Fiscal Discipline and Exchange Rate Regimes: Evidence from the Caribbean

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This draft
October 11, 2005

Abstract

This paper assesses the nature of fiscal discipline under alternative exchange rate regimes. First, it shows in a simple theoretical framework that fiscal agencies under a currency union with a fixed exchange rate can have the largest incentive to overspend (compared to that under other exchange rate regimes) owing to their ability to spread the costs of overspending across *both*, time—given the fixed exchange rate—and space—given the currency union. Next, it estimates the determinants of fiscal policy in 15 Caribbean countries during 1983-2004 using a fixed-effects regression analysis, which confirms the main conclusions of the theoretical framework. In particular, fiscal stances in member countries of the Eastern Caribbean Currency Union (which maintained a fixed peg during the sample period) demonstrated greater free-riding behavior than that under other exchange rate regimes.

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[3] We are grateful to Tobias Rasmussen for his contributions at early stages of this paper. We would also like to thank Roberto Alvarez, Paul Cashin, Jingqing Chai, Rishi Goyal, Juan Manuel Jauregui, Catherine Patillo, Prachi Mishra, Garth Nicholls, Patrick Njoroge, Sanjaya Panth, David O. Robinson, Ratna Sahay, Sebastian Sosa, Carlos Vegh, Dwight Venner, and Patricia Welsh-Haynes and the seminar participants at the Eastern Caribbean Central Bank and IMF, Western Hemisphere Department, and University of California at Los Angeles for many helpful comments. We are responsible for any errors and omissions.

I. Introduction

The world economy has repeatedly witnessed unconventional relationships between exchange rate regimes and fiscal stances. Thus, countries have time and again challenged the received wisdom that "fixed exchange rates induce fiscal discipline" by pursuing fiscal expansion under currency pegs, which has sometimes resulted in a disorderly abandonment of the peg (Russia in 1998). Still others have allowed fiscal profligacy under a currency union with a fixed peg, which has led to a costly adjustment of the peg (e.g., the CFA franc zone in 1994). These experiences raise a fundamental question regarding the relationship between fiscal and monetary regimes, i.e., how are fiscal incentives affected under alternative exchange rate regimes, which is the central focus of this paper. [4]

This paper investigates the scope for moral hazard or "free-riding" behavior in fiscal policies under various exchange rate regimes: such as fixed pegs, currency unions, a combination of both—that is, a fixed peg within a currency union (FPCU)—and flexible regimes. A FPCU can influence fiscal incentives in two conflicting ways. At one extreme, the potential risk of a disorderly abandonment of the union wide peg can motivate all member countries to maintain fiscal discipline. At the other extreme however, member governments have the option of postponing fiscal reform to future governments, given the fixed peg, or share it with other members, given the currency union, which can induce free riding. This paper develops a conceptual framework to show how fiscal incentives may be perversely affected under a FPCU. Furthermore, it explores the validity of the conceptual framework by estimating the factors underlying fiscal efforts in 15 Caribbean countries after controlling for institutional and other macroeconomic factors and recognizing specifically the scope for free riding under certain exchange rate regimes.

The conceptual framework developed in the paper draws on past studies that have analyzed, separately, the impact of fixed exchange rate regimes and currency unions on fiscal policies (Tornell and Velasco, 1995, 2000, Sun, 2003, and Chari and Kehoe, 2004). These two separate strands of work are integrated to derive the conditions under which the scope for free riding intensifies under a FPCU relative to that under other regimes. Specifically, we show that, under certain conditions, A FPCU can allow member governments to transmit costs of fiscal overspending—i.e., inflation tax—across time (to future governments) as well as space (to other countries within the union), and thus generate scope for fiscal indiscipline relative to that under other exchange rate regimes.

Empirically, the paper addresses a key weakness in existing studies that have analyzed the relationship between exchange rate regimes and fiscal stance in a cross-sectional setup (Tornell and Velasco, 2000, Fatas and Rose, 2000). These cross-sectional analyses do not take into account unobservable heterogeneity. In addition, no previous study has considered how exactly the incentives for "free riding" are manifested under alternative exchange rate regimes. This paper uses a panel fixed effects regression for its estimation analysis, which

[4] There is also a growing literature that argues that factors such as institutions are the exclusive determinant of all macroeconomic outcomes, i.e., there is not direct relationship between fiscal performance and monetary arrangement (see for instance, Abiad and Baig, 2005, Alesina, Hausmann, and Stein, 1999, Calvin and Mishkin, 2003, Woo, 2003).

controls for country specific unobservable heterogeneity. In addition, the panel fixed effects (FE) regression significantly reduces potential simultaneity problems between fiscal performance and exchange rate regimes—which cross-sectional regressions suffer from—by netting out the impact of average fiscal performance on exchange rate regime choice.[5] Also, besides using a binary variable to account for the impact of alternative regimes on fiscal policy—as done in previous studies—we also identify specific channels of free-riding behavior that arise under alternative regimes.

The choice of the sample countries is motivated by a number of compelling factors. First, the Caribbean region has a variety of exchange rate arrangements—from the fixed peg currency union (FPCU) in the Eastern Caribbean Currency Union (ECCU) to more flexible regimes—allowing one to compare fiscal stances across the spectrum of exchange rate regimes over time.[6] Second, the generally high political and institutional stability in the Caribbean relative to the rest of Latin America makes fixed-effects estimation (which assumes stable country specific structural characteristics over time) an acceptable empirical approach. Third, given its high exposure to exogenous shocks (e.g., natural disasters, global shocks to tourism, erosion of trade preference for agriculture exports), the Caribbean region serves as an ideal platform to assess whether fiscal expansions in some countries were merely in response to GDP downturns or indeed reflected fiscal indiscipline or free-rider problems.

The empirical results confirm the presence of exacerbated free riding behavior in fiscal policies under the FPCU regimes. The data indicates that among the 15 Caribbean countries, fiscal outcomes in the countries with the fixed peg currency union (FPCU) regime were the worst, followed by countries with fixed pegs; while countries with flexible regimes were the best fiscal performers. The regression analysis reveals five important results with respect to the presence of free-riding in fiscal behavior under alternative exchange rate regimes. First, fiscal policies under both fixed peg and FPCU regimes suffer from "inter-temporal" free-riding arising from the ability to postpone the potential costs of fiscal overspending (i.e., inflation tax) given the fixed exchange rate. Second, fiscal performance under flexible regimes is not affected by inter-temporal free-riding. Third, in countries with the FPCU regime, fiscal stances deteriorate with improved bailout capacity of the regional central bank. Fourth, fiscal policies in countries with an FPCU regime also worsen with increase in their systemic importance in the currency union. The third and the fourth results are reflective of "regional free-riding" implying countries' tendencies to free-ride on other member countries in the union. Finally, the fiscal performance of countries not belonging to a

[5]While the choice of exchange rate regime could be a consequence of *average* or systematic fiscal performance (in cross-sectional studies), the plausibility of the choice of the exchange rate regime to depend on fiscal performance over time is very low.

[6] The ECCU has one of only two FPCU in the world and hence can be analyzed relative to the other exchange rate regimes in the Caribbean. Besides the ECCU, the only other currently operating currency union with a fixed exchange rate regime is the CFA franc zone, which comprises the West African Economic and Monetary Union (WAEMU) and the Central African Economic and Monetary Union (CEMAC). The Euro Area, while also representing a currency union, differs from the ECCU and the CFA zone in that the common currency in the union freely floats against all other major international currencies.

currency union does not suffer from regional free-riding. These results are robust to a number of sensitivity tests.

The rest of the paper is organized as follows. Section II provides a brief summary of the related theoretical literature and draws on it to show how fiscal incentives can be distorted under alternative regimes. Section III describes some stylized facts on the nature of national fiscal policies, then presents the estimation analysis. Section IV concludes.

II. Fixed Exchange Rates, Currency Unions, and Fiscal Discipline

This section first reviews the theoretical literature on the relationship between fiscal discipline and exchange rate regimes. It then integrates the relevant studies and analyzes the nature of fiscal incentives arising under alternative exchange rate regimes, with a particular focus on the FPCU regime.

Literature Review

The existing literature has analyzed both, the "traditional" and the "unconventional" association between fiscal incentives and exchange rate regimes. Earlier studies supported the traditional view that a fixed exchange rate is an effective policy for fiscal discipline, since fiscal profligacy is deterred by the risk of losses in foreign reserves or build-up of public debt, resulting ultimately in a costly abandonment of the peg.[7] However, country experiences with realignment or collapse of fixed exchange rates caused in part by fiscal deterioration (for example, the CFA franc zone in January 1994 and Argentina in December 2001) have time and again questioned the conventional wisdom.

Recent studies have shown that the conventional view can be overturned by explicit consideration of fiscal incentives induced by the exchange rate regime. Tornell and Velasco (1995, 2000) show that fiscal discipline is not always maintained under a fixed exchange rate. The authors assume that a government can finance fiscal deficits by issuing debt for a temporary period, but eventually has to rely on the inflation tax (as with Krugman, 1979). Thus, different exchange rate regimes influence fiscal incentives differently, depending on when observable costs start to bite. Under a fixed exchange rate, observable costs will *not* materialize until inflation takes place at some time in the future. Conversely, under a flexible regime, inflation is observed in the present owing to the consequence of anticipated future inflation (in the spirit of Sargent and Wallace, 1981). If governments are shortsighted and dislike inflation, they spend more under fixed exchange rates, as they can postpone the costs of higher spending.

In a similar vein, Chari and Kehoe (2004) show that fiscal discipline is not necessarily upheld under a currency union. In their model, the supranational central bank faces a tradeoff between the benefits of greater debt deflation and the output costs of higher inflation, and reneges on its commitment of low inflation when the benefits exceed the costs. Consequently, a government in a currency union has the incentive to overspend given that the

[7] See Frenkel et al. (1991) and Giavazzi and Pagano (1988).

benefits of spending accrue solely to its own country while the inflation cost of higher fiscal deficits can be shared with other members of the union.

Thus, the *combination* of the two exchange rate arrangements—a fixed peg within a currency union (FPCU)—can indeed give rise to perverse fiscal incentives, a fact that has not been explicitly explored before.[8] Under the traditional setup, fixed rates and currency unions reinforce each other, making the monetary arrangement an ideal environment for fiscal discipline. However, considering also the elements of the alternative view, the scope for free riding can intensify. Following Tornell and Velasco (2000) and Sun (2003), and assuming that: (i) there are no enforceable rules for fiscal deficits and no policy coordination between member governments; (ii) governments eventually rely on inflationary financing of fiscal deficits; (iii) and governments are biased toward spending and are shortsighted, i.e., they discount the future more heavily than the present, then fiscal policies under a FPCU can induce greater free-riding opportunities by allowing a member government to transmit costs of fiscal slippages to the future and to other member governments. These arguments are formalized in the following subsection. Readers who are mainly interested in the intuitive explanation can skip this subsection and move to the next one that summarizes the main results of the formal analysis shown here.

The Conceptual Framework

This subsection provides the theoretical underpinnings that support the case that the scope for free riding in fiscal policy—under some conditions—is present in all fixed exchange rate regimes (while not so under flexible regimes), and is maximized under a currency union with a fixed exchange rate (FPCU).[9]

A simple conceptual framework is developed, drawing on Tornell and Velasco (2000) and Sun (2003), which allows a clear understanding of the optimal level of government spending under different exchange rate regimes. The following propositions will be proved with respect to free-riding behavior in fiscal policies:[10]

I. “Pure regional free-riding”: $g^{flex,cu} > g^{flex,ic}$

II. “Pure Intertemporal free-riding”: $g^{fix,ic} > g^{flex,ic}$

[8] See Sun (2003), however, for an analysis of fiscal policies in a context of “fragmented policymaking,” i.e. many fiscal authorities operating in a single country with a fixed exchange rate, which can be adapted to a multi country setup. The author shows that if the punishment for abandonment of the peg is high enough, fixed exchange rates might induce more fiscal discipline and inflation may not occur.

[9] Note that the only type of free riding behavior under consideration is with respect to the burden of the inflation tax. Other forms of free riding, e.g., higher future taxes or lower future social expenditure are not considered here.

[10] The model focuses on government spending in period 1 for simplicity. Given that at equilibrium the relationship between g1 and g2 will not depend on the exchange rate regime, the results can be extended intertemporally in a straightforward fashion.

III. “Exacerbated free-riding”: (a) $g^{fix,cu} > g^{fix,ic}$ and (b) $g^{fix,cu} > g^{flex,cu}$,

where,

$g^{flex,ic}$ is the net present value of the level of government spending in a country with a flexible exchange rate regime;
$g^{flex,cu}$ is the net present value of the level of government spending in a country in a currency union with a flexible exchange rate regime;
$g^{fix,ic}$ is the net present value of the level of government spending in a country with a fixed exchange rate regime; and
$g^{fix,cu}$ is the net present value of the level of government spending in a country in a currency union with a fixed exchange rate regime (FPCU).

The Environment

The model takes place in two periods in a world with perfect capital mobility and price flexibility. It assumes an economy in which a set of *n* identical countries populated by identical individuals pursue fiscal policy independently with no enforceable rules. The policy makers enjoy spending but dislike inflation. The countries belong to a currency union with a common regional central bank that eventually accommodates fiscal authorities and distributes seignorage revenue.[11] The relevant functional forms, timing assumptions and institutional framework are standard in this literature and chosen for ease of computation.

The model is based on some convenient assumptions. First, the household problem can be solved independently from that of the public authorities. Second, the solution for government spending—the main focus of this analysis—can be solved analytically and independently from budget constraints and equilibrium conditions. Third, the propositions (I to III) can be proved without explicit consideration of the strategies of other countries.

Households

The representative household (same across the currency union) is assumed to receive a constant endowment y and a transfer from its own government g_i. It has to pay inflation tax on money holdings and consumes the only good in the economy, for which the law of one price and a unit international price is assumed ($P=E$). It is able to save through an internationally traded bond $f_{i,t}$ or by holding nominal domestic currency $M_{i,t}$. Real money holdings are defined as $m_{i,t}=M_{i,t}/E_t$.

[11] The model also assumes the intertemporal budget constraint holds with perfect foresight, focusing thus on the consequences of overspending on foreign exchange markets and not on those of capital markets (which would also imply increased country risk). Country risk could be incorporated in the model but would not change the main results, as country risk would equally affect both exchange rate regimes.

In period 1 the household holds assets $m_{i,0}$ and $f_{i,0}$, which are chosen at the end of the previous period. It receives the endowment and government transfer $g_{i,1}$, receives (or pays) interest, r, for bond holdings, and consumes $c_{i,1}$. It also decides the amount of assets to carry over to period 2 ($m_{i,1}$ and $f_{i,1}$). In period 2 it might accumulate assets (debt) by choosing a lower (higher) $c_{i,2}$ than the sum of endowment and transfers she receives. The budget constraint faced by the household in each period is given by[12],[13]:

$$\text{Period 1}: (f_{i,1} + m_{i,1} - f_{i,0} - m_{i,0}) = y + g_{i,1} + rf_{i,0} - c_{i,1} - \pi_1 m_{i,0} \tag{1}$$

$$\text{Period 2}: (-f_{i,1} - m_{i,1}) = y + g_{i,2} + rf_{i,1} - c_{i,2} - \pi_2 m_{i,1} \tag{2}$$

Summing up over both periods and rearranging yields the following intertemporal budget constraint, in which initial liabilities (left-hand side) are equal to the present value of the surpluses (right-hand side):[14]

$$-(1+r)(f_{i,0} + m_{i,0}) = y + g_{i,1} + \frac{y + g_{i,2}}{1+r} - c_{i,1} - (i_1 m_{i,0}) - \frac{c_{i,2} - (i_2 m_{i,1})}{1+r} \tag{3}$$

The household's utility function is defined as:

$$u(c_{i,1}) + \left(\frac{\varepsilon}{\varepsilon - 1}\right)(m_{i,0})^{(\varepsilon-1)/\varepsilon} + \beta\left[u(c_{i,2}) + \left(\frac{\varepsilon}{\varepsilon - 1}\right)(m_{i,1})^{(\varepsilon-1)/\varepsilon}\right] \tag{4}$$

where, $u(c)$ has the standard properties, the discount rate β is equal to the world interest rate, and ε is a parameter which is between 0 and 1.[15]

The representative household chooses $c_{i,1}, c_{i,2}$, $m_{i,0}$, $m_{i,1}$ and maximizes the objective function (4) subject to budget constraint (3), for which the associated Lagrange multiplier is λ. The first order conditions follow:

$$u'(c_{i,1}) = \beta(1+r)u'(c_{i,2}) = \lambda \tag{5}$$
$$m_{i,0}^{-1/\varepsilon} = \lambda i_1 \tag{6}$$
$$m_{i,1}^{-1/\varepsilon} = \lambda i_2\,. \tag{7}$$

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[12] Note that $\pi_t = \frac{(P_t - P_{t-1})}{P_t}$ and by the law of one price, devaluation is the same as inflation.

[13] The following transversality condition is imposed: $f_{i,2} = m_{i,2} = 0$.

[14] Note that $i = r + \pi$.

[15] This assumption guarantees the economy operates in the upward-sloping side of the Laffer curve.

It is assumed that $\beta(1+r)=1$ and λ is normalized to 1. If the government transfers all resources to the household, the solution for the above equations is:

$$c_1 = c_2 = \bar{c} = f(y).$$

While money demand becomes:

$$m_{i,j-1} = m_{j-1} = i_{i,j}^{-\varepsilon} \qquad \text{j = 1,2.} \tag{8}$$

Note that money demand is independent from transfers received from the local government, so the country subscript can be dropped.

Regional central bank

The central bank is assumed to be able to commit to price stability in period 1 but to abandon its commitment in period 2 and provide seignorage to monetize budget deficits, and that the central bank provides each government according to its needs to remain solvent.[16] The basis for this assumption can be substantiated both from a theoretical and empirical stand point. Theoretically, inflation is seen as the result of the tradeoffs of the central bank between benefits to fiscal accounts versus costs of output decline.[17] Even in regimes with strong commitment to a peg where the likelihood of inflation may appear to be low, at some point the benefits of inflation will reach a threshold when it is optimal to inflate.[18] Moreover, country experiences have proven that currency crisis can take place (and inflation occur) even when the central bank had apparently no incentive (and not even legal capacity) to devalue (e.g., Argentina). Fears of fiscal insolvency usually spur self-fulfilling mechanisms resulting in a widespread sudden plunge in the demand for government liabilities, including the currency.[19]

Under fixed exchange rates the monetary authority controls the exchange rate and given the law of one price it controls inflation of the union as a whole. It will set $\pi_1 = 0$, and π_2 will be determined by the aggregate government budget constraint. Under flexible

[16] Thus, this model abstracts from time inconsistency considerations. For instance, Sun (2003) replaces the assumption of shortsighted government with time inconsistency behavior of the fiscal authorities and shows that if punishment associated with the abandonment of the peg is big enough, fixed exchange rates might induce more fiscal discipline.

[17] The beneficial effects of inflation on public accounts are twofold. Tornell and Velasco (2000) stress on seignorage revenues deriving from the devaluation, while Chari and Kehoe (2004) stress on the deflation of debt in domestic currency.

[18] In the context of high foreign currency debt, the threshold is likely to kick in after the foreign currency debt has been defaulted, as Rocha et al show (2002).

[19] Reinhart (2002) shows that 85 percent of debt crisis are accompanied by currency crisis, even though her definition of debt crisis does not include IFI's bailouts (as in Manasse et al). Thus, the correlation between debt crisis and currency crisis could be even higher.

exchange rates, it controls the rate of growth of money supply (μ) and thus has no direct control on inflation.[20] It will set $\mu_1 = 0$ and μ_2 will be determined by the aggregate government budget constraint.

Fiscal agents

Government operations comprise giving transfers to the citizens of its country and collecting inflation tax from them. They can also incur debt (*b*) which has to be repaid by the end of the second period. In the context of a currency union, government budget constraints must hold in the aggregate.[21] The budget constraint is:

$$(\sum_{i=1}^{n}(b_{i,1} - b_{i,0}) + \sum_{i=1}^{n}(m_{i,1} - m_{i,0}) = \sum_{i=1}^{n} g_{i,1} + r\sum_{i=1}^{n} b_{i,0} - \pi_1 \sum_{i=1}^{n} m_{i,0} \tag{9}$$

$$(-\sum_{i=1}^{n} b_{i,1} - \sum_{i=1}^{n} m_{i,1}) = \sum_{i=1}^{n} g_{i,2} + r\sum_{i=1}^{n} b_{i,1} - \pi_2 \sum_{i=1}^{n} m_{i,1} \tag{10}$$

Rearranging and using money demand equation (8), we get the traditional expression where the initial liabilities (left-hand side) are equal to the net present value of surpluses (right-hand side).

$$(1+r)(\sum_{i=1}^{n}(b_{i,0} + m_{i,0})) = nm_0^{1-1/\varepsilon} + nm_1^{1-1/\varepsilon} /(1+r) - \sum_{i=1}^{n} g_{i,1} - \sum_{i=1}^{n} g_{i,2} /(1+r)\,. \tag{11}$$

Note that a social planner who cares exclusively about the welfare of its citizens would choose government spending equal to zero. Government transfers have no effect on the level of consumption, but create inflation, which is socially costly. Two key distortions are introduced which give the analysis more realism in a developing country setup and makes the decision on spending meaningful and contingent on different regimes.

The first fundamental distortion is that the fiscal authorities care not only about the utility of their constituencies but also about their own transfers, which are assumed to improve the chance of being re-elected. A second distortion is that governments are shortsighted, i.e. discount rate is higher than the interest rate, which implies that $\delta[1+r] < 1$. The utility function of the government can then be expressed by:

$$\alpha u(g_{i,0}) + (1-\alpha)u(m_{i,0}, c_{i,1}) + \delta\left[\alpha u(g_{i,1}) + (1-\alpha)u(m_{i,1}, c_{i,2})\right], \tag{12}$$

[20] $\mu_t = \dfrac{(M_t - M_{t-1})}{P_t}$

[21] See Woodford (1998) and Bergin (2000) for a justification of why the relevant solvency condition in a union is that of the aggregate government.

where α represents the weight governments assign to their own spending, and $u(m,c) = u(c) + (\frac{\varepsilon}{\varepsilon - 1})(m)^{(\varepsilon-1)/\varepsilon}$.

Solution under fixed exchange rates

Under fixed exchange rates by construction $\pi_1 = 0$ and thus $m_0 = r^{-\varepsilon}$. Therefore, inflation in the first period is outside government influence. However, the government indirectly affects π_2 (and consequently m_1) as higher spending would result in higher inflation in period 2. The fiscal authorities problem becomes maximizing the objective function (12), subject to solvency condition (11), for which the associated Lagrange multiplier is Ψ. The first-order conditions yield:

$$u'(g_{i,1}) = \delta(1+r)u'(g_{i,2}) = \psi \tag{13}$$

$$\delta m_{i,1}^{-1/\varepsilon} = \frac{\psi n(1-\varepsilon)}{(1+r)\varepsilon} m_{i,1}^{-1/\varepsilon}. \tag{14}$$

The left-hand side of equation (14) reflects the costs of additional spending (a reduction in welfare associated with higher inflation and less money holdings) and on the right-hand side reflects the benefits of it: marginal utility times the amount of spending in terms of inflation tax. Note that money balances nicely cancel in this type of utility function which allows one to solve for government spending analytically while disregarding the budget constraint and equilibrium conditions. The fundamental implication is that decisions of individual governments do not depend on other government's actions, i.e., the model has a single possible solution. Solving these two equations yields:

$$u'(g_{i,1}^{fix,cu}) = \delta(1+r)\frac{\varepsilon}{n(1-\varepsilon)}. \tag{15}$$

If n =1 (individual country):

$$u'(g_{i,1}^{fix,ic}) = \delta(1+r)\frac{\varepsilon}{(1-\varepsilon)}, \tag{16}$$

and given that $u'(g) < 0 \rightarrow g_{i,1}^{fix,ic} < g_{i,1}^{fix,cu}$.

Using (13), $g^{fix,cu} > g^{fix,ic}$ **Proposition III (a)**.

where g is the intertemporal government spending of a government:

$$g = g_{i,1} + \frac{g_{i,2}}{1+r}$$

Solution under flexible exchange rates

The central bank exogenously fixes money growth ($\mu_1 = 0, \mu_2$). Thus, both π_2 and π_1 become endogenous, for which the system requires an extra equation. The follow identity holds:

$$m_1 = m_0(1-\pi_1) \tag{17}$$

Using (8) and rearranging

$$m_1 = m_0(1+r) - m_0^{(\varepsilon-1)/\varepsilon} \tag{18}$$

The fiscal authorities' problem amounts to maximizing the objective function (12), subject to solvency condition (11) (for which the associated Lagrange multiplier is Ψ) and money dynamics (18) (with the associated multiplier θ). The first-order conditions are (13) and:

$$\delta m_{i,1}^{-1/\varepsilon} = \frac{\psi n(\varepsilon-1)}{(1+r)\varepsilon} m_{i,1}^{-1/\varepsilon} + \theta \tag{19}$$

$$m_{i,0}^{-1/\varepsilon} = \frac{\psi n(1-\varepsilon)}{\varepsilon} m_{i,0}^{-1/\varepsilon} + \theta\left[\left(\frac{1-\varepsilon}{\varepsilon}\right) m_0^{-1/\varepsilon} + (1+r)\right] \tag{20}$$

Combining (19) and (20),

$$\psi = \delta(1+r)\underbrace{\frac{\varepsilon}{(1-\varepsilon)n}\left[\frac{\dfrac{m_{i,0}^{-1/\varepsilon}}{\delta(1+r)} - \dfrac{(1-\varepsilon)}{\varepsilon(1+r)} m_{i,0}^{-1/\varepsilon} m_{i,1}^{-1/\varepsilon} + m_{i,1}^{-1/\varepsilon}}{m_{i,0}^{-1/\varepsilon} - \dfrac{(1-\varepsilon)}{\varepsilon(1+r)} m_{i,0}^{-1/\varepsilon} m_{i,1}^{-1/\varepsilon} + m_{i,1}^{-1/\varepsilon}}\right]}_{\Lambda} \tag{21}$$

First note that

$$u'(g_{i,1}^{flex,cu}) = \delta(1+r)\frac{\varepsilon}{n(1-\varepsilon)}\Lambda < \delta(1+r)\frac{\varepsilon}{(1-\varepsilon)}\Lambda = u'(g_{i,1}^{flex,ic})$$

In this case, the analytical solution for government spending depends on the level of inflation and thus of the level of money balances. However, it is clear that for any level of those variables it could be proved that the marginal utility under flexible is bigger than in the fixed case.

Given that $u'(g) < 0 \rightarrow g_{i,1}^{flex,cu} > g_{i,1}^{flex,ic}$.

Using (13), $g^{flex,cu} > g^{flex,ic}$ **Proposition I**

Also, given the assumption that $\delta(1+r)<1$, it is clear that $\Lambda>1$. Thus:

$$\psi^{flex}=u'(g_{i,1}^{flex,cu})>\delta(1+r)\frac{\varepsilon}{n(1-\varepsilon)}=u'(g_{i,1}^{fix,cu})$$

which implies $g_{i,1}^{fix,cu}>g_{i,1}^{flex,cu}$.

Using (13), $g^{fix,cu}>g^{flex,cu}$. **Proposition III (b)**

It is straightforward that $u'(g_{i,1}^{flex,ic})>\delta(1+r)\frac{\varepsilon}{(1-\varepsilon)}=u'(g_{i,1}^{fix,ic})$

which implies $g_{i,1}^{fix,ic}>g_{i,1}^{flex,ic}$.

Using (13), $g^{fix,ic}>g^{flex,ic}$.

Proposition II

Appendix I presents some interesting extensions to this simple model, which also has implications for the variables used to proxy for free-riding in the empirical section.

Summary of the Theoretical Results

Table 1 illustrates how fixed exchange rate regimes and currency unions can spread the burden of the inflation tax across time and space, and hence induce fiscal incentives that are at odds with the conventional wisdom. Four cases are highlighted:

Case I, represented by the upper left panel of Table 1, shows the situation when a country has a flexible exchange rate regime. Fiscal overspending would be translated into depreciation of the exchange rate and inflation in the same period as demand for money decreases in anticipation of future inflation. This is the benchmark case with no free riding in fiscal policy.

Table 1. Allocation of the Inflation Tax Under
Alternative Exchange Rate Regimes

	Individual Country	Currency Union
Flexible exchange rate regime	*Case I. "No free riding"* Inflation tax borne by the country in the present	*Case II. "Regional free riding"* Inflation tax borne by all countries in the union in the present

Fixed exchange rate regime	*Case III. "Intertemporal free-riding"* Inflation tax borne by the country in the future	*Case IV. "Intertemporal and regional free-riding"* Inflation tax borne by all countries in the union in the future

Under Case II, a country is a member of a currency union that operates a flexible exchange rate. While fiscal overspending would generate costly present inflation, this is now shared with all union members. This case is labeled as "regional free-riding" since the costs of spending are diluted for the country undertaking fiscal expansion.

Under Case III, a country has a fixed exchange rate. In this case, future inflation does not lead to present inflation as the current exchange rate is fixed. Deferring the costs of the inflation tax amounts to free riding on future governments by spending today, a phenomenon that can be called "intertemporal free riding."

Finally, under Case IV, the common currency of the union—adopted by all union members—is fixed vis-à-vis a major international currency (i.e., the FPCU regime). The outcome in this case follows naturally from the other three cases. Actual inflation or even the probability of higher inflation in the future has no consequences for money demand or inflation today, given the fixed exchange rate. Inflation is expected at some point in the future and the cost is expected to be shared by future member governments, given the currency union. Thus, the inflationary costs of fiscal expansion are minimal at present—future governments end up bearing them and member governments end up sharing them. Consequently, incentives for fiscal slippages at present are the highest.

III. Empirical Analysis

This section explores the empirical validity of the conclusions of the conceptual framework by first, presenting some stylized facts and then undertaking a more formal regression analysis. The sample comprises 15 Caribbean countries over 1983-2004. The sample starts in 1983 because of lack of data on fiscal stance prior to that year. The Caribbean featured a unique spectrum of exchange rate regimes during the sample period, including fixed pegs, various forms of flexible regimes, and one of the only two "currency union cum fixed peg" regimes in the world.[22]

[22] In the sample, the ECCU countries (Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines) maintained their FPCU regime through out the sample period. The Bahamas, Barbados, Belize and Suriname maintained conventional fixed peg regimes through out the sample period. The Dominican Republic maintained a fixed peg until 2002, Guyana until 1989, Haiti until 1991, Jamaica until 1990 and Trinidad and Tobago until 1993. These countries abandoned their fixed peg regimes in favor of a variety of more flexible exchange rate regimes, including floats.

Stylized Facts

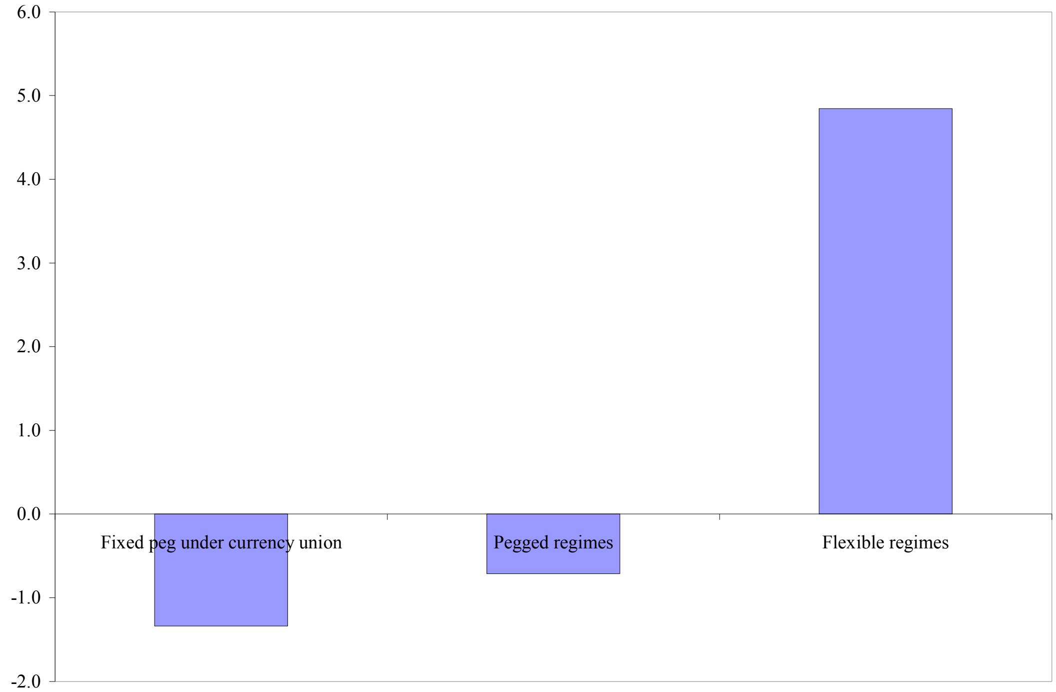
The data suggests that fiscal policies in the sample countries were in line with the predicted outcome of the conceptual model (Figure 1). In particular, the average primary deficit of the six ECCU countries with a FPCU regime was the worst in the Caribbean during 1990–2004 (a sufficiently long period over which short-run determinants of fiscal policy can be expected to net out), followed by countries with pegged exchange rates. The countries with various forms of flexible regimes—including floats—were the best fiscal performers in the sample.[23]

The relatively poor fiscal performance of pegged regimes in the Caribbean supports related empirical findings. Sahay (2005) analyzes the public debt dynamics of a sample of 15 Caribbean countries and finds that the ECCU countries are among the most highly indebted emerging market economies. The author shows that most of the increase in public debt is accounted for by a deterioration in primary balances.[24] Alberola and Molina (2004) find in a sample of 32 emerging market economies that countries with fixed exchange rates during 1990-2001 were worse fiscal performers compared to those with flexible regimes. Tornell and Velasco (2000) find in a sample of countries in Africa that countries with the CFA Franc FPCU regimes had higher fiscal deficits than those with flexible regimes.

Figure 1. Fiscal stances of Caribbean countries, average 1990-2004
(primary balance in percent of GDP)

[23] This result also has direct implications for the regression analysis presented in the next sub-section. In particular, even if there were any causality from fiscal performance to exchange rate regime choice, one would expect fixers to be associated with stronger fiscal balances contrary to what is shown in Figure 1.

[24] Kufa and others (2004) show that fiscal policies in the ECCU have consistently worsened over time, increasing the risk of unsustainability of the public sector debt. Duttagupta and Tolosa (2005) show that the growth in fiscal spending in the ECCU during 1983-2004 generally surpassed GDP growth irrespective of the nature of the business cycle, implying that fiscal stances were influenced by other factors besides growth.



Source: Authors' calculations.

Estimation Results

The estimation method used to examine the presence of free riding in fiscal stances of the Caribbean countries represents a marked improvement over previous studies on the same issue. Past studies (such as Fatas and Rose, 2001 and Tornell and Velasco, 2000.) have generally used cross-section regression techniques to estimate this relationship between fiscal stance and exchange rate regimes, a key weakness of which is the inability to take into account unobserved heterogeneity. Panel data analysis helps tackle unobservable heterogeneity problems—for instance a fixed effects estimation allows one to estimate the response of fiscal policy to changes in economic conditions under the prevailing exchange rate regimes after taking into account country-specific, time-invariant characteristics. [25]

Two alternative estimation methods are used to investigate the factors underlying fiscal stances in the Caribbean. First, we estimate fiscal stances using a simple ordinary least squares (OLS) regression with binary dummy variables corresponding to alternative exchange rate regimes as right-hand side variables to assess whether fiscal stances are associated with alternative regimes in any significant way. Then, fiscal policies are estimated using a fixed effects (FE) estimation method with specific time-varying proxies of free-riding behavior

[25] The country-specific, time-invariant factors also help proxy for "institutions" data for which is very poor in the Caribbean (e.g., fiscal transparency, characteristics of the budget process, independence of the Ministry of Finance over the Cabinet, the degree of expenditure control by the budget authority). See von Hagen and Harden, 1996.

under alternative exchange rate regimes.[26] These proxies help identify the specific channels through which fiscal efforts are affected by moral hazard behavior and the particular nature of free-riding—i.e., intertemporal versus regional—which cannot be done with the use of simple dummy variables corresponding to alternative exchange rate regimes as done in previous cross-sectional studies.

The estimated equation has the following form:

$$y_{it} = \alpha + \beta x_{it} + \gamma z_{it} + v_{it}$$

where:

(i) y_{it} is a measure of fiscal stance of country *i* at time *t,* expressed as the primary fiscal balance (expressed as a percentage of GDP). Since the primary balance is unaffected by interest payments on accumulated public debt, it serves as an appropriate indicator of fiscal policy stance;

(ii) x_{it} comprises a number of control variables for country *i* at time *t*, the description of which (and their expected signs in the regression) is given in Box 1;

(iii) v_t is the error term in the regression; and

(iv) under the OLS regression, z_{it} comprises dummy variables corresponding to the pegged and the FPCU regimes. Under the FE regression, z_{it} is a group of three indicators representing proxies for intertemporal and regional free-riding as described below.

[26] Noting that most sample countries did not change their prevailing exchange rate regimes during the sample period, time-invariant dummy variables corresponding to alternative exchange rate regimes cannot be used as regressors in the FE regression as they would be dropped out from the regression.

Box 1. Control Variables Used in the Regression[27]

(i) **Economic performance**, measured by the annual real GDP growth rate.

(ii) **Trade openness**, expressed as the sum of exports and imports of goods and services as a percentage of GDP, as a proxy for trade policies.

(iii) **Terms of trade, measured by the ratio of export price to import price, in dollars**. Improvement in the terms of trade would improve fiscal revenues, reduce the need for expansionary fiscal policy, and help improve the primary balance.

(iv) **A dummy for an IMF program** controls for the effect of existing IMF programs on the fiscal stance.

(v) **Time dummies**, to control for time specific events and also account for innovations in the financial markets over time that ease borrowing constraints for member governments.

Intertemporal free-riding is proxied by the closeness to election under alternative exchange rate regimes. The conceptual framework established that the more shortsighted the government is, the more incentives it will have to spend under fixed exchange rates (see proof of Proposition II in the previous section.). Elections are natural situations when governments' shortsightedness generally increase, i.e., the closer are elections, the more governments care about the present—in which the chances of winning the election are decided—and the more they discount the future. However, a fixed or pegged exchange rate regime can conveniently postpone the costs of fiscal overspending to the future, while under flexible regimes the costs would have to be paid upfront. Thus, the tendency to free ride might be inversely related to the time to election under fixed regimes.

Three variables are used to fully explore the impact of all exchange rate regimes on intertemporal free riding: (i) the product of the time remaining to the next election and a dummy for all ECCU countries to capture the effect under the ECCU; (ii) the product of the time remaining to the next election and a dummy for countries that maintained fixed peg regimes to capture the effect under these exchange rate regimes; and (iii) the time remaining to the next election in years for all other regimes to assess the effect under flexible regimes. In the presence of intertemporal free-riding, there would be a negative relationship between fiscal stance and proximity to election for all countries with fixed exchange rates, including the ECCU, and no such relationship for countries with flexible regimes.

Regional free-riding is proxied by the level of official foreign reserves relative to base money under different exchange rate regimes. While countries not belonging to any currency union have access to external reserves at their central banks only, each ECCU member country has access to the entire pool of foreign reserves at the Eastern Caribbean Central Bank (ECCB).[28] In the presence of regional free-riding, the increase in foreign reserves at the ECCB would induce fiscal slippages, resulting in a worsening of fiscal balances in ECCU

[27] The data sources of all the indicators are documented in Appendix II.

countries. In the non-ECCU countries, foreign reserves are not expected to have a negative bearing on fiscal stances.

Two variables are used in the regression to explore the impact of all exchange rate regimes on regional free-riding: (i) the product of a dummy for all ECCU countries and the level of foreign reserves at the ECCB (as a percent of reserve money) that captures the effect under the CBA; and (ii) the level of foreign reserves under all other exchange rate regimes.

The relative size of an ECCU member country, reflecting its systemic importance in the ECCU, is used as an alternative proxy for regional free-riding. However, as shown in the theoretical model, the relationship between this proxy and fiscal stance is ambiguous. On the one hand, the more systemically important a country becomes, the greater can be the perceived prospects of being bailed out by the regional central bank to maintain the stability of the FPCU.[29] One the other hand, the expectation of being bailed out could be seen to be higher if a country is small, since the associated costs are relatively small.

Results

The estimation results of the OLS regression indicate that both, fixed peg and FPCU regimes adversely impact fiscal stances (Table 2, column (a)). After controlling for time specific effects and the impact of other macroeconomic variables on fiscal stances, fiscal stances appear to be worse in countries with fixed peg and FPCU regimes.

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[28] The reserve pooling agreement in the ECCB implies that no individual country reserves are allocated, and but each member has unrestricted access to the common pool of reserves as long as it has the domestic currency to make it effective (see Willams and others, 2005). Thus, the use of foreign reserves to determine the bailout capacity of the central bank from each member's perspective appears reasonable.

[29] See Wildasin (1997) for a similar argument. For instance, the countries that violated the Stability and Growth Pact in Europe were its largest members, France and Germany.

Table 2. Determinants of Fiscal Policy in the Caribbean, 1983-2004

Dependent variable: primary balance (in percent of GDP) Explanatory Variables	(a) OLS	(b) Fixed effects
	Coefficients 1/	
(1) Dummy for CPCU regime	-5.84	
	(0.00)**	
(2) Dummy for fixed peg regime	-5.32	
	(0.00)**	
(3) Proximity to election (number of years to election) for flexible regimes		0.03
		(0.92)
(4) Inter-temporal free-riding in the ECCU: Proximity to election for countries under the ECCU		-0.60
		(0.01)**
(5) Inter-temporal free-riding under fixed pegs: Proximity to election for fixed peg regimes		-0.36
		(0.10)*
(6) Official foreign reserves (relative to reserve money) for non-ECCU countries		0.00
		(0.71)
(7) Regional free-riding: Official foreign reserves (relative to reserve money) for ECCU countries		-0.13
		(0.01)**
(8) Regional free-riding : Dummy for ECCU * relative country size in ECCU		-0.76
		(0.03)**
(9) Real GDP growth	-0.10	0.00
	(0.30)	(0.98)
(10) Terms of trade	0.00	0.00
	(0.90)	(0.83)
(11) Trade openness	0.02	0.02
	(0.37)	(0.05)**
(12) Dummy for IMF program	-0.02	1.34
	(0.97)	(0.10)*
(13) Time dummies 2/		
year 1985	All time dummies from 1989 to 2004 are negative and significant	-4.37
		(0.02)**
year 1988		-3.52
		(0.04)**
year 1989		-3.04
		(0.06)*
year 1990		-2.89
		(0.06)*
year 1991		-3.73
		(0.03)**
year 1992		-2.73
		(0.10)*
year 1998		-2.82
		(0.10)*
year 1999		-3.07
		(0.07)*
year 2000		-3.85
		(0.02)**
year 2001		-3.57
		(0.03)**
year 2002		-5.83
		(0.00)**
Number of observations	256	256
Number of countries	15	15
R-squared	0.31	0.34
Significance of the regression : F(30, 211)		3.69**
Significance of U(i)s : F(14, 211)		12.05**
Hypothesis Test: significance of years after 1998 in having a negative influence on fiscal policy F(1, 211)		4.48**

Source: Authors' calculations.

1/ Each coefficient represents the impact of a change in a given explanatory variable on the fiscal stance in percentage. The parentheses contain probability values. Results that are statistically significant at 5 percent and 10 percent are marked by "**" and "*" respectively.

2/ Coefficients for the statistically significant time dummies are presented only

With the FE regression, five important results are obtained. First, fiscal policies in the fixed peg and FPCU regimes are significantly influenced by intertemporal free-riding (Table 2, column (b)).[30] In other words, for all countries with fixed peg regimes, including the ECCU members, fiscal stances worsen as the election year draws closer, reflecting that the cost of fiscal expansion is deferred to the future. Second, the negative association is not observed between fiscal stances and proximity to election under flexible regimes, reflecting that the immediate inflationary consequences of fiscal expansion under flexible regimes deter free riding. Third, fiscal policies under the FPCU regime are also affected by regional free riding. In particular, fiscal stances of the ECCU countries worsen with an increase in foreign reserves at the ECCB, consistent with the expectation of being bailed out rising with an improvement of the bailout capacity of the central bank. Fourth, the negative association between the central bank's foreign reserves and fiscal stance is not observed for countries that do not belong to a currency union. Fifth, fiscal stances under the ECCU also worsen as the relative size of a member country in the ECCU rises, confirming that countries' expectation of being bailed out rises with increase in their systemic importance in the union.

A positive relationship is observed between primary balance and the prevalence of an IMF program, implying that countries that adopted fiscal reforms under IMF supported economic programs were able to improve their fiscal stances.

Finally, the results show that fiscal policies in the Caribbean countries deteriorated significantly since the late-1990s. Four of the time dummies from 1998-2004 are individually significant in worsening the fiscal balances of the Caribbean countries. Also, the hypothesis test at the bottom panel of Table 2 confirms the joint significance of the years after 1998 in adversely affecting fiscal stances. A possible explanation could be that with innovations in financial markets, Caribbean countries had better access to external financing, which exacerbated their fiscal imbalances.

Robustness

The majority of results were robust to a number of sensitivity tests:

Additional control variables

Natural disasters—dummies corresponding to the year in which a natural disaster hit a particular country—were added to assess whether fiscal effort was significantly affected by these exogenous shocks (Table 3, column (a)).[31] Table 3 presents the statistically significant dummies only. Note that some of the natural disaster dummies had a positive effect on fiscal balance.[32] The only natural disasters that adversely affected fiscal balances adversely were the one in Antigua and Barbuda (1995), and St. Vincent and the Grenadines (1992). Also, the

[30] To avoid endogeneity between some of the right-hand side explanatory variables (real GDP growth, trade openness, foreign reserves) with the primary balance, one-year lagged values of the explanatory variables are used.

[31] The data on natural disasters during the sample period was obtained from the "EM-DAT" database and comprised disasters including hurricanes, floods, drought, earthquakes, slides, famine, volcano, mudslides (also see Rasmussen, 2004).

five key results corresponding to fiscal free-riding continue to hold, i.e., presence of inter-temporal free riding under both FPCU and fixed peg regimes; absence of intertemporal free-riding under flexible regimes; deterioration of fiscal stances with increase in bailout capacity of the regional central bank with increase in size of the member country in the ECCU (both results reflecting the presence of regional free riding); and the absence of regional free riding in countries that do not belong to a FPCU.

Other controls—e.g., availability of external financing (proxied by total private sector capital flows from industrial countries to emerging market economies); world oil prices; world interest rates (proxied by the three-month U.S. treasury bill rate); and institutional development (proxied by real GDP per capita) were also added to the regression but did not have any systematic or significant influence on fiscal policy.

Alternative proxy for fiscal stance

Primary expenditure (as a percentage of GDP) is used as an alternative proxy of fiscal stance (Table 3, column (b)).[33] The results on intertemporal free-riding and size based regional free-riding under the ECCU continue to hold, while the result of inter-temporal free riding under fixed exchange rate regimes does not. Note also that, primary spending does not increase in respond to the reserve coverage at the ECCB. Using fiscal revenue as an alternative proxy for fiscal stance, the results show that increase in the bailout capacity of the ECCB reduces fiscal revenues significantly, i.e., regional free-riding is manifested through an increase in governments' laxity in generating fiscal revenues. [34] Also, as expected, fiscal policies under non-FPCU regimes are nor affected by regional free-riding.

[32] This result could have two implications: either, the increase in fiscal spending in response to a natural disaster was accompanied with at least the same increase in grant financed fiscal revenue; or contrary to expectations, primary expenditure did not increase or was actually compressed during a disaster episode (column (b) provides some support for this argument).

[33] Note that the primary spending only summarizes the expenditure side of fiscal stance and hence is a relatively poor proxy of fiscal policy compared to the primary balance. In other words, a deterioration of fiscal stance is associated with an increase in primary expenditure, only if the former overshoots any increase in fiscal revenue.

[34] These regression results are not presented here, but available upon request.

Table 3. Determinants of Fiscal Policy in the Caribbean, 1983-2004

Fixed Effect Regression	Dependent variable (in percent of GDP)	
	(a) primary balance	(b) primary expenditure
Explanatory Variables	Coefficients 1/	
(1) Proximity to election (number of years to election) for flexible regimes	-0.10	0.22
	(0.98)	(0.46)
(2) Inter-temporal free-riding in the ECCU: Proximity to election for countries under the ECCU	-0.59	0.62
	(0.03)**	(0.01)**
(3) Inter-temporal free-riding under fixed pegs: Proximity to election for fixed peg regimes	-0.44	-0.07
	(0.09)*	(0.75)
(4) Official foreign reserves (relative to reserve money) for non-ECCU countries	0.01	-0.01
	(0.93)	(0.14)
(5) Regional free-riding: Official foreign reserves (relative to reserve money) for ECCU countries	-0.11	-0.06
	(0.03)**	(0.18)
(6) Regional free-riding : Dummy for ECCU * relative country size in ECCU	-0.79	2.56
	(0.05)**	(0.00)**
(7) Real GDP growth	-0.04	0
	(0.66)	(0.96)
(8) Terms of trade	0.01	-0.04
	-0.67	(0.00)**
(9) Trade openness	0.02	0.00
	(0.05)**	(0.71)
(10) Dummy for IMF program	1.32	0.20
	(0.16)	(0.80)
(11) Natural disasters		
Antigua and Barbuda, 1995	-6.39	11.40
	(0.08)*	(0.00)**
St. Kitts and Nevis, 1987	8.85	-6.49
	(0.02)**	(0.09)*
St. Lucia, 1987	7.76	-1.04
	(0.04)**	(0.78)
St. Lucia, 1988	8.43	-1.63
	(0.02)**	(0.67)
St. Vincent and the Grenadines, 1986	7.23	-3.82
	(0.03)**	(0.31)
St. Vincent and the Grenadines, 1987	5.90	4.46
	(0.10)*	(0.23)
St. Vincent and the Grenadines, 1992	-5.48	0.61
	(0.09)*	(0.87)
Number of observations	256	282
Number of countries	15	15
R-squared	0.54	0.33
Significance of the regression	F(89, 152) = 2.03**	F(37,230)=3.59**
Significance of U(i)s	F(14, 152) = 9.22**	F(14,230)=42.74**

Source: Authors' calculations.

1/ Each coefficient represents the impact of a change in a given explanatory variable on the fiscal stance. The parentheses contain probability values. Results that are statistically significant at 5 percent and 10 percent are marked by "**" and "*" respectively. Coefficients on time dummies not shown

IV. Conclusion

This paper explores how fiscal incentives are distorted under alternative exchange rate arrangements. It first develops a conceptual framework to show that fiscal policies under a fixed exchange rate in a currency union can be influenced by free-riding behavior owing to the ability of policy markers to shift the costs of fiscal overspending to future governments or to neighboring member countries. Stylized facts support the main conclusion of the conceptual framework in that for a sample of 15 Caribbean countries during 1983-2004, fiscal stances of the countries with a fixed peg in a currency union (FPCU) were the most expansionary, followed by countries with fixed peg regimes. Finally, the paper estimates the determinants of fiscal policies in the Caribbean countries in a panel context, which confirm that free-riding does influence fiscal policies in countries with the FPCU regime and (to a lesser extent) in countries with fixed peg regimes.

These results raise an important concern regarding countries behavior with the choice of exchange rate regimes. Thus, while it might be true that many countries opt for fixed exchange rate regimes to control fiscal spending, it is also true that many countries eventually renege on their own implicit commitment on fiscal constraint, and prefer to postpone the costs of spending to the future. Under a FPCU like the Eastern Union Currency Union, this result is aggravated by the additional dimension of free-riding whereby member countries expect to share the costs of country-specific spending with all other member countries. Thus, often, the consequence of choosing restrictive exchange rate regimes backfires, resulting in looser fiscal discipline than before.

These findings underscore the need to ensure the consistency of fiscal policies with the FPCU arrangement in the ECCU. Possible options include improving the effectiveness of the regional central bank's fiscal guidelines by enforcing them at the regional or national levels. Other options are comprehensive disbursement of information on country-specific fiscal performance throughout the region to generate peer pressure and induce more fiscal discipline. Regional free-riding could be discouraged by clearly demonstrating that the regional central bank will not bailout members—either directly by financing fiscal deficits, or indirectly by bailing out banking systems in individual countries. In this regard, the current practice by the ECCB of not bailing out governments facing intermittent debt servicing problems (as in Antigua and Barbuda since the early 1980s and Dominica in 2002) has helped establish the credibility of the central bank's commitment to exchange rate stability. Finally, consideration should also be given to whether more fiscal policy coordination at the regional level would help attain greater fiscal discipline in the region.

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Appendix I. Some Extensions to the Theoretical Model

We consider here the consequences of introducing simple extensions to the basic conceptual framework that was developed in the text. The extensions do not change the main results of the model in terms of the differences in the scope for free-riding under different exchange rate regimes, but help explore how to relate the main results with the empirical estimation of free-riding in fiscal policies.

Asymmetries in country size

The model assumes that all governments are identical and the solution for government spending is symmetric. Now consider how the results might change if country sizes are different. The analysis will reveal two offsetting forces affecting the incentives for spending. On the one hand, larger countries tend to have greater bargaining power with the regional central bank, and thus could sustain higher deficits based on greater access to inflationary financing. On the other hand, large countries have less capacity to dilute the costs of their misbehavior across the union, as they represent an important share of it.

The setup of the problem changes in two different dimensions. First, we assume the representative consumer of each country is scaled by a factor *s*, which represents the relative size of each country. Thus, the money holdings and consumption are scaled by the same factor and the aggregate government budget constraint becomes:

$$(1+r)(\sum_{i=1}^{n}(f_{i,0}+m_{i,0}))=\sum_{i=1}^{n}s^{i}m_{i.0}^{1-1/\varepsilon}+\sum_{i=1}^{n}s^{i}m_{i.1}^{1-1/\varepsilon}/(1+r)-\sum_{i=1}^{n}g_{i,1}-\sum_{i=1}^{n}g_{i,2}/(1+r) \qquad (22)$$

Second, the central bank treats countries differently according to their size. Large countries typically have more bargaining power with the central bank, as their importance for economic success of the union as a whole tends to be higher.[35] To capture this effect we now introduce the possibility that the central bank decides to extend bailouts only to certain subset of countries based on their relative size. We are thus going to assume two types of countries: “small” (with no access to central bank bailout) and “large” (with access to central bank bailout).

The solution to government spending for small countries now becomes

$$g_{i,1}^{fix,cu,small}=0 \qquad (23)$$

For large countries, under fixed exchange rates, first-order condition (14) for each country *i* becomes:

[35] For a model of discipline and bargaining power, see Berger et al (2004) for the case of Eastern European countries.

$$\delta s^i m_{i,1}^{-1/\varepsilon} = \frac{\psi(1-\varepsilon)\sum_{j=1}^{n} s^j}{(1+r)\varepsilon} m_{i,1}^{-1/\varepsilon} \tag{24}$$

Thus, the solution for government spending is:

$$u'(g_{i,1}^{fix,cu,l\arg e}) = \delta(1+r)\frac{s^i}{\sum_{j=1}^{n} s^j}\frac{\varepsilon}{(1-\varepsilon)} \tag{25}$$

The solutions show offsetting effects on government spending. On the one hand, the bigger the share of the country in the union ($\frac{s^i}{\sum_{j=1}^{n} s^j}$) the smaller government spending, as there are less free riding opportunities available. On the other hand, the smaller the share of the country the more likely it will not have access to bailouts and its government spending financed by inflation tax would have to be zero.

Role of pooled international reserves

The regional central bank's bailout decision can be further complicated by introducing the role of international reserves. If international reserves are high enough so that the central bank can extend a bailout without generating inflation in period 2, every individual country will have an extra incentive to spend given the possibility of a non-inflationary bailout. Even if governments do not expect to be directly bailed out by the central bank, the latter's commitment to bail out the financial system from systemic crises reduces the urgency for governments to prepare for potential liquidity shortages in the banking system, and also benefits governments that have significant ownership in the banking system. This implies that in times of higher reserves government spending also increase as fiscal authorities endeavor to exploit this opportunity.

Finally, to approach the data, it is desirable to take into account that the model has assumed that there is full access to capital markets and no uncertainty in debt repayment. However, full free-riding opportunities may not be fully exploited if capital markets imperfections are introduced.

Appendix II. Data Sources

Fiscal stance proxies. (i) *Primary balance divided by nominal GDP*: For the ECCU countries, data for primary balance and GDP during 1983–1990 was obtained from the Eastern Caribbean Central Bank (ECCB), while data after 1990 was obtained from IMF, Western Hemisphere Department. For the non-ECCU countries (except The Bahamas) data was obtained from IMF, Western Hemisphere Department. The data of the Bahamas was obtained from IMF, World Economic Outlook (series GCBXI for primary balance, and series NGDP for nominal GDP) (ii) *Primary expenditure, divided by nominal GDP*: For the ECCU countries, the primary expenditure series before 1990 was obtained from the ECCB, while that after 1990 was from IMF, Western Hemisphere Department. For the non-ECCU countries the data was from IMF, World Economic Outlook (series GCENL – series GCEI) (iii) *Overall balance, divided by nominal GDP*: For the ECCU countries, the overall balance before 1990 was obtained from the ECCB, while that after 1990 was from IMF, Western Hemisphere Department. For the non-ECCU countries, the data was from IMF, World Economic Outlook (series GCB).

De facto exchange rate regime. Reinhart-Rogoff (2002) classification of exchange rate regimes, the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*, various issues, and IMF, Western Hemisphere Department.

Gross domestic product. For ECCU countries from IMF, Western Hemisphere Department. For the rest of the Caribbean countries from WEO (series W_NGDP_R).

Election dates. From *Database of Political Institutions,* World Bank.

ECCB foreign reserves coverage was measured by the ratio of foreign assets at the ECCB in terms of reserve money (lines 1L. DZF and 14...ZF in IMF's International Financial Statistics, IFS). Nominal exchange rate between EC$ and US$ (series AE.ZF in IFS) was used to convert foreign assets of the ECCB in US$ to that in EC$.

Terms of trade. WEO, Series W_TT .

Openness. Defined as the sum of exports and imports of goods and services, divided by nominal gross domestic product. For ECCU countries, these series were obtained from the IFS, series codes 90C..ZF… (exports), 98C..ZF… (imports) and 99B..ZF… (nominal GDP). For rest of Caribbean, the series were obtained from WEO: WEO W_NX (exports), W_NM (imports) and W_NGDP (nominal GDP).