth argument purports that volatility increases and by extension, growth is dampened because automatic stabilisers are not allowed to kick in automatically (Eichengreen and Wyplosz, 1998; Levinson, 1998). A poorly designed rule can be more harmful than helpful. Rules can suffer from a number of weaknesses, namely, balanced budget and overall deficit limits could force cuts in investment. These may also accommodate manipulations, and do not guarantee debt sustainability. In addition, they are procyclical, unless cyclically adjusted. Moreover, debt and

revenue rules can induce revenue procyclicality due to the progressivity of tax systems. Debt rules may lead to undesirable responses to interest rate and exchange rate shocks, if debt is close to its prudential limit. Drawbacks with individual rules have led most countries to adopt a combination of rules.

The coverage of fiscal rules may vary significantly. Coverage speaks to whether the rules take into consideration the central government or the entire public sector. At a minimum, rules must cover the central government. However, to prevent the accumulation of debt, it is critical that the fiscal framework guiding the central government involves a cohesive mechanism that controls all sources of indebtedness, which must include the wider public sector. Narrow coverage, including not covering quasi-fiscal activities through institutions beyond the general government, such as public nonfinancial and financial enterprises, can render a fiscal rule(s) unsuccessful because they can provide room/incentives to shift operations to areas of the budget not covered by the rules or directly off budget.

Based on the four main types of rules, the one(s) that might be most suitable to individual Caribbean countries should be guided by the considerations articulated by the IMF (2009) as well as country idiosyncrasies. Deciding on the most apt rule will require not only perspective and judgment, but importantly, due cognizance of the political-economy realities in country. In the final analysis, the choice of a fiscal rule must meet its primary and proximate objectives and must be able to withstand harsh political and economic situations.

(iii) Design Issues

The economic, political, and institutional peculiarities of a country are integral to the design of any fiscal rule. While there is no one-size-fits-all approach, there are some broad principles that should guide the design of fiscal rules. Primarily, these include simplicity and transparency, credibility, and flexibility. With respect to simplicity, the variable(s) being constrained must be a fiscal indicator that is clearly defined, uncomplicated, and difficult to manipulate. Additionally, the variables(s) must be easy to monitor and control, especially during budget implementation. Simplicity and transparency go hand in hand. In relation to transparency, Balassone and Franco (2002) recognise that transparency is helpful for the success of fiscal policy, whether it be rules-based or discretionary. Specifically related to fiscal rules, it is important that they are designed and implemented in an unambiguous manner, and must be well explained and communicated to the public. Transparency is also important to enhance the integrity of the budget process by

limiting quasi-fiscal activities. Additionally, the institutional structures and functions supporting a fiscal rule must be explicit. Transparency in fiscal reporting is also important.

Regarding credibility, Anderson and Minarik (2006: 180) are adamant that "no fiscal rule can add to credibility if it is flouted." Indeed, a credible fiscal rule is one that makes it arduous and/or costly (politically and otherwise) to make ad hoc and frequent changes. Rules must also be perceived as credible by financial markets and the public at large so as to bolster confidence in fiscal policy decisions and underpinning institutions and frameworks. However, rules ought not to be too rigid, rendering them unworkable. There must be a feasible balance between credibility and flexibility.

Pertaining to flexibility, it is particularly important in fixed exchange-rate economies where fiscal policy is the only macroeconomic stabilisation tool. Regardless of the exchange-rate regime, however, fiscal rules should be designed with sufficient built-in flexibility so that fiscal policy can adequately respond to economic and other shocks, without undermining the discipline and sustainability benefits of the rule(s). According to Schaechter et al. (2012: 20), fiscal rules should be designed with appropriate escape clauses that include:

> "(1) a very limited range of factors that allow such escape clauses to be triggered in legislation;
>
> (2) clear guidelines on the interpretation and determination of events (including voting rules); and
>
> (3) specification on the path back to the rule and treatment of accumulated deviations."

Schaechter et al. (2012) observe that 12 countries globally, as well as countries in the Euro and West African Monetary areas, use fiscal rules with embedded escape clauses. Typically, escape clauses apply in the event of: (i) natural disasters, (ii) economic recession, (iii) banking system bailouts, (iv) change in government, (v) change in budget coverage, and (vi) other events outside of governments' control. Importantly, the magnitude of the shock(s) that would give effect to an escape clause must be unequivocal. Ultimately, the decision of if and when to relax a fiscal rule in the presence of a shock, is a country-specific one.

(iv) Implementation Modalities

The credibility of the rule and governments' commitment to the rule are likely to be enhanced if there is a high degree of certainty that noncompliance would be sanctioned. Mechanisms for enforcement must be an integral part of the design of any fiscal rule. Ter-Minassian (2010) emphasises that enforcement mechanisms must have a solid legal basis and

discourage noncompliance through unambiguous and sufficiently potent sanctions. With respect to a legal basis, Ter-Minassian (2010), while pointing out that it is not necessarily a precondition for the introduction of a fiscal rule, duly acknowledges that its sustainability and credibility prospects are greatly enhanced with a strong legal foundation. In relation to enforcement mechanisms, their success is likely to be heightened if they are underpinned by explicit requirements to correct aberrations from the rule within a reasonable, pre-specified period. Ter-Minassian (2010) suggests that sanctions should be realistic enough to make application doable. Based on the survey of the literature, typically, sanctions are either financial (e.g., fees and fines) or administrative (e.g., submission of a plan to correct deficit). However, there are two factors that condition the usefulness/effectiveness of sanctions; first, they require a third-party enforcer, who may or may not be effective; and second, full enforcement may lead to political instability. For these reasons, the IMF (2009) opines that sanctions are hardly ever envisaged, and advocates that formal enforcement procedures should rely on mechanisms that encourage an obligation to (1) take corrective measures and/or (2) minimise cost of noncompliance. The IMF (2009: 34) asserts that "the mere introduction of fiscal rules does not guarantee success, unless the cost of breaking the rule is higher than the benefit of doing so."

(v) Institutional Arrangements

There is general agreement in the literature that fiscal rules must be embedded in strong institutional arrangements. Lane (2003) in particular stresses the importance of the efficacy of governments' machinery and insists that fiscal policies must be used in conjunction with improvements in government efficiency. Bergan and Hutchinson (2014) find empirical support for moderate-to-high government efficiency in aiding the effectiveness of fiscal rules in reducing the procyclicality of fiscal policy in developing countries. The IMF (2009) calls for adequate PFM systems and views them as prerequisites for effective implementation of fiscal rules. Indeed, the IMF (2009) argues that PFM systems should be so effective that they allow for a smooth and easy conversion of the intent of the fiscal rule into the reality of budget policy and implementation. Of the PFM systems, sound accounting systems that are consistent across all government ministries are particularly important for Ter-Minassian (2010) to ensure timely monitoring of the fiscal targets included in a country's fiscal rules.

Monitoring is indeed crucial, and increasingly several countries (particularly, but not exclusively in advanced and emerging-market) are using "fiscal watchdogs" such as an independent fiscal council to monitor and assess the implementation and impacts of fiscal

policy. From a survey of the literature, fiscal councils perform three main functions: (i) fiscal analysis (which should be objective) and costing of proposed budgetary measures; (ii independent fiscal forecasts and broader macroeconomic projections; and (iii) assessments of the appropriateness of the fiscal stance. In some countries, fiscal councils are also responsible for publicizing non-observance of rules.

In countries that have fiscal rules, their credibility is further bolstered because of the oversight provided by such independent bodies. Wyplosz (2011), in a systematic evaluation of fiscal councils worldwide, remarks, “a fair conclusion is that advisory fiscal policy councils have made a tangible contribution to fiscal discipline in countries where policymakers have shown a willingness to listen to them” (p. 11). Wyplosz (2011) contends that after fiscal rules, a fiscal council is the second-best solution for promoting fiscal discipline and sustainable public finances. Calmfors and Wren-Lewis (2011) advance the point that fiscal councils are not alternatives to fiscal rules but are complementary and suggest that the design of fiscal rules should be considered jointly with the design of fiscal councils. Indeed, international organisations such as the IMF, OECD, and European Commission have also advocated complementarity and cohesion.

Of course, the actual setup of a fiscal council must be country specific, taking into account the nature/magnitude of the fiscal and debt challenge as well as the political context. It is noteworthy however, that fiscal councils are not a panacea. Indeed, based on a survey of fiscal councils worldwide, it appears that there is little political cost for a government that ignores the advice of fiscal councils (Wyplosz 2011). Though useful, there are inherent limitations of fiscal councils; as such, it is important that fiscal rules be embedded in law in particular, a fiscal responsibility law (FRL).

Leinert (2010: 5) defines a FRL as “a limited-scope law that elaborates on the rules and procedures relating to three budget principles: accountability, transparency and stability.” The author outlines the following requirements as core components of a FRL:

> “(1) specification of the medium-term path of fiscal aggregates;
>
> (2) description of the medium-term and annual budget strategy for attaining the chosen fiscal objectives;
>
> (3) regular publication of reports (at least twice a year) on the attainment of fiscal objectives or targets; and
>
> (4) audited annual financial statements that assure the integrity of fiscal information” (p. 5).

However, Leinert (2010) points out that those are not exhaustive, and in practice, FRLs usually contain discretionary features. Fiscal rules embedded in a FRL-type legislation have become popular in recent years, especially in emerging-market economies. According to Schaechter et al. (2012), 14 emerging economies had FRLs in 2011, compared with four in 2000 and none in 1985. Reasons for adopting a FRL vary depending on country context; however, two reasons appear common: accountability and responsibility.

(vi) Timing

Depending on the objective(s) of the fiscal rule, it can either be introduced: (i) at the start of a fiscal consolidation program; (ii) to lock in gains from a fiscal consolidation program; (iii) during a period of economic upturn; or (ii) during an economic recession. (i) and (iv) are consistent with the stabilisation objective, while (ii) and (iii) accord with the sustainability objective. The IMF (2009) presents empirical evidence which suggests that fiscal rules are more likely to be adopted by countries in which a fiscal consolidation program is ongoing, rather than in countries just starting a program. The study's findings support the view that prior consolidation enhances the credibility of fiscal rules. Further, the evidence also implies that fiscal rules are more likely to be introduced during times of economic stability than during periods of economic declines, large external imbalances, and sharp currency depreciations. In the final analysis, however, whatever the appropriate timing might be, public consultations prior to design of the rule is important.

To wrap up this section, global lessons suggest that fiscal rules matter. However, there is no dominance of one rule over others; rather, rules involve tradeoffs in terms of implementation ease/difficulty, sustainability, and institutional arrangements. Additionally, rules have different properties relative to key policy goals. As such, specific country context, policy objective, and priority will determine the precise type of rule and nature of the supporting fiscal responsibility legislation. Countries such as Barbados and Belize, for example, that are highly indebted, might require both a primary balance and a debt rule to firmly entrench medium-term fiscal and debt sustainability, as opposed to a country such as Guyana, where only a spending rule might be fitting, given its relatively low level of indebtedness and few if any sustainability concerns.

Institutional requirements will also vary by country. For example, country-specific medium-term objectives and budgetary arrangements must be considered. Global good practices suggest that the strength of fiscal institutions and an effective supporting medium-term

budgetary architecture contribute significantly to the success or failure of fiscal rules. Accordingly, Caribbean countries are encouraged to pursue, at minimum, the following: (i) development of medium-term budget framework that is binding; (ii) stronger expenditure monitoring mechanisms; (iii) enforceable multi-annual expenditure ceilings across the public sector; and (iv) creation of independent fiscal councils/"watchdogs" for effective monitoring and accountability. Fiscal responsibility frameworks must also recognise the inherent openness of Caribbean economies and consequently their vulnerability to external shocks and, as such, fiscal responsibility legislation must be written with built-in flexibility to be both functional and flexible. Finally, but by no means least, political will is important. In the Caribbean context, given the political roots of the fiscal and debt problem, rules must be binding, enshrined in law, and effectively enforced. Public consultation and stakeholder buy-in are crucial. All of these require strong political commitment and resolve.

4. Simulating the Impacts of Fiscal Rules

In the absence of a formal assessment of the impact of fiscal rules on fiscal and wider economic outcomes, a simulation exercise is undertaken to determine if and the extent to which different types of fiscal rules impact economic performance and welfare. A small open economy real business cycle (RBC) model, derived from the works of Bi, Wenyi, and Shu-Chun (2014), Wright and Ramirez (2014), and Ovalle and Ramirez (2014), is used to carry out the simulation exercise. The objectives of the model are twofold: (i) to determine welfare effects from simulated fiscal rules; and (ii) to assess the extent of volatility of key macroeconomic variables under various fiscal rules scenarios. The model uses three types of fiscal rules: revenue, expenditure and the overall fiscal balance. Simulated fiscal rules allow the fiscal authority to determine limits for the debt-to-GDP ratio, while making changes to revenue or expenditure or the overall fiscal balance separately as well as simultaneously.

4.1 Determining Welfare Effects

Lucas' (1987) methodology is used to determine the welfare effects (changes in households' consumption) of specified simulated fiscal rules relative to a discretional fiscal policy.[4] The methodology estimates the reductions in average consumption householders are willing to

[4] Defined by Gonzalez-Garcia, Lemus, and Mrkaic (2013) as the difference between actual government activities less a "no policy change" scenario, which is the previous year's fiscal balance adjusted by inflation.

accept and still remain indifferent among the various fiscal rules. The formula for estimating welfare utility, based on compensating consumption is:

$$\eta = (1-\beta)\eta + \beta\eta$$

(1)

where the discount factor represented by β determines consumption at its steady state, which allows householders to experience indifference in terms of expected utility across the different fiscal rules relative to the discretional policy rule. Determining the change in steady-state consumption by using second order approximations, welfare gains and compensating variations are calculated to compare each fiscal rule to the discretional policy rule following Schmitt-Grohe and Uribe (2004), Gonzalez-Garcia, Lemus, and Mrkaic (2013), and Kumhof and Laxton (2013).

4.2 Assessing Macroeconomic Volatility

Following a similar exercise by Ovalle and Ramirez (2014), the volatility of selected macroeconomic variables (output, consumption, investment, and employment) under each simulated fiscal rule is compared against the discretional fiscal policy across the nine economies studied (The Bahamas, Belize, Barbados, and the six economies comprising the ECCU).[5] The very nature of these small, very open economies generally portends acute vulnerability to shocks, such as terms of trade and productivity shocks. The prevalence of these shocks contributes to increasing volatility of key macroeconomic variables that could adversely affect confidence in governments' fiscal policy and overall consumer welfare.

The model consists of three sectors: government, households, and firms.

Government sector

Standard fiscal variables are derived as follows: income taxes τ_t^i, from labour and capital, consumption taxes, τ_t^c and the deficit, b_t^*, financed by bonds. Transfers are granted to householders z_t and the real sector comprises of both the tradable and non-tradable goods (g_t^T) and (g_t^N), respectively. The goods basket incorporates goods at a constant elasticity of substitution (CES) aggregator.

The price of government goods is outlined as follows: $p_t^g = [\varphi^g (p_t^N)^{1-\chi} + (1 - \varphi^g)(s_t)^{1-\chi}]^{\frac{1}{1-\chi}}$ (2)

[5] These countries were included because of data availability and consistency.

where φ^g is the level of home bias (the proportion of goods consumed from domestic production relative to imported goods), χ is the rate of substitution between goods, s_t is the rate of exchange, and p_t^N is the non-tradable goods price.

The deficit position is described by:

$$\tau_t^c c_t + \tau_t^i (w_t l_t + r_t^N k_{t-1}^N + r_t^T k_{t-1}^T) - (s_t b_{t-1}^* - p_t^g g_t - z_t) = q_t s_t b_t^*$$

(3)

where q_t is the foreign bond price and $q_t s_t b_t^*$ (fiscal deficit) is the amount that will be financed by selling bonds b_t^*, w is wages, l is leisure, r is interest rate, k is capital, and N and T are the non-traded and traded sectors, respectively.

Movement in the fiscal deficit is based on rules targeting debt and rules related to revenue and expenditure. Changes in revenue, spending, and overall balance determine targeted limits for the debt-to-GDP ratio $\left(\frac{b}{y}\right)$ as follows:

Targeted debt ratio with Revenue Rule $\tau_t = \alpha_0 \tau_{t-1} + \alpha_1 \left(\frac{b_t^*}{y_t} - \frac{b^*}{y}\right)$, y $\alpha_0 > 0$, $\alpha_1 > 0$

(4)

Targeted debt ratio with Expenditure Rule $g_t = \alpha_0 g_{t-1} + \alpha_1 \left(\frac{b_t^*}{y_t} - \frac{b^*}{y}\right)$, y $\alpha_0 > 0$, $\alpha_1 < 0$

(5)

Targeted debt ratio with Overall Balance Rule $bp_t = \alpha_0 bp_{t-1} + \alpha_1 \left(\frac{b_t^*}{y_t} - \frac{b^*}{y}\right)$, y $\alpha_0 > 0$, $\alpha_1 > 0$

(6)

where α_0 is the policy instrument and α_1 is the degree of adjustment between targeted debt-to-GDP ratio and the actual when different rules are applied. Simulated fiscal rules allow the fiscal authority to determine limits for the debt-to-GDP ratio, while making changes to revenue or expenditure or the overall fiscal balance separately, as well as simultaneously.

With no limits for the debt-to-GDP ratio and the level of government spending, the revenue rule establishes a minimum level for revenue, hence limiting the tax- to-GDP ratio. τ^*:

$$\tau_t = \tau^*$$

(7)

With limits set for government spending, but no limits for the debt-to-GDP ratio and revenue, the government spending-to-GDP ratio is set at an upper limit:

$$\frac{g_t}{y_t} = \frac{g^*}{y}$$

(8)

The overall balance rule is determined assuming constraints on the overall balance-to-GDP ratio, and no constraints on revenues, expenditure, and debt:

$$\frac{bp_t}{y_t} = \left(\frac{bp}{y}\right)^* \quad (9)$$

Compared against these simulated rules is the discretional rule (d_t), which shows government spending and revenue beyond and above the existing fiscal policy stance (Attinasi and Klemm, 2014). The discretional rule is defined as the difference between actual government activities less a "no-policy change" scenario, which is the previous year's fiscal balance adjusted by inflation:

$$d_t = g_{t-}g_{t-1}(1+\pi_{it})$$

(10)

The automatic mechanism of correction that rectifies deviations from targeted levels is normalised, which is a usual practice in fiscal management.

Households

The household basket of goods comprises property, leisure, and consumption $\tilde{c}_t$ and $(1 - l_t)$ following a CES index:

$$\tilde{c}_t = \left[\omega(c_t)^{\frac{\upsilon-1}{\upsilon}} + (1-\omega)(g_t)^{\frac{\upsilon-1}{\upsilon}}\right]^{\frac{\upsilon}{\upsilon-1}}$$

(11)

where ω is the share of private consumption bias (portion of private goods consumed relative to public goods) and υ relates to the level of inter-changeability between the three types of goods. The determined utility function for preferences is as follows:

$$U_t = \left(log(\tilde{c}_t) + \phi\frac{(1-l_t)^{1-\sigma}}{1-\sigma}\right)$$

(12)

σ is the inverse of the Frisch elasticity[6] of labour and ϕ is the share of leisure in the function.

Household maximises utility over the horizon; $E_t \sum_{t=0}^{\infty} \beta^t U_t;\ \beta \in (0,1)$, where β is the discount factor, helping to determine the paths for goods, labour, investment, and capital throughout the sectors:

$$(1+\tau_t^c)c_t + i_t^N + i_t^T + \frac{\kappa}{2}\left(\frac{i_t^N}{k_{t-1}^N} - \delta\right)^2 k_{t-1}^N + \frac{\kappa}{2}\left(\frac{i_t^T}{k_{t-1}^T} - \delta\right)^2 k_{t-1}^T = \left(1-\tau_t^i\right)(w_t l_t + r_t^N k_{t-1}^N + r_t^T k_{t-1}^T) + z_t \quad (13)$$

where the parameter κ is the adjustment costs of capital and the rate of depreciation is δ. The first order conditions (FOC) for the equilibrium relationship among householders is outlined as follows:

$$\phi(1-l_t)^{-\sigma} = (1+\tau_t^c)(1-\tau_t)w_t \omega c_t^{\frac{-1}{v}} \tilde{c}_t^{\left(\frac{1}{v}-1\right)} \quad (14)$$

Firms

Following a Cobb-Douglas function, firms produce for the tradable and non-tradable sectors in perfect competition as follows:

$$y_t^N = a_t (k_t^N)^{1-\alpha^N} (l_t^N)^{\alpha^N} \quad (15)$$

$$y_t^T = a_t (k_t^T)^{1-\alpha^T} (l_t)^{\alpha^T} \quad (16)$$

$$\ln \frac{a_t}{a} = \rho_a \ln \frac{a_{t-1}}{a} + \varepsilon_t^a;\ \varepsilon_t^a \sim N(0, \sigma_a^2) \quad (17)$$

a_t is the total factor of production that follows the AR (1) process and ε_t^a is a productivity shock in both sectors.

The FOC helps determine labour and capital demand, and a shock to terms of trade follows an exogenous process:

$$l_t^N = \alpha^N \left(\frac{p_t^N}{w_t^N}\right) y_t^N \quad (18)$$

[6] Captures the substitution effect of a change in the wage rate on labour supply.

$$l_t^T = \alpha^T \left(\frac{\xi_t s_t}{w_t^T}\right) y_t^T \quad (19)$$

$$k_{t-1}^N = (1-\alpha^N) \left(\frac{p_t^N}{r_t^N}\right) y_t^N \quad (20)$$

$$k_{t-1}^T = (1-\alpha^T) \left(\frac{\xi_t s_t}{r_t^T}\right) y_t^T \quad (21)$$

$\xi_t = p_t^x / s_t$ is the terms of trade that follows an exogenous process:

$$\ln \frac{\xi_t}{\xi} = \rho_\xi \ln \frac{\xi_{t-1}}{\xi} + \varepsilon_t^\xi;\ \varepsilon_t^\xi \sim N(0, \sigma_\xi^2) \quad (22)$$

Appendix B provides further details on the model's calibration and parameters used.

5. Results

Results, presented in Appendix C for The Bahamas, Belize, Barbados and the ECCU, show the impact on consumer welfare (gains/losses), based on the gap between the simulated fiscal rules and the prevailing discretionary fiscal policy. Expenditure rules, which simulate adjustments in public spending based on deviations from the targeted debt-to-GDP ratio, provide higher consumer welfare in The Bahamas (0.18 difference) relative to the discretionary fiscal policy rule than any other rules. This result is similar for all the economies studied with Belize (0.38 difference), Barbados (0.13 difference) and the combined ECCU economies (0.47 difference). For Belize and the ECCU, the expenditure rule without adjustments in the targeted debt-to-GDP ratio was considered the next-best fiscal rule for improving welfare relative to the discretional policy. In The Bahamas and Barbados, a revenue rule (which simulate adjustments in revenue based on deviations from the targeted debt-to-GDP ratio) was considered the second-best rule for improving welfare.

The classifications of the simulated fiscal rules in Appendix C are: DR1, which shows adjustments being made to revenue once there is a deviation from the targeted debt-to-GDP ratio; DR2, which is similar to DR1, but adjustments are made to government spending based on deviations from the targeted debt-to-GDP ratio; DR3, which shows adjustments in the overall balance against deviations from the targeted debt ratio, RBF, RG, and RI—all rules for the overall balance, expenditure, and revenue as proportions of GDP, respectively, with no limits to the debt-to-GDP ratio.

Results in Appendices D to G pertaining to the volatility of selected macroeconomic variables show that rules based on simulations without a targeted debt-to-GDP ratio tend to increase macroeconomic volatility. This result is also observed by Ovalle and Ramirez (2014) and could be suggestive of a lack of credible consistency of government policies. However, simulated revenue rules without adjustments in expenditure tend to have the overall lowest volatility across the economies studied. In the first two economies studied (Bahamas and Belize), this rule had the near lowest volatility in consumption, investment, and employment, with similar results for Barbados and the ECCU countries.

A key policy implication of the simulated results is that going forward, the design and conduct of fiscal policy should be modified to include appropriate fiscal rules to reduce macroeconomic volatility and enhance welfare. The flexibility of the rules must take into account the cyclical nature of the economy. To ensure cyclical neutrality, fiscal rules must allow for the efficient functioning of automatic stabilisers. The design of fiscal rules largely depends on

governments' macroeconomic objectives and priorities. The policy dilemma that policymakers face is ensuring that the most effective enforcement mechanisms are implemented.

6. Conclusion

This study examined issues surrounding the applicability, design, and adoption of fiscal rules for 12 Caribbean countries as one transformative shift toward promoting a new fiscal-structural culture. In analyzing the Caribbean's fiscal-structural context, the study argued that Caribbean countries cannot adequately surmount their fiscal and debt challenges in the absence of an institutionalised and legitimate discretionary-constraining mechanism, such as fiscal rules. The implementation of fiscal rules, which are idiosyncratic given varying contexts, but which are all are geared toward entrenching discipline, curbing procyclicality, enforcing countercyclical policies, and improving budget transparency and credibility, are considered an urgent development priority. Simulations carried out to assess consumer welfare and macroeconomic volatility under various fiscal rules-scenarios found that of the different types of fiscal rules, simulated expenditure rules perform best in terms of reducing macroeconomic volatility, and in that regard, appear to be the most welfare enhancing. The results suggest that the attainment of crucial economic targets depends on governments' ability to design and manage binding rules to guide an effective fiscal framework. This requires assessment of the country's major fiscal challenges and institutional frameworks. The process must be subject to continuous monitoring, preferably by an independent authority. The findings of the study evince useful insights for policymakers on how the design and conduct of fiscal policy might be improved for better fiscal and, by extension, development outcomes.

Appendix A: Fiscal Rules in Jamaica and Grenada

Jamaica: In 2010, Jamaica entered into an extended loan facility (EFF) program with the IMF. Persistent fiscal deficits increased the country's dependence on debt, causing the debt-to-GDP ratio to reach over 140 percent in 2010 (Central Bank of Jamaica, 2013). The IMF program was short-lived, and in 2013, Jamaica once again requested an EFF from the IMF. In response to Jamaica's request for an EFF, the IMF imposed as a major conditionality the design of a fiscal rule by August 31, 2013, to be incorporated as part of the 2014/2015 budget. The Jamaican government's request for a four-year EFF from the IMF was approved in August 2013. In March 2014, Jamaica took aggressive steps to improve its fiscal framework and meet its target by enacting legislation to enable the adoption of the fiscal rules. Jamaica's fiscal responsibility framework, as articulated in Financial Accountability (Amendment) Act, 2014 and the Public Bodies Management and Accountability (Amendment) Act, 2014, includes a balanced budget rule and a debt rule. The framework's prime objective is to limit the annual fiscal deficit of the public sector (covering all fiscal activities) to achieve a reduction in public debt to no more than 60 percent of GDP by 2025/2026. The rule establishes an automatic correction mechanism that would be triggered by substantial cumulative deviations from the annual balance target. The fiscal responsibility framework allows for an escape clause to be effected with parliamentary approval, allowing for the suspension of the fiscal rules for a specified period in the event of major adverse shocks, such as natural disasters, severe economic contraction, public emergency, or a financial sector crisis. The fiscal rules take into account all fiscal activities associated with the public sector as well as fiscal implications of public–private partnerships, therefore accounting for contingent fiscal liabilities and risk. Rules are enforced in law, but there is no independent monitoring. The framework does not propose sanctions for breaches of the fiscal rules.

Grenada: The fiscal responsibility framework as articulated in its Fiscal Responsibility Act, 2016 (FRA), has four main objectives: (i) transparency in fiscal and financial affairs; (ii) full and timely disclosure and wide publication of financial transactions and decisions; (iii) reduction of public debt to a prudent and sustainable level; and (iv) risk monitoring and management. The FRA includes a primary balance rule and a debt rule; specifically, a primary surplus of 3.5 percent of GDP and a debt-to-GDP ratio of 60 percent (policy target) and 55 percent of GDP (operational target). The fiscal operations of the public sector are to be consistent with maintaining public debt on a sustainable path toward its policy target, for example, by maintaining primary expenditure growth at 2 percent adjusted for inflation, capping the growth of the wage bill by 2 percent adjusted for inflation, and keeping wage negotiations current. The FRA allows the suspension of the fiscal rules in case of natural disasters, severe economic contractions, or financial crisis. A three-year period is allowed for corrective actions. The FRA also requires monitoring and reporting to Parliament on compliance with the rules and targets.

Appendix B: Model Parameters and Moments

Calibration

The calibrated parameters used in the model comprise both parameters that are common across the economies studied and country-specific parameters. The moments of the detrended data for the period are matched with the coefficients of autocorrelations and standard deviations of the model, to ensure the consistency of the data within the model. The determination of both parameters is based on information garnered from similar studies (Bi et al., 2014; Wright and Ramirez, 2014) on small open economies. Parameters calculated or estimated by the authors are from data series derived from statistical databases from the Central Banks of Barbados, Belize and Bahamas, the IMF International Finance Statistical Database, and the Economic Commission of Latin America and the Caribbean (ECLAC). Table A1 comprises the common parameters, while Tables A2 and A3 contain the country-specific parameters.

Table A1: Common Parameters

Parameters		
φ	Weight of non-tradables in consumption basket	0.5
σ	Inverse of the Frisch elasticity of labour supply	2
υ	Elasticity of substitution between c_t y g_t	0.49
ω	Weight of c_t in effective consumption	0.8
χ	Elasticity of substitution between tradables and non-tradables c_t and g_t	0.44
χ^l	Elasticity of substitution between l_t^N and l_t^T in l	1
φ^l	Steady state labour income share of the non-tradable sector	0.5
κ	Investment adjustment costs	1.7
α^N	Weight of labour income in non-tradable sector	0.5
α^T	Weight of labour income in tradable sector	0.5
ϕ	Steady state of leisure participation	0.25
δ	Annual rate of depreciation	0.1

The proportion of the non-tradable share in the consumption basket (φ) is set to 0.5, which is close to estimates in previous studies (Bi et al., 2014), for example, 0.49 for the Dominican Republic (Wright and Ramirez, 2014). Following Bi et al. (2014) and Wright and

Ramirez (2014), and estimated parameters for similar small open economies, σ, the inverse of the Frisch elasticity of supply, is estimated at 2, the substitution elasticity in the household basket (υ) is calibrated at 0.49 and ω, the weight of consumption preference c_t in effective consumption is made at 0.8, while the level of substitution on tradable versus non-tradable is estimated at 0.44. The labour mobility,χ^l, is equal to 1, the steady share of labour income in the non-tradable sector φ^l, is calibrated to 0.5. Costs of investment adjustment parameter are done at 1.7. Assuming that sectors have about the same labour intensiveness, the parameters are similar for labour income in the tradable and non-tradable sectors (α^N) and $(\alpha^T = 0.5)$. With most householders spending approximately 25 percent of their time at work, the labour share is usually made to 0.25 and the annual depreciation rate of capital is 0.10 for sectors.

The country-specific parameters in Tables A2 and A3 are derived from Mendoza and Oviedo's (2004) methodology for steady state debt-to-GDP ratio, while the persistence and volatility of productivity and terms of trade are estimated from the Hodrick-Prescott (HP) filter against the trend series. Using the ratio of tax expense to taxable income, the effective tax rates are derived and sales tax is used as effective tax on goods and services (Ovalle and Ramirez, 2014). Beta β, which is the discount factor that determines the optimality of consumption, labour, capital, and investment, is computed from the real lending rate for each economy.

Table A2: Description of Country-Specific Parameters

Parameters	Description	Methodology and data
$\frac{b}{y}$	Steady-state debt ratio	Mendoza-Oviedo (2004)
τ_i	Effective income tax rate	1990-2012
τ_c	Effective tax rate on goods and services	1990-2012
ρ_a	Persistence productivity shock	1990-2012
ρ_{ti}	Persistence terms of trade shock	1990-2012
σ_a	Volatility productivity shock	1990-2012
σ_{ti}	Volatility terms of trade shock	1990-2012
β	Discount factor	1990-2012

Table A3: Country-Specific Parameters

Countries	ρ_a	ρ_ξ	σ_a	σ_ξ	τ_i	τ_c	β	$\frac{b}{y}$
Antigua Barbuda	0.68	0.31	0.02	0.04	0.10	0.14	0.98	0.91
The Bahamas	0.61	0.57	0.01	0.03	0.02	0.04	0.99	0.50
Barbados	0.58	0.31	0.01	0.04	0.19	0.17	0.98	0.61
Belize	0.62	0.09	0.01	0.02	0.14	0.16	0.97	0.68
Dominica	0.46	0.47	0.01	0.02	0.15	0.15	0.97	0.83
Grenada	0.56	0.43	0.02	0.02	0.15	0.15	0.98	0.90
St. Kitts and Nevis	0.68	0.53	0.01	0.03	0.17	0.16	0.97	0.87
St. Lucia	0.42	0.61	0.01	0.02	0.15	0.15	0.97	0.81
St. Vincent and the Grenadines	0.60	0.30	0.01	0.03	0.15	0.15	0.98	0.83

The country-specific parameters show a discount factor averaging 0.98 for the nine economies studied; this implies a quarterly real interest rate of approximately 2 percent, with an effective rate of 8 percent. The Bahamas has the highest discount factor of (0.99), with four economies having a factor of 0.97.

The steady-state debt-to-GDP ratio, calculated from Mendoza and Oviedo's (2004) methodology, determines a ratio based on the difference between the minimum levels of income and spending with respect to GDP, divided by the interest-growth rate differential. The smaller economies of the region averaged a higher steady-state level of approximately 0.90, with Antigua and Barbuda, Grenada, St. Kitts and Nevis close to or above this average.

The persistence and volatility shock parameters for productivity and terms of trade are obtained from the HP-filtered data against the trend of per capita output and the real exchange rate. The highest persistence is observed among the Bahamian data of 0.61 and 0.57. The volatility parameter shows that Antigua and Barbuda experience higher levels than most other economies within the sample of economies.

Effective Income tax rate and rate for goods and services are also outlined in Table A3. The income tax rates for most economies are usually based on a progressive system of taxes, as higher-income earners pay higher taxes. Throughout these economies, the effective rate is

based on taxable expense against taxable income. In this study, the value-added tax or sales tax is used as a measure to determine the effective tax rate on goods and services.

Moments

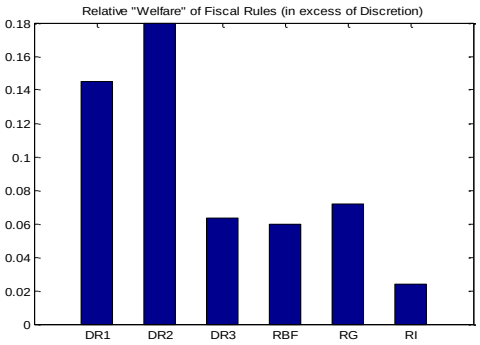
Using the autocorrelations and the standard deviations of the productivity and terms of trade shocks along with a cost adjustment parameter, the correlations and standard deviations of the key variables for the de-trended data are produced covering the period 1990-2012. Table A4 reports the moments of the data across the economies. The results show that the model closely matches the data. Indeed, the smallness and openness of the economies studied contribute to macroeconomic volatility, and liquidity-constrained householders do not encourage persistence in output and consumption (Ovalle and Ramirez, 2014; Kumhof and Laxton, 2013).

Tables A4. Moments of the Data

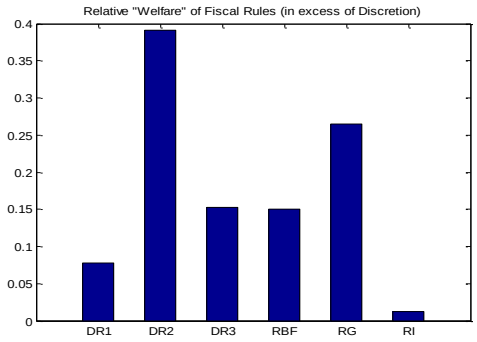
Variables	**Standard deviation**	**Auto-correlations**
GDP	1.58	0.62
Private consumption	2.42	0.81
Investment	3.95	0.76

Appendix C:

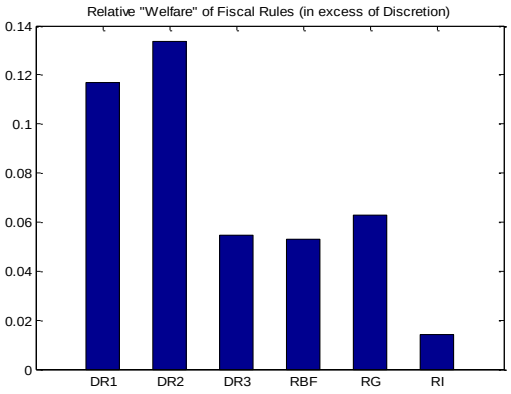
The Bahamas



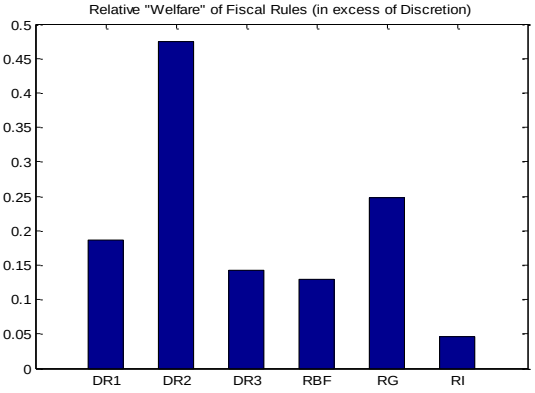
Belize



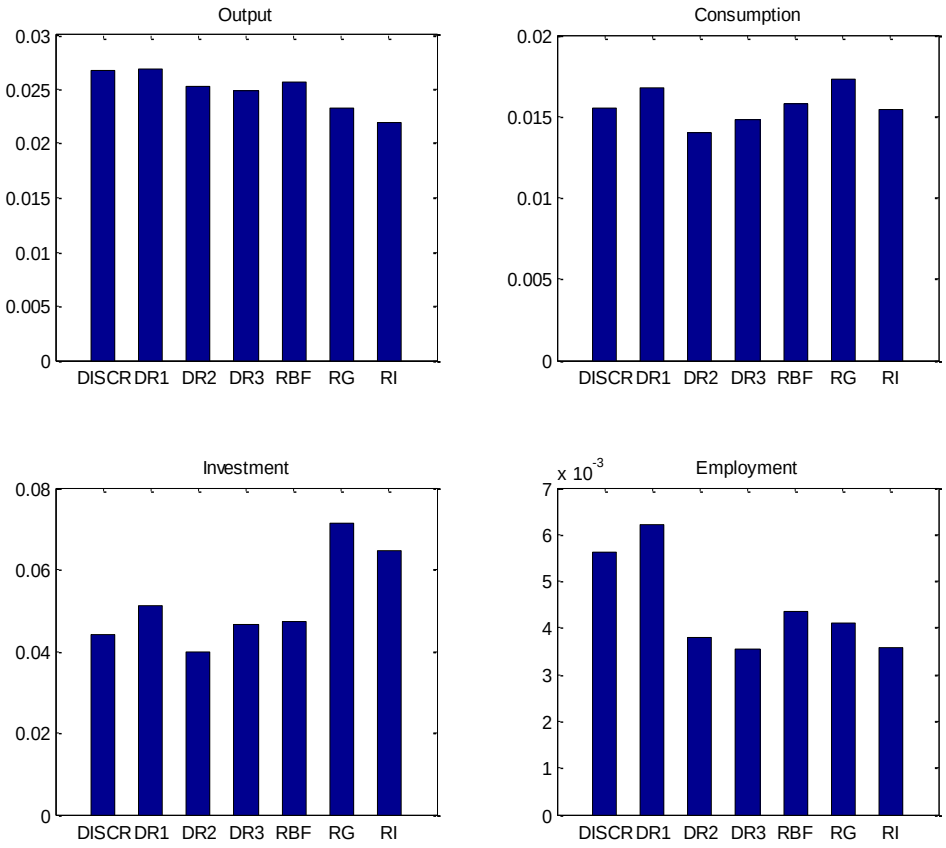
Barbados



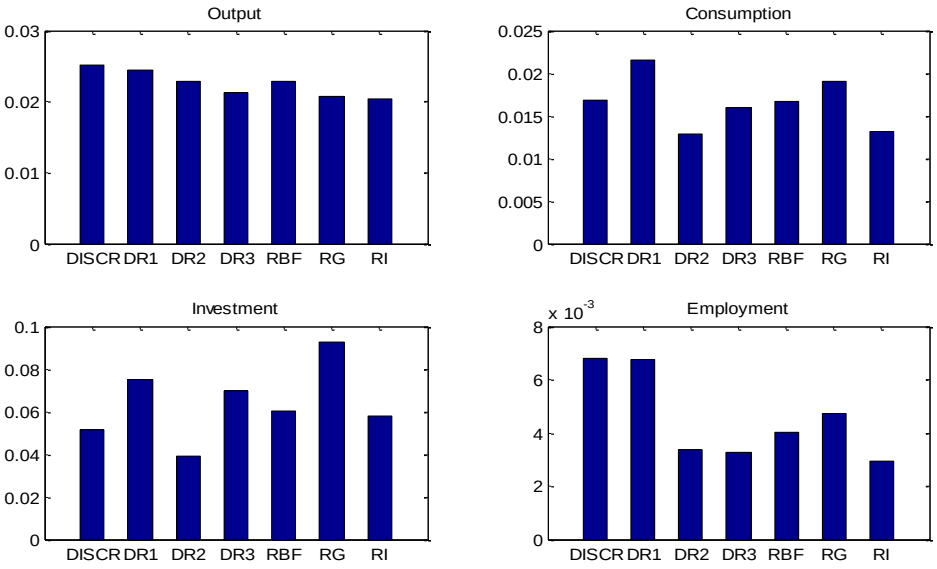
ECCU



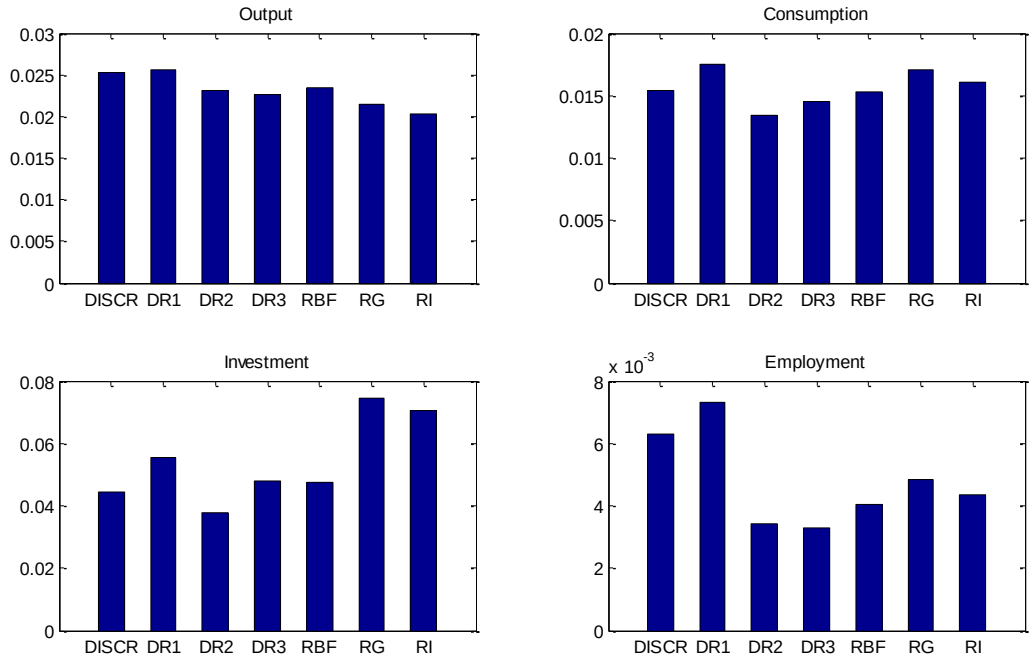
Appendix D: The Bahamas



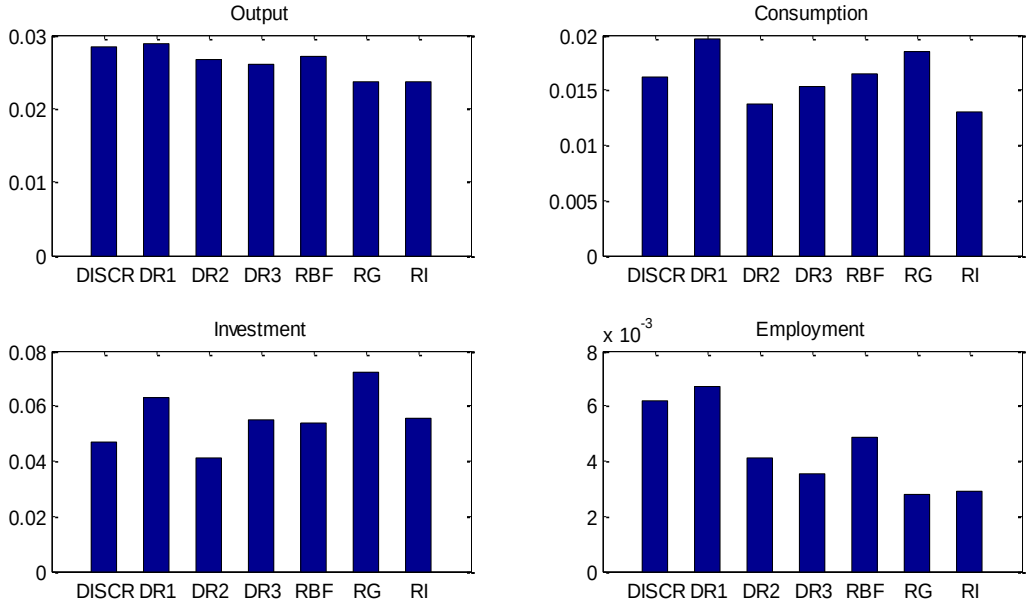
Appendix E: Belize



Appendix F: Barbados



Appendix G: ECCU



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