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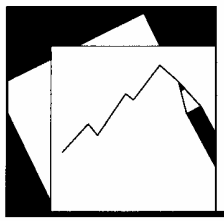

IMF Working Paper

Tax Incentives and Investment in the Eastern Caribbean

Sebastian Sosa

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Tax Incentives and Investment in the Eastern Caribbean

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Abstract

Tax incentives have been used extensively in the countries of the Eastern Caribbean Currency Union (ECCU) to promote investment. The associated revenue losses are large, and benefits in terms of new investment have been limited, raising doubts about the cost effectiveness of the tax incentive schemes. This paper examines the effects of incentives using the marginal effective tax rate approach (METR), adapting this methodology to the case of a small open economy where the marginal investor is a nonresident. The results show that METRs are high in the region; that there is a large dispersion in the size of METRs across financing source; and that METRs on investment are larger than the overall distortion on capital, with a substantial subsidy to domestic saving. In the presence of tax holidays—the most common incentive scheme in the region—the distortion on capital basically vanishes.

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Contents Page

I. Introduction 3

II. Related Literature 4

III. Methodology 5
A. Derivation of the Required Pre-Tax Real Rate of Return (p): A Simple Model of Investment 5
B. After-Tax Real Rate of Return to Savers (s) and the Nominal Cost of Funds (r) 8
C. The Arbitrage Assumption 8
D. Incorporation of Indirect Taxes 10
E. METR in the Presence of Tax Holidays 10
F. Limitations of the Methodology 11

IV. Tax Incentives in the ECCU 12

V. Results 12
A. Magnitude of the Distortions 13
B. The Case of Tax Holidays 13
C. Distortions Across Sectors, Assets, and Financing Sources 13
D. Distortions on Investment and on Saving 14
E. An Alternative Incentive Scheme 14

VI. Concluding Remarks 15

Appendices
I. Alternative Expressions for Z 16
II. Summary of the Tax Provisions and Fiscal Incentives in the ECCU 17
III. Data and Assumptions 19

References 20

Figure
1. Marginal Effective Taxes in a Small Open Economy 22

Tables
1. METRs in the ECCU Region (Tourism and Hotels; Machinery) 23
2. METRs in the ECCU Region (Tourism and Hotels; Machinery) 23
3. METRs in the ECCU Region (Tourism and Hotels; Buildings) 24
4. METRs in the ECCU Region (Manufacturing; Machinery) 25
5. METRs in the ECCU Region (Manufacturing; Buildings) 26
6. METRs on Investment in the ECCU Region 27
7. METRs on Saving in the ECCU Region 27
8. METRs in the ECCU Region: An Alternative Incentive Scheme 27

I. INTRODUCTION

Tax incentives have been widely used in the countries of the Eastern Caribbean Currency Union (ECCU) as an instrument to promote investment. These incentives have typically been granted in the form of tax holidays, exempting certain firms from paying both import duties and corporate income taxes.

Recently, doubts have been raised about the efficacy and cost effectiveness of tax concession schemes in the region. On the one hand, revenue losses from them are large and have increased over the last decade. Chai and Goyal (2005) estimate forgone tax revenues in the ECCU countries to range between 10 and 16 percent of GDP. The high cost in terms of loss of revenues is particularly relevant given the fiscal and financial vulnerabilities of the region. Tax incentives in the ECCU have other less obvious costs. In some cases tax holidays are granted with a considerable degree of discretion, relying on case-by-case evaluations.[2] These types of concessions are not only difficult to administer effectively, but are also nontransparent. In addition, they are in general non-neutral, distorting the allocation of resources. On the other hand, the benefits of tax incentives in terms of increased foreign direct investment (FDI) appear to have been limited. In fact, FDI flows to the ECCU countries relative to the rest of the world declined dramatically during the second half of the 1990s.

The main objective of the paper is to examine the incentives for investment in the corporate sector offered by the tax systems in the ECCU using the marginal effective tax rate (METR) approach. This approach has been widely used to examine tax incentives and the distortions generated in the capital market by the tax system. However, no previous work has been done applying this methodology to the case of the ECCU.

The METR is a forward-looking measure that summarizes the incentives to invest in a particular asset as provided by complex tax laws. It can be interpreted as the tax rate that bears on revenue from marginal investment, hence constituting the adequate measure of incentives to additional investment. The METR, rather than the statutory or average effective tax rate (AETR), is the tax rate that really matters in capital allocation.

The contributions of the paper are twofold. First, a methodology is developed based on King and Fullerton (1984), extending their approach to the case of a small open economy where the marginal investor is nonresident. As will be discussed later, the corresponding arbitrage assumption implies that the saving and investment sides of the domestic capital market are effectively segmented. An important implication is that the METR on capital decisions can be decomposed into that corresponding to the investment side and that corresponding to the

[2] Even though most concessions are granted under the existing legislation (Hotel Aid Ordinances, Fiscal Incentives Ordinances, Import Duty Acts, etc.), some others are granted by special decisions by Ministers or the Cabinet, with a significant degree of administrative discretion.

saving side. Indirect taxes—which are typically excluded from the METR framework—are also incorporated into the analysis.

The second contribution of the paper is the application of the methodology to the countries of the ECCU. METRs are computed for all the countries in the region in order to get a quantitative estimation of the distortions generated in the capital market by the tax system. Moreover, the total distortion on capital is broken into two components by estimating separately the distortions affecting the investment side and those affecting the saving side. The effectiveness of alternative tax schemes is analyzed by performing the following exercises: (i) simulation of METRs for a scenario with tax holiday, in order to analyze the effective incentive provided by this type of concession, which is the most commonly used in the region; and (ii) simulation of the effects on METRs of eliminating tax holidays and lowering the general corporate income tax rate. Finally, in addition to the intertemporal distortion—the extent of which is measured by the size of the METR—other types of distortions caused by the tax system on capital are estimated; namely the distortions across sector, asset, and financing instrument.

The paper proceeds as follows. The next section summarizes the related literature. Section III presents the conceptual framework and methodology. Section IV describes the main components of the tax system in ECCU countries, in particular the different incentive provisions. Section V undertakes the application of the methodology to these countries, and presents the results of the simulations for a set of alternative scenarios. Section VI contains some concluding remarks.

II. Related Literature

The effect of tax incentives in developing countries has been examined using different methodologies in recent empirical studies. Several country studies have used the METR approach: Estache and Gaspar (1995) analyze the Brazilian case; Boadway, Chua, and Flatters (1995) the case of Malaysia; and Mintz and Tsiopoulos (1995) the case of Central and Eastern European countries. Another branch of the literature studies the effect of tax systems on FDI in developing countries. Shah and Slemrod (1995) use time series data to examine the sensitivity of FDI to taxes in Mexico, incorporating METRs and other measures for tax rates into the analysis. Altshuler, Grubert, and Newlon (1998) use cross-section data to study the effects of taxation on FDI in 58 countries in 1984 and 1992. Using panel data, Wei (2000) analyzes the effect of taxes and corruption on FDI for a sample of 45 developed and developing countries. Based on a dynamic model of production, Bernstein and Shah (1995) provide an empirical framework for assessing the case of Mexico, Pakistan, and Turkey. Another case study is provided by Chalk (2001), who analyzes tax incentives in the Philippines from a regional perspective. Surveys of investors have also frequently been used to evaluate the effectiveness of tax incentives in developing countries. Examples of this approach are provided by Halvorsen (1995) for Thailand; and OECD (1995) for a group of transition economies.

Previous studies on tax incentives in the ECCU have approached the issue from different perspectives. Bain (1995) focuses on revenue losses associated with tax concessions; Chai and Goyal (2005) compare these costs with the benefits in terms of increased FDI; Andrews and Williams (1999) analyze the administrative aspects of tax concessions; and Lecraw (2003) focuses on coordination and harmonization issues. However, as was mentioned before, no previous work has been done using the METR approach to the case of the ECCU countries.

III. METHODOLOGY

The METR approach is used, following the seminal contribution by King and Fullerton (1984), and extending their methodology to the case of a small open economy where the marginal investor is nonresident.

The METR approach has been widely used to examine tax incentives and distortions in the capital market induced by the tax system. The METR measures the tax burden on a marginal investment in a given type of asset; that is, how the marginal rate of return on such investment is affected by tax provisions. The focus is on marginal effective tax rates because for allocation decisions they are more relevant than average ones. The effect of alternative investment incentives can be estimated by computing how the METR is affected by the incentive scheme.

The METR is defined as the wedge between the expected pre-tax real rate of return on a new marginal investment project, net of true economic depreciation (*p)* and the after-tax real return to the saver who supplied the funds for the investment (*s*), typically expressed as a percentage of the pre-tax rate of return:

$$METR = \frac{p - s}{p}. \tag{1}$$

In a scenario without of taxes, a saver investing his funds in a marginal project would earn a real rate of return equal to the rate of return of the project itself. On the other hand, with distortionary taxes and concessions, the two rates of return can differ. The size of the wedge depends on such factors as: specific corporate tax and incentives scheme, the interaction of taxes with inflation, the tax treatment of depreciation and inventories, the personal tax regime, the treatment of capital gains, dividends and other forms of income, the type of asset, the economic sector of the project, and the source of finance.

A. Derivation of the Required Pre-Tax Real Rate of Return (*p*): A Simple Model of Investment

The required pre-tax real rate of return (*p*) is typically inferred by measuring the user cost of capital. We use the standard theory of the firm, following the Jorgenson (1963) and Hall and

Jorgenson (1967) neoclassical models of investment, in order to derive an expression for the user cost of capital.

Consider a firm that produces output according to the following production function with the standard properties:

$$Y_t = F(K_t, L_t)$$

where Y_t, K_t, and L_t are output, capital stock and labor in period t.

The firm's problem is to maximize the net present value of the cash flow discounted by the nominal cost of capital *(r)*.[3] Hence, firm's optimization problem is:[4]

$$Max \int_0^{\infty} \left[(P_t F(K_t, L_t) - W_t L_t)(1-\tau) - (1-\phi)(1-Z) Q_t I_t \right] e^{-rt}$$

$$s.t. \dot{K}_t = I_t - \delta K_t \; ; \; K_0 \text{ given}$$

where I_t stands for investment in period t, P_t is the price of output, Q_t is the price of investment goods, W_t is the nominal wage, τ is the corporate income tax rate, ϕ is the investment tax credit, δ is the economic depreciation rate of capital, and Z stands for the present value of the future tax savings from depreciation allowances per dollar of gross investment.

The current value Hamiltonian for this problem is:

$$H = \left[P_t F(K_t, L_t) - W_t L_t \right](1-\tau) - (1-\phi)(1-Z) Q_t I_t + \lambda_t \left[I_t - \delta K_t \right]$$

where λ is the co-state variable representing the shadow price of capital. The first order conditions for the optimal value of the capital path, using L_t and I_t as control variables and K_t as the state variable are:

$$\frac{\partial H}{\partial I_t} = -(1-\phi)(1-Z) Q_t + \lambda_t = 0 \qquad (2)$$

$$\frac{\partial H}{\partial L_t} = \left[P_t F_L(K_t, L_t) - W_t \right](1-\tau) = 0 \qquad (3)$$

---

[3] This optimization problem is equivalent to maximize the equity or market value of the firm, since the latter is proportional to the net present value of its cash flow.

[4] We set up the model in continuous time only for convenience.

$$\dot{\lambda}_t = r\lambda_t - \frac{\partial H}{\partial K_t} = r\lambda_t - P_t F_K\left(K_t, L_t\right)\left(1-\tau\right) + \delta\lambda_t \qquad (4)$$

$$\frac{\partial H}{\partial \lambda_t} = \dot{K}_t = I_t - \delta K_t \quad . \qquad (5)$$

First order condition (3) implies the standard equilibrium condition, $F_L = \frac{W_t}{P_t} = w$ that is, labor is employed until its marginal product is equal to the real wage.

From (2) we infer that $\lambda_t = (1-\phi)(1-Z)Q_t$, thus $\dot{\lambda}_t = (1-\phi)(1-Z)\dot{Q}_t$. Hence, using (4) we get:

$$P_t F_K\left(K_t, L_t\right) = \frac{\left(r + \delta - \frac{\dot{Q}_t}{Q_t}\right)}{1-\tau}(1-\phi)(1-Z)Q_t \quad . \qquad (6)$$

Deflating P_t and Q_t by $e^{-\pi t}$, where π is the inflation rate and p^* and q are then real prices, we get:[5]

$$\frac{p_t^* F_K\left(K_t, L_t\right)}{q_t} = \frac{\left(r - \pi + \delta - \frac{\dot{q}_t}{q_t}\right)}{1-\tau}(1-\phi)(1-Z). \qquad (7)$$

The right-hand side of equation (7) constitutes an expression for the user cost of capital incorporating tax issues. In equilibrium this user cost of capital is equal to the marginal product of capital gross of taxes. In order to convert it to a rate of return, the economic depreciation rate is subtracted. The required real rate of return, gross of taxes but net of depreciation (p), is then:

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[5] In the literature, most applications of this methodology assume $\frac{\dot{q}_t}{q_t} = 0$, either because estimates of real capital gains are not reliable or because the tax system is indexed to inflation.

$$p_t = \frac{\left(r - \pi + \delta - \frac{\dot{q}_t}{q_t} \right)}{1-\tau}(1-\phi)(1-Z) - \left(\delta - \frac{\dot{q}_t}{q_t} \right). \qquad (8)$$

The present value of the future tax savings from depreciation allowances per dollar of gross investment *(Z)* depends on the details of the tax system, in particular the depreciation schedules for tax purposes. The expressions for *Z* for alternative tax depreciation provisions are presented in Appendix I.

B. After-Tax Real Rate of Return to Savers (*s*) and the Nominal Cost of Funds (*r*)

The after-tax real rate of return to savers (*s*) depends on the source of financing and can be measured as a weighted average of the rates on those sources: corporate bonds, retained earnings, and new equity issues. Hence:

$$s = \beta i\left(1 - m^i\right) + \left(1-\beta\right)\left[\alpha\left(1 - m^d + \tau\right)\rho + \left(1-\alpha\right)\rho\right] - \pi \qquad (9)$$

where i is the corporate borrowing rate, m^i and m^d are the individual's personal tax rate on interest and dividends respectively, β is the debt-asset ratio of the firm, α is the proportion of new shares in total equity finance, and ρ is the firm's cost of equity. Intuitively, a saver holding corporate debt receives a rate of return equal to $i(1- m^i)$. The after-tax nominal rate of return on new shares is $\left(1 - m^d + \tau\right)\rho$, because dividends are taxed at the personal level and can be credited for corporate taxes paid. Finally, the rate of return to savers on retained earnings is equal to ρ, since capital gains are in general nontaxable.

The nominal cost of funds, *r*, i.e. the one that the firm uses for discounting its cash flow, is a weighted average of its after-tax borrowing costs and the cost of raising equity:

$$r = \beta i\left(1-\tau\right) + \left(1-\beta\right)\rho\,. \qquad (10)$$

The cost of debt financing is $i(1-\tau)$, due to the fact that interest payments are tax deductible. Note that it is assumed that the cost of equity finance from new issues is equal to that from retained earnings. This is a correct assumption if there is no tax on capital gains and if there is full imputation of corporate taxes, which ensures that dividends remain un-taxed at the personal level.

C. The Arbitrage Assumption

A key issue in the use of the METR approach is the selection of an arbitrage assumption. The arbitrage assumption determines which rates of return are taken as given, and consequently

which rates are computed given the true values of the parameters. In the seminal work by Fullerton and King (1984) two alternative arbitrage assumptions are adopted: the so called fixed-*p* and fixed-*s* cases. The former implies that investments be compared with the same pre-tax rate of return by taking *p* as given. The latter, on the other hand, takes the after-tax return to savers *(s)* as given.

In this paper an alternative, small open economy assumption is used—the financing costs facing a country are determined by international capital markets—and it is assumed that the marginal investor is a nonresident. Therefore, the after-tax rate of return to foreign investors is exogenous. Using this arbitrage assumption both i and ρ can be computed, which in turn are used to calculate s, r and p.

More specifically, nominal rates of return are based on the world real rate of return, adjusted for taxes on nonresidents:[6]

$$i = \frac{r^* + \pi}{1 - \tau^d} \tag{11}$$

$$\rho = \frac{r^* + \pi}{1 - \tau^e} \tag{12}$$

where r^* is the world real interest rate, and τ^d and τ^e stand for the noncreditable tax rate on nonresidents' interest and dividend income, respectively.

Given our arbitrage assumption, the required rate of return is exogenously given by international capital markets. Therefore, the saving and investment sides of the domestic capital market are effectively segmented; in any given year domestic saving and investment need not necessarily be equal. An important implication is that the METR on a capital decision can be broken into two components, one corresponding to the investment side and the other corresponding to the saving side, as illustrated in Figure 1.[7]

The effects of each country's tax system on incentives to invest are measured by the marginal effective tax rate on investment, computed as the percentage difference between the pre-tax real rate of return under each system (p), and the real rate of return if income from capital

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[6] This formulation is based on Hansson and Stuart (1986).

[7] The graph illustrates a "normal" situation in which METRs, both on investment and saving, are positive. Many tax systems, including the ECCU as will be shown later, have the effect of subsidizing either marginal investments or savings.

were untaxed—that is, the world real rate of return, r^*. The marginal effective tax rate on saving is measured by the percentage difference between the after-tax real return to domestic savers (s) and the prevailing rate of return available in international capital markets (r^*), which would be the return to investors in the absence of any taxes. Therefore, the marginal effective tax rates on investment and saving can be expressed as:

$$METR(I) = \frac{p - r^*}{p} \tag{13}$$

$$METR(S) = \frac{r^* - s}{s} \quad . \tag{14}$$

D. Incorporation of Indirect Taxes

The METR methodology is usually used to estimate the distortion caused only by direct taxes. In this paper, some indirect taxes—in particular import duties and tariffs—are also incorporated into the analysis. This is particularly relevant in our case study, since in the ECCU countries tax concessions typically include exemptions from this type of tax. In fact, one of the most common incentives in the region is the exemption from duties of imports of plant and equipment. This type of tax affects the price of investment, and the expression for p becomes:

$$p_t = \frac{\left(r - \pi + \delta - \frac{\dot{q}_t}{q_t} \right)}{1 - \tau} (1 - \phi)(1 + \psi)(1 - Z) - \left(\delta - \frac{\dot{q}_t}{q_t} \right) \tag{15}$$

where ψ represents the import tariff.

E. METR in the Presence of Tax Holidays

As mentioned earlier, the tax holiday is the most common incentive scheme in the ECCU. The METR approach for the case of a firm which operates under a tax holiday is now described, following Boadway, Chua, and Flatters (1995).

Suppose that the length of the holiday period is equal to T years, and no taxes are paid by the firm during that lapse of time. The computation of p in the presence of tax holidays is more complicated, and can be expressed as:

$$p_t = \frac{\left(r_t - \pi + \delta - \frac{\dot{q}_t}{q_t}\right)}{1-\tau_t}(1+\psi_t)(1-Z_t) + \frac{\left[1 + r_t - \pi - \frac{\dot{q}_t}{q_t}\right]\left(\dot{Z}_t\right)}{1-\tau_t} - \left(\delta - \frac{\dot{q}_t}{q_t}\right). \quad (16)$$

The tax holiday provisions make τ_t, ψ_t, r_t, i_t, ρ_t, and Z_t vary over time. Statutory tax rates are equal to zero between period 0 and T, and τ and ψ afterwards. The cost of funds for the firm is now given by $r_t = \beta i_t(1-\tau_t) + (1-\beta)\rho_t$. Since statutory taxes take only two values depending on whether the firm is operating during or after the tax holiday, r_t has two values as well: r_0 during the holiday and r_1 afterwards.

It is assumed that there is an initial depreciation allowance of γ on gross investment, that the remaining *(1- γ)* can be depreciated according to a declining balance schedule at a rate equal to η, and that depreciation allowances cannot be deferred until the end of the tax holiday. Under these assumptions, Z_t is given by:[8]

$$Z_t = \tau(1-\gamma)(1+r_1)\left(\frac{\eta}{\eta + r_1}\right)(1-m^d)\left[\left(\frac{1-\gamma}{1+r_0}\right)\right]^{T-1}. \quad (17)$$

F. Limitations of the Methodology

The METR approach is used extensively as an indicator of the incentive effects of the tax structure. Nonetheless, this methodology has some limitations. First, the METR measures only the distortion on capital decisions by quantifying the effect of taxes and concessions on the rate of return; it does not measure the responsiveness of investment, nor it does show the effects on government tax revenues. Second, the computation of METRs typically implies some strong assumptions. All markets are assumed to be competitive. Firms operate in a risk-free environment or at least one in which they maximize only expected returns; in fact firms act as if the future cash flows and tax rules were known with certainty. The financial structure of the firm is taken as given; that is, the incentive effects of the tax provisions on the financial structure are not endogenous. Finally, the same tax structure, tax rates, and inflation rate are expected to remain constant over the entire life of the project; hence METRs computations estimate capital decisions in a world in which economic agents expect no changes.

[8] For a detailed derivation of Z_t in the case of tax holidays see Mintz (1995).

IV. TAX INCENTIVES IN THE ECCU

Countries in the ECCU grant a wide range of tax concessions, currently provided by various laws. The most important are the Hotel Aid Ordinances, which apply to hotels, the Fiscal Incentives Ordinances, which apply to the manufacturing sector, and the Import Duty Act, which refers to import duties. Each ECCU country issues its own version of this legislation. In general, tax concessions have to be approved by Cabinet, but some authority is delegated to Ministries of Industries, Development Corporations, Directors of Finance, and Customs authorities. Even though most concessions are granted under the existing legislation, there is a significant degree of discretionary power available to Ministers and the Cabinet. The incentive schemes typically exempt specific firms from paying corporate income taxes for a tax holiday period varying from 5 to 20 years, and may also allow the firms to carry forward net losses during the holiday period. On the indirect tax side, tax incentives comprise in general exemption from import duties on raw materials and equipment. Appendix II summarizes the most relevant issues of the tax system in each country of the ECCU, describing in particular the tax incentive scheme in each of them.

V. RESULTS

This section presents the estimation of the distortions on capital decisions resulting from the ECCU countries' tax systems. METRs are computed for each of the six countries in the region, considering different sectors (tourism and hotels, and manufacturing), assets (machinery and buildings), and sources of financing (debt, equity, and a weighted average of these two sources).[9]

The main objectives of this section are as follows. First, METRs for each country of the ECCU are computed in order to quantify the magnitude of the intertemporal distortions affecting capital markets caused by the tax system. Second, indirect taxes are incorporated in the estimation of METRs. Third, other types of distortions caused by the tax system on capital are estimated, measured by the dispersion of the METRs across sectors, across assets and across financing instruments. Fourth, the total distortion on capital is decomposed by estimating separately the distortions affecting the investment side and those affecting the saving side. Finally, simulations of the effectiveness of alternative tax schemes are undertaken: (i) simulation of the METRs in every country of the ECCU for a scenario with tax holidays, the most widely used concession scheme in the region, in order to analyze the effective incentive provided thereby; and (ii) simulation of the effects on METRs of eliminating tax holidays and lowering the general corporate income tax rate.

[9] The data used for each country's estimation is summarized in Appendix II. Additional data and assumptions used in the empirical analysis are described in Appendix III.

A. Magnitude of the Distortions

We begin by computing METRs for a base case, in which the sector considered is tourism and hotels, the asset considered is machinery, and the financing source considered is a weighted average of debt (35 percent) and equity (65 percent) financing. The first column of Table 1 presents the results for each country in the region for a scenario without tax holidays. The size of METRs is high in the region, 23.7 percent on average, and METRs range from 16.9 percent in Grenada to 33.7 percent in Antigua and Barbuda. Intuitively, for every dollar of income from the marginal investment, approximately 24 cents are paid in taxes and 76 cents are earned by the saver who supplied the funds for the investment. The magnitude of these distortions is fairly similar to those of the rest of the Caribbean, where the METR is 24.7 percent on average.[10] The size of METRs in the ECCU is higher if we include indirect taxes into the analysis. As the second column of the table shows, the average METR increases to 41.1 percent, varying from 34.1 percent in the case of Grenada to 47.8 percent in the case of Antigua and Barbuda.

B. The Case of Tax Holidays

As was mentioned earlier, the tax holiday is the most common incentive scheme within the region. The third column of Table 1 presents the results of the simulations for the base case assuming now that the investment is undertaken by a firm enjoying a tax holiday. By comparing METRs for cases with and without a tax holiday, the effective incentive to investment provided by such concession scheme can be estimated. In the presence of tax holidays there is a dramatic reduction in METRs and the distortion on capital caused by taxes basically vanishes, and in some cases—Antigua and Barbuda, and Grenada—it becomes a subsidy. To the extent that tax holidays are in some cases granted on a discretionary basis, this substantial difference on METRs implies a large distortion discriminating among investments which are granted a tax holiday and those which are not, a distortion that may imply an important misallocation of resources.

C. Distortions Across Sectors, Assets, and Financing Sources

Tables 2–5 present the results of the simulations for each country, for two different sectors—tourism and hotels, and manufacturing—for two types of assets—machinery and buildings—and for three alternative financing sources—100 percent debt, 100 percent equity, and a weighted average of both. There is a small dispersion of the size of METRs across sectors and across assets, which implies that both the intersectoral and cross-asset distortions are not of substantial magnitude. However, there is a large dispersion in the size of METRs across financing instruments. In fact, METRs for investments financed through debt are substantially lower, and in some cases—when indirect taxes are not considered—are

[10] The average for the rest of the Caribbean includes The Bahamas, Barbados, Belize, Dominican Republic, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago.

negative. This different pattern of distortions across method of finance is not related to any clear economic goal; therefore, the unintended consequences of these distortions are likely to cause an inefficient use of resources.

D. Distortions on Investment and on Saving

The selected arbitrage assumption discussed in Section III allows us to decompose the METR on a capital decision into two components, one corresponding to the investment side and the other corresponding to the saving side. As illustrated in Table 6, METRs on investment for our base case[11] are larger than the overall distortion on capital; in fact, the average METR(*I*) is equal to 53.1 percent. As in the case of the overall METRs, the presence of a tax holiday implies a large reduction of the METR(*I*), to an average equal to 11.0 percent. The fact that METR(*I*)s are higher than the overall distortions, indicates that METRs on domestic saving are negative. Table 7 illustrates the magnitude of the subsidies imposed by that the tax system on domestic saving. These subsidies are essentially explained by the lower burden imposed by personal income taxation on domestic savers relative to foreign savers. As in the case of the investment side, when tax holidays are considered the size of the distortion on saving is reduced.

E. An Alternative Incentive Scheme

As stated earlier, the presence of tax holidays causes a sharp reduction of METRs. A large reduction can also be obtained by considering an alternative incentive scheme, consisting of a lower corporate income tax rate and an initial depreciation allowance with further allowances of the undepreciated asset according to the true depreciation.[12] The results of the simulations for this alternative incentive scheme are presented in Table 8. The average METR in this scenario is equal to 6.3 percent. This alternative incentive scheme would not be granted on a discretionary basis; therefore, it would not cause the misallocation of resources caused by tax holidays (due to the distortions across investments benefited and those not benefited from the concession). Tax holidays have other disadvantages compared to this alternative scheme which have been highlighted in the related literature. First, the revenue losses associated to tax holidays are typically larger, without providing additional benefits in terms of lower METRs. Second, tax holidays represent a less transparent, less simple and less easy to administer incentive scheme. Finally, as has been shown by Harberger (1980), while the tax holiday system is non-neutral, an incentive scheme with a low corporate income tax rate and

[11] We present only the results of the simulations of the METR(*I*) and METR(*S*) for the base case; we undertook the simulation for all the combinations of sectors, assets, and financing instruments and the results do not vary significantly.

[12] In the following simulations we consider a corporate income tax rate equal to 30 percent and an initial depreciation allowance equal to 60 percent of the value of the asset. Similar results can be obtained with a lower corporate income tax rate—20 percent—and a less generous initial depreciation allowance.

an initial depreciation allowance with further depreciation according to the true deprecation is neutral.[13] As a non-neutral scheme, tax holidays subsidize not only the net return of the investment but also depreciation, hence discriminating between projects with different lifetimes.

VI. CONCLUDING REMARKS

In this paper, the METR approach is used to analyze the distortions on capital decisions created by the tax system in the ECCU member countries. This methodology is adapted to the case of a small open economy with a foreign marginal investor, incorporating both direct and indirect taxes into the analysis.

The main results of the paper are summarized as follows. METRs are high in the region, in particular when we include indirect taxes into the analysis. There is a small dispersion of the size of METRs across sectors and across assets, hence neither the intersectoral nor the cross-asset distortions appear to be large. In contrast, there is a large dispersion in the size of METRs across financing sources. METRs for debt-financed investments are substantially lower, and in some cases are negative. METRs on investment are larger than the overall distortion on capital, whereas there is a large subsidy to domestic saving explained by the lower burden on domestic savers relative to foreign savers imposed by the tax system at the personal level.

Tax holidays are the most common incentive scheme in all ECCU countries. METRs in the case of firms granted a tax holiday are substantially lower than those in the case without such a concession. In fact, with a tax holiday the distortion on capital caused by taxes basically disappears, and in same cases it becomes a subsidy. To the extent that in some cases tax holidays are granted with a considerable degree of discretion, this difference on METRs implies a substantial distortion discriminating among investments which are granted a tax holiday and those which are not, which may imply an important misallocation of resources.

A similar reduction in the METRs can also be obtained by considering an alternative incentive scheme, consisting in a lower corporate income tax rate and an initial depreciation allowance with further allowances of the undepreciated asset based on the true depreciation. In contrast to the tax holiday, this scheme would not be granted on a discretionary basis and therefore it would not cause the inefficient allocation of resources due to distortions across investments benefited and those not benefited from the concession.

[13] A non-neutral scheme is defined as one that promotes projects with low pre-tax rate of return while other projects with higher pre-tax rates of return are not promoted.

Alternative Expressions for *Z*

The present value of the future tax savings from depreciation allowances per dollar of gross investment (*Z*) depends on the details of the tax system, in particular the depreciation schedules for tax purposes. In this Appendix we present the expressions for *Z* for alternative tax depreciation provisions, following King and Fullerton (1984).

First, consider a case in which tax depreciation is granted at an exponential rate equal to η (which is the continuous time version of declining balance depreciation) and tax depreciation allowances are computed at historic cost. The expression for *Z* in this case is:

$$Z = \int_0^\infty \tau\eta e^{-(\eta+r)t} dt = \frac{\tau\eta}{\eta + r}.$$

Second, consider the case in which the tax system provides straight line depreciation. A tax lifetime, *L*, is specified for each asset; and the asset may be depreciated for tax purposes by *1/L* per unit in each year. In this case, *Z* can be expressed as:

$$Z = \int_0^L \tau\left(\frac{1}{L}\right)e^{-rt} dt = \frac{\tau\left(1 - e^{-rL}\right)}{rL}.$$

Finally, suppose that a proportion γ of an asset's cost can be immediately expensed, and the remaining *(1- γ)* can be depreciated according to a declining balance schedule on a historic cost basis. In this case *Z* becomes:

$$Z = \tau\gamma + \left(1 - \gamma\right)\int_0^\infty \eta\tau e^{-(r+\eta)t} dt = \tau\frac{\left(r\gamma + \eta\right)}{r\eta}.$$

Summary of the Tax Provisions and Fiscal Incentives in the ECCU

	Antigua and Barbuda	Dominica	Grenada
CIT [1] rate	40%	30%	30%
Personal income rate	• on interest: no tax • on dividends: no tax • capital gains: no tax	• on interest: no tax • on dividends: 15% • capital gains: no tax	• on interest: no tax • on dividends: 15% • capital gains: no tax
Nonresident withholding taxes	• on interest: 20% • on dividends: 20%	• on interest: no tax • on dividends: 15%	• on interest: no tax • on dividends: no tax
Depreciation schedule	• Declining balance	• Straight line	• Straight line
Loss carry-forward period	• Maximum 6 years (cannot reduce taxable income by more than 50% in any one year)	• Maximum 5 years, this period beginning at the end of the holiday period	• Maximum 5 years (cannot reduce taxable income by more than 50% in any one year)
Tax holidays	• Tax holidays of 5 (hotels) and 10–15 (manufacturing) years, exemption from CIT, duties and VAT on imports of plant, equipment and inputs for "approved" cases	• Tax holidays of up to 20 (hotels) and 10–15 (manufacturing) years, exemption from CIT, duties and VAT on imports of plant, equipment and inputs for "approved" cases. • No dividend taxes during the tax holiday	• Tax holidays of up to 10 (hotels) and 10–15 (manufacturing) years, exemption from CIT, duties and VAT on imports of plant, equipment and inputs for "approved" cases. • No dividend taxes during the tax holiday
Other incentives	• No taxes for offshore banking and insurance • Incentives for Export Processing Zones • Tax holiday of 15 years for enclave enterprises[14]	• No taxes for offshore banking and insurance • Tax holiday of 15 years for enclave enterprises	• Projects with exports over 60% are given additional tax holidays • No taxes for offshore banking and insurance • Tax holiday of 15 years for enclave enterprises

Sources: International Monetary Fund; and country authorities.

[1] Corporate income tax rate.

[14] Enclave enterprises are defined as 100 percent export-oriented projects, according to the 1974 CARICOM Agreement.

Summary of the Tax Provisions and Fiscal Incentives in the ECCU (concluded)

	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
CIT [1] rate	37%	33.33%	40% (35% for Hotels)
Personal income rate	• on interest: no tax • on dividends: no tax • capital gains: no tax	• on interest: 30% • on dividends: 30% • capital gains: no tax	• on interest: no tax • on dividends: no tax • capital gains: no tax
Nonresident withholding taxes	• on interest: no tax • on dividends: 10%	• on interest: no tax • on dividends: 25%	• on interest: 20% • on dividends: 20%
Depreciation schedule	• Declining balance with initial allowance of 20%	• Declining balance with initial allowance of 20%	• Declining balance with initial allowance of 10% (buildings) and 20% (equipment)
Loss carry-forward period	• Maximum 5 years (cannot reduce taxable income by more than 50% in any one year)	• Maximum 6 years (cannot reduce taxable income by more than 50% in any one year)	• Maximum 5 years (cannot reduce taxable income by more than 50% in any one year)
Tax holidays	• Tax holidays of 5–10 (hotels) and 10–15 (manufacturing) years, exemption from CIT, duties and VAT on imports of plant, equipment and inputs for "approved" cases	• Tax holidays of up to 15 (hotels) and 10–15 (manufacturing) years, exemption from CIT, duties and VAT on imports of plant, equipment and inputs for "approved" cases	• Tax holidays of up to 15 (hotels) and 10–15 (manufacturing) years, exemption from CIT, duties and VAT on imports of plant, equipment and inputs for "approved" cases
Other incentives	• No taxes for offshore banking and insurance • Tax holiday of 15 years for enclave enterprises	• No taxes for offshore banking and insurance • Tax holiday of 15 years for enclave enterprises	• Tax holiday of 25 years for offshore banking and insurance • Tax holiday of 15 years for enclave enterprises

Sources: International Monetary Fund; and country authorities.

[1] Corporate income tax rate.

Data and Assumptions

Most of the data used for each country are described in Section IV and in Appendix II, in particular the corporate and personal income tax rates, the nonresident withholding tax rates, the depreciation schedule provided by law, the loss carry-forward provisions, and the details regarding tax holiday schemes. In this Appendix, we describe additional data and assumptions used for the empirical analysis.

The projected inflation rate for 2005 for the ECCU—2.1 percent—is used as the inflation rate for all the countries in the region. Following previous work in the related literature, the real world interest rate (r^*) is assumed to be equal to 10 percent. We perform a sensitivity analysis assuming r^* to be 5 percent, and the results do not vary significantly.

The economic lifetime of the asset is assumed to be 20 years in the case of machinery and 50 years in the case of buildings. When not specified by law, we assumed that lifetime and depreciation rates are equal to the true ones. Finally, in the simulations corresponding to the tax holiday cases, it is assumed that depreciation allowances cannot be deferred until the end of the tax holiday.

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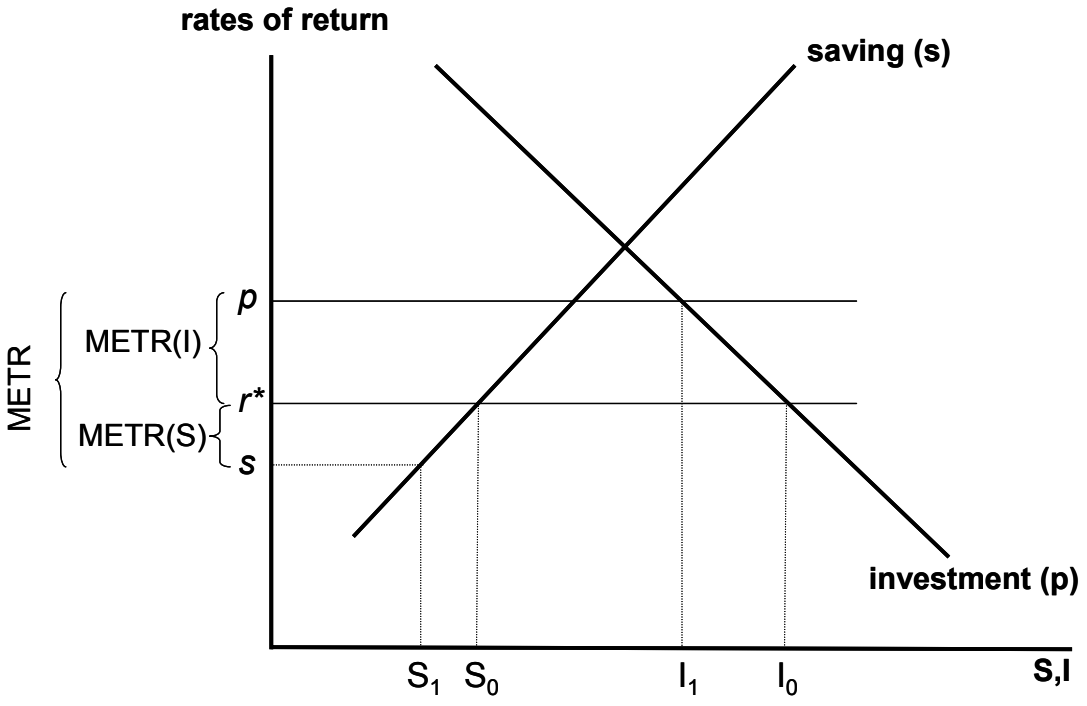
Figure 1. Marginal Effective Taxes in a Small Open Economy



$$METR = \frac{p - s}{p}$$

$$METR(I) = \frac{p - r^*}{p}$$

$$METR(S) = \frac{r^* - s}{s}$$

Table 1. METRs in the ECCU Region
(Tourism and hotels; machinery; 35 percent debt - 65 percent equity)

Country	Only Direct Taxes (Without Tax Holidays)	Including Indirect Taxes (Without Tax Holidays)	Including Indirect Taxes (With Tax Holidays)
Antigua and Barbuda	0.337	0.478	-0.070
Dominica	0.181	0.402	0.014
Grenada	0.169	0.341	-0.029
St. Kitts and Nevis	0.258	0.427	0.006
St. Lucia	0.277	0.438	0.000
St. Vincent and the Grenadines	0.200	0.379	0.001
Average	0.237	0.411	-0.013

Source: Author's calculations.

Table 2. METRs in the ECCU Region
(Tourism and hotels; machinery)

Country	Only Direct Taxes (Without Tax Holidays)	Including Indirect Taxes (Without Tax Holidays)	Including Indirect Taxes (With Tax Holidays)
Antigua and Barbuda			
Debt	-0.037	0.238	-0.101
Equity	0.405	0.525	-0.061
Dominica			
Debt	-0.106	0.114	0.015
Equity	0.239	0.445	0.013
Grenada			
Debt	-0.106	0.156	-0.031
Equity	0.235	0.387	-0.028
St. Kitts and Nevis			
Debt	-0.130	0.208	0.010
Equity	0.325	0.470	0.005
St. Lucia			
Debt	0.270	0.487	0.001
Equity	0.279	0.430	0.000
St. Vincent and the Grenadines			
Debt	-0.183	0.145	0.001
Equity	0.280	0.433	0.001
Average			
Debt	-0.049	0.225	-0.018
Equity	0.294	0.448	-0.012

Source: Author's calculations.

Table 3. METRs in the ECCU Region
(Tourism and Hotels; buildings)

Country	Only Direct Taxes (Without Tax Holidays)	Including Indirect Taxes (Without Tax Holidays)	Including Indirect Taxes (With Tax Holidays)
Antigua and Barbuda			
Weighted	0.333	0.457	-0.010
Debt	-0.056	0.166	-0.017
Equity	0.402	0.511	-0.009
Dominica			
Weighted	0.195	0.402	-0.005
Debt	-0.073	0.102	-0.009
Equity	0.248	0.445	-0.004
Grenada			
Weighted	0.186	0.335	-0.018
Debt	-0.073	0.137	-0.029
Equity	0.247	0.382	-0.015
St. Kitts and Nevis			
Weighted	0.254	0.397	0.005
Debt	-0.150	0.110	0.010
Equity	0.323	0.449	0.004
St. Lucia			
Weighted	0.264	0.404	0.000
Debt	0.241	0.413	0.001
Equity	0.269	0.404	0.000
St. Vincent and the Grenadines			
Weighted	0.257	0.398	0.001
Debt	-0.085	0.144	0.001
Equity	0.329	0.453	0.000
Average			
Weighted	0.248	0.399	-0.005
Debt	-0.033	0.178	-0.007
Equity	0.303	0.440	-0.004

Source: Author's calculations.

Table 4. METRs in the ECCU Region
(Manufacturing; machinery)

Country	Only Direct Taxes (Without Tax Holidays)	Including Indirect Taxes (Without Tax Holidays)	Including Indirect Taxes (With Tax Holidays)
Antigua and Barbuda			
Weighted	0.337	0.478	-0.017
Debt	-0.037	0.238	-0.025
Equity	0.405	0.525	-0.015
Dominica			
Weighted	0.181	0.402	-0.003
Debt	-0.106	0.114	0.000
Equity	0.239	0.445	-0.004
Grenada			
Weighted	0.169	0.341	-0.029
Debt	-0.106	0.156	-0.031
Equity	0.235	0.387	-0.028
St. Kitts and Nevis			
Weighted	0.258	0.427	0.001
Debt	-0.130	0.208	0.002
Equity	0.325	0.470	0.001
St. Lucia			
Weighted	0.277	0.438	0.000
Debt	0.270	0.487	0.001
Equity	0.279	0.430	0.000
St. Vincent and the Grenadines			
Weighted	0.244	0.409	0.001
Debt	-0.219	0.123	0.001
Equity	0.326	0.465	0.001
Average			
Weighted	0.244	0.416	-0.008
Debt	-0.055	0.221	-0.009
Equity	0.301	0.454	-0.007

Source: Author's calculations.

Table 5. METRs in the ECCU Region
(Manufacturing; buildings)

Country	Only Direct Taxes (Without Tax Holidays)	Including Indirect Taxes (Without tax Holidays)	Including Indirect Taxes (With Tax Holidays)
Antigua and Barbuda			
Weighted	0.333	0.457	-0.003
Debt	-0.056	0.166	-0.004
Equity	0.402	0.511	-0.002
Dominica			
Weighted	0.195	0.402	-0.009
Debt	-0.073	0.102	-0.016
Equity	0.248	0.445	-0.007
Grenada			
Weighted	0.186	0.335	-0.018
Debt	-0.073	0.137	-0.029
Equity	0.247	0.382	-0.015
St. Kitts and Nevis			
Weighted	0.254	0.397	0.001
Debt	-0.150	0.110	0.002
Equity	0.323	0.449	0.001
St. Lucia			
Weighted	0.264	0.404	0.000
Debt	0.241	0.413	0.001
Equity	0.269	0.404	0.000
St. Vincent and the Grenadines			
Weighted	0.305	0.435	0.001
Debt	-0.102	0.131	0.001
Equity	0.377	0.490	0.001
Average			
Weighted	0.256	0.405	-0.005
Debt	-0.035	0.176	-0.007
Equity	0.311	0.447	-0.004

Source: Author's calculations.

Table 6. METRs on Investment in the ECCU Region
(Tourism and hotels; machinery; 35 percent debt - 65 percent equity)

Country	(Without Tax Holidays)	With Tax Holidays
Antigua and Barbuda	0.653	0.169
Dominica	0.486	0.014
Grenada	0.403	-0.029
St. Kitts and Nevis	0.528	0.083
St. Lucia	0.561	0.200
St. Vincent and the Grenadines	0.553	0.224
Average	0.531	0.110

Source: Author's calculations.

Table 7. METRs on Saving in the ECCU Region
(Tourism and hotels; machinery; 35 percent debt - 65 percent equity)

Country	(Without Tax Holidays)	With Tax Holidays
Antigua and Barbuda	-0.910	-0.288
Dominica	-0.594	0.000
Grenada	-0.392	0.000
St. Kitts and Nevis	-0.571	-0.083
St. Lucia	-0.649	-0.249
St. Vincent and the Grenadines	-0.791	-0.288
Average	-0.651	-0.151

Source: Author's calculations.

Table 8. METRs in the ECCU Region: An Alternative Incentive Scheme
Corporate income tax rate = 30 percent, initial depreciation allowance = 60 percent
(Tourism and hotels; machinery; 35 percent debt - 65 percent equity)

Country	METR
Antigua and Barbuda	0.067
Dominica	0.024
Grenada	0.014
St. Kitts and Nevis	0.074
St. Lucia	0.151
St. Vincent and the Grenadines	0.048
Average	0.063

Source: Author's calculations.