THE TAXATION OF BUSINESS AND CAPITAL INCOME IN COLOMBIA

George R. Zodrow

Professor of Economics and

Rice Scholar, Baker Institute for Public Policy

Rice University

Houston Texas USA

I. INTRODUCTION

Recent changes in the tax structure in Colombia have resulted in major changes in the taxation of capital income. These include the imposition of a ten percent corporate income tax surcharge resulting in an effective statutory tax rate of 38.5 percent, the enactment of partial expensing at a thirty percent rate for business purchases of depreciable assets other than structures, and the assessment of a 0.3 percent wealth tax with the proceeds used to fight the ongoing war against the guerrillas. Businesses also now receive credits for value-added tax (VAT) on business purchases of capital equipment – as is entirely appropriate under a consumption-based VAT – but the present value of the credits is reduced because they are spread out over three years. Moreover, all of these provisions are scheduled to be eliminated over the next few years. In addition, the Colombian business tax system is fully indexed for inflation (with indexing for inventories recently reintroduced), so that tax burdens vary little with inflation. The Colombian income tax system is also largely integrated, with dividends received exempt at the individual level if corporate level tax is paid; however, capital gains taxation on a realization basis at the individual level (another recent tax change) results in a moderate amount

of double taxation of capital income at the business and individual levels. Interest income is also taxed at the individual level.

This brief outline of the taxation of business and capital income in Colombia suggests that many factors, including a wide variety of tax provisions not yet considered, affect the final tax burden borne by such income.[1] Indeed an obvious issue in assessing the current tax system as well as any future reforms is that, because there are so many tax provisions that interact in complex ways, it is difficult for policy makers to determine the net tax burden on business and capital income attributable to all these provisions. Fortunately, a now-standard public finance instrument — the "marginal effective tax rate" or METR — is a tool that can be used to quantify in a single measure the net effects on investment incentives of all of the provisions in a tax system that affect an investment in any particular asset or in any particular business subsector.[2]

This report provides a METR analysis of the Colombian tax system. The following section begins with an overview of the METR methodology that explains its advantages and disadvantages in characterizing the tax treatment of business and capital income under a tax system. Section III describes how the tax system in Colombia is modeled for purposes of the METR calculations, including a description of the main features of the current tax system, the capital stock weights used to calculate METRs on typical investments in fifteen business subsectors, and some additional assumptions that must be made to conduct the analysis. Section IV provides and interprets the results of the analysis, first for investments in five types of capital assets and then for typical investments in the fifteen different business subsectors. The final

---

[1] In addition, several Colombian taxes are not considered in this analysis which focuses on the income, wealth and value-added taxation of business purchases of capital assets; these include the bank debit tax and local taxes on property and industry and commerce.

[2] For an earlier analysis of the marginal effective tax rates applied to business and capital income in Colombia in the late 1980s, see McLure, Mutti, Thuronyi and Zodrow (1990). McLure and Zodrow (1997) provide an overview of the history of tax reform in Colombia, and Echavarría and Zodrow (forthcoming) discuss the effects of business income taxation on foreign direct investment in Colombia.

section summarizes the results and comments briefly on some potential tax reforms that might be appropriate for Colombia.

II. AN OVERVIEW OF THE METR METHODOLOGY

General Discussion

The concept of a marginal effective tax rate was created to analyze in a single measure of the tax burden on business and capital income, which is affected by a large number of provisions of the business and individual income tax systems, as well as by features of any property and wealth taxes, indirect transactions taxes including value-added taxes applied to capital purchases, import duties, and gross receipts taxes, and any special investment incentives that affect the incentives to invest. METR analysis is based on the standard neoclassical model of investment in which the level of investment is assumed to be a function of the "cost of capital" faced by a firm – the minimum or "hurdle" rate of return that an investment must earn to be profitable – an assumption that has been confirmed by the most recent empirical evidence on this issue (Gordon and Hines, 2002). METR analysts, such as King and Fullerton (1984), Boadway, Bruce and Mintz (1984) and many others, have taken the basic neoclassical model and modified it to take into account the net effect of all the provisions of a tax system on the cost of capital to the firm. The primary goal of an METR analysis is thus to describe this net effect of a tax system on investment incentives in a straightforward and intuitively appealing form.

The METR terminology naturally provides some insight into the nature of this tool. A METR is *marginal* because it is based on an analysis of a prospective incremental investment – one that just breaks even, with its after-tax cost equal to its after-tax returns.[3] It calculates the *effective* tax burden in that it captures the net effects of all the provisions of the tax system, rather than focusing on a single characteristic such as the maximum statutory corporate tax rate.

---

[3] METR analysis is thus not well suited to analyzing tax effects on investments that generate above-normal returns.

And it is a *tax rate* in that it is defined as the difference between the gross of tax and net of tax returns to an investment – the "tax wedge" between gross and net returns created by the tax system – expressed as a percentage of the gross return.

The calculation of a METR requires careful specification of the characteristics of an investment in a specific asset or in a specific business sector, including the time path of its returns, the rate of economic depreciation of the asset and the length of its life, how the asset is financed, the economic environment in which it occurs, including the inflation rate, interest rates, and returns to equity, and all of the features of the current or proposed tax system that affect both the after-tax returns and the after-tax costs attributable to the investment, including all tax depreciation allowances, investment credits and allowances, interest deductions, special exemptions, etc., allowed under the income tax as well as any other taxes that impinge on investment decisions. Given this information, the analysis calculates the effective tax rate on a marginal or breakeven investment under the assumptions of profit maximization by the firm, competitive markets, and perfect certainty (e.g., with respect to future returns and inflation rates).

Several additional assumptions underlying the METR approach should be noted. For example, METRs assume that firms are profitable, so that if the effective tax rate on an investment is negative (it is subsidized at the margin), the resulting losses can be used currently to offset other income. METR calculations are typically static; that is, they usually assume that the tax system in place at the time of investment remains unchanged for the life of the investment. Since the analysis typically assumes that assets depreciate at a constant rate but last forever, strictly speaking this implies that the analysis assumes the tax system remains fixed

forever.[4] In addition, the calculation of METRs is partial equilibrium in nature. Thus, some rate of return in the economy must be taken as fixed; in the context of a small open economy such as that of Colombia, it is natural to take as fixed an interest rate that is determined in international capital markets. The return to equity, inclusive of an equity premium, can also be treated as determined in international markets. An implication of these partial equilibrium assumptions is that METR analysis cannot be used to analyze the shifting of business taxes to consumers or workers that might occur with market adjustments in the context of a general equilibrium model of the economy. Instead, the analysis implicitly reflects the rather simplistic assumptions regarding tax incidence implied by the assumption of a fixed rate of return after corporate-level taxes – that gross returns increase by enough to offset all business level taxes and that personal level taxes on capital income are borne by the owners of those assets – and that taxes on labor are borne by labor and general consumption taxes are borne by consumers. Accordingly, to the extent that these incidence assumptions are incorrect, reported METRs levels and differentials may be somewhat misleading. METRs also typically do not take into account, or take into account in a fairly ad hoc way, issues of tax administration, compliance and evasion, as they describe the tax system as it would operate if it were effectively administered and enforced.[5]

Finally, as noted above, a METR is defined as the tax wedge between the gross of tax and net of tax returns earned by a marginal investment, expressed as a percentage of the gross return. (The "gross" and "net" terminology refers to returns before and after taxes; both types of returns are defined net of actual economic depreciation.) The net return can be measured at the company or "entity" level, in which case only entity level taxes (including withholding taxes) are

---

[4]   The typical METR analysis also assumes that the inflation rate remains constant forever. However, since the Colombian tax system is fully indexed for inflation, the METRs in this analysis are assumed to be independent of the inflation rate.

[5]   Note also that since METRs are calculated for marginal investments, they are not a good indicator of the tax revenues that are raised from taxing capital income, which depend heavily on the taxation of inframarginal and other investments that earn above-normal returns as well as existing investments.

considered. Such calculations are sometimes referred to as "open economy" METRs, since the taxation of saving at the level of the saver is ignored, so that such an METR reflects the Colombian tax burden faced by a foreign multinational contemplating foreign direct investment in Colombia. Alternatively, the net return can be measured at the level of the "saver" or provider of funds; in this case, the calculation includes taxation at the individual level. Such calculations are sometimes referred to as "closed economy" METRs since the source of investment funds is assumed to be domestic savers. Since Colombia closely approximates a small open economy, the report will report METRs calculated at the firm level, including, in some cases, withholding taxes on repatriations of funds from Colombian subsidiaries to their foreign parents. However, since the taxation of domestically financed investment is also of concern, the analysis will also consider METRs that include both firm and individual level taxes.

The basic concept of a METR can be illustrated with the following simple example. Suppose a business makes a marginal investment in a capital asset that just breaks even taking into account all taxes in the system, and earns a return of ten percent net of depreciation but before any taxes. Suppose further that, after accounting for all taxes, the net real return received by the firm and paid to its investors is seven percent. In this case, the METR on the investment is thirty percent – $0.3 = (0.10 - 0.07)/0.10$).

Issues Illuminated by METR Analysis

The primary applications of METR analysis are twofold. First, the results of an METR analysis show the net effect of all components of the tax system on the *level* of the taxation of capital income generated by marginal investments in the various types of assets defined by the tax code. For example, an METR can be calculated to measure the actual tax burden on a prospective investment in a particular type of asset attributable to the existing (or any proposed) tax system. Moreover, appropriately weighted averages of the METRs on investments on all of

the types of assets defined by the tax code can be constructed to provide estimates of the METRs

on specific investments or a measure of the overall level of taxation in the economy. METRs

thus show how the tax system distorts investment decisions (and, if individual level taxes are

considered, saving decisions as well) and thereby introduces inefficiencies or "excess burdens"

into the economy.[6]

Second, by considering a variety of investments that differ in asset composition, method

of finance, investor or economic circumstances, METR analysis provides an indicator of the tax

differentials that arise across different types of investments – that is, it shows how taxes affect

the *composition* of investment. In particular, a METR analysis shows how the tax system results

in a variety of distortions of investment decisions, thus creating additional efficiency losses,

beyond those associated with simply taxing capital income at a uniform effective tax rate. The

most commonly cited distortion is across types of assets, as differential taxation of different

types of assets induces businesses to invest too heavily in tax-advantaged assets and too little in

tax-disadvantaged assets. This of course translates into distortions across business subsectors –

analyzed in detail in this report – as the tax system favors subsectors with production processes

that use tax-favored assets intensively and penalizes businesses that use relatively heavily taxed

---

[6]   It should be noted that "distortions" of investment decisions must be measured relative to some benchmark. In general, a tax system would not distort investment decisions only if the METR were zero on all types of investment; this would occur, for example, under an ideal consumption-based tax (Zodrow and McLure, 1991). In this case, METR differentials – and the associated distortions of investment decisions – would be measured relative to a benchmark tax rate of zero. However, under an income-based tax, the benchmark level of taxation of capital income is typically the statutory income tax rate. In this case, the distortion of saving/investment decisions implied by the taxation of capital income at the statutory rate is in a sense taken as given, and the distortions attributable to tax differentials are measured relative to the statutory income tax rate. In addition, note that this discussion assumes that efficiency requires a tax system that is neutral across assets. This need not be true. For example, tax differentials may be desirable to correct for negative production externalities (e.g., pollution) or to offset other inefficiencies in the economy (e.g., inefficiencies in the taxation of labor income or due to protective tariffs). These complications are ignored in the analysis, as they are best addressed with specific tax policies as needed (e.g., taxes on effluents or reform of the system of labor income taxation) rather than through the ordinary income tax system applied to capital income; for further discussion, see Gugl and Zodrow (2004). Finally, taxes on capital income are not distortionary if they are offset by the benefits of public services received. Since the taxes analyzed in this report are not likely to be related to the benefits of public services received, this factor is not considered explicitly in the analysis. However, it should be remembered that it is always desirable to replace general taxes on capital, such as the corporate profits tax or customs duties, with taxes that are explicitly related to government benefits received, such as user charges and fees.

assets intensively. The following subsections discuss these distortions and a wide variety of others, all of which can be analyzed with an appropriately designed METR analysis.

Distortions of the Level of Investment and Saving

METRs provide an indication of the overall level of taxation of various forms of capital income and thus indicate how the tax system affects investment and saving decisions. Because they consider many aspects of the tax system, METR analyses often give very different results regarding the effects of the tax system on investment decisions than would a simple examination of statutory tax rates (or special preferences) in isolation. Effective tax rates that are far above or below the statutory rate indicate potential areas for reform, as relatively high positive rates act as a deterrent to investment, while negative METRs suggest that the tax system stimulates investments that are socially undesirable because they earn a return lower than the opportunity cost of funds.

Distortions of the Allocation of Investment

METRs are also very useful in identifying the extent to which the tax system distorts investment allocation decisions by asset and by business sector (given the benchmark level of taxation of capital income in the tax system). Apart from a variety of standard market failure arguments (e.g., externalities or the existence of other tax-induced distortions), most public finance economists would argue that competitive markets are generally efficient in allocating resources. The implication of this view is that tax differentials – at least those that are not specifically designed to offset market failures or charge firms for the benefits of public services received – are generally undesirable because the associated distortions of investment allocation decisions result in reduced productivity of investment; that is, a disproportionate amount of capital is allocated to those sectors and assets in which tax treatment is relatively favorable rather than to those sectors and assets where investment would be most productive in the sense of generating output valued by consumers. In other words, the tax system should generally be

characterized by "economic neutrality" or a "level playing field" with respect to investment allocation decisions, or METRs that do not vary according to the type of asset or business sector.

In addition, METR analysis provides an estimate of the extent to which certain types of preferential treatment confer an advantage to the tax-favored activity. Indeed, METR analysis can be used to determine whether the effects of "preferential" treatment of certain forms of investment are in fact consistent with the intent underlying such treatment. For example, in some cases such as certain types of tax holidays, supposedly preferential treatment results in METRs that are actually higher than those under the ordinary income tax system. Similarly, a preferentially low tax rate in a subsector can have the effect of increasing METRs if depreciation deductions and other investment allowances under the regular tax system are sufficiently generous.

Method of Finance

METR analysis is useful in determining whether the tax system favors one form of finance over another. Under a market-based approach to tax reform, such distortions are also undesirable as they imply a tax-induced alteration of the allocation of risk-bearing in the economy. For example, a tax bias toward debt finance may increase the overall indebtedness of firms and thus increase the likelihood that costly bankruptcies – or perhaps even more costly government bailouts – will be incurred during an economic downturn.

In addition, tax differentials across methods of finance may discriminate against certain types of firms. For example, a tax system that results in an unusually high METR on new share issues will discourage investments by firms that tend to use new issue finance to a disproportionate extent, including new enterprises that have little retained earnings and limited access to debt finance. Again, most public finance economists would argue that neutrality with respect to firm financing decisions is a desirable property of tax system.

Choice of Organizational Form

METR analysis is also often used to identify the extent to which the tax system distorts decisions regarding the choice of organizational form. In most countries, firms may be organized as corporations subject to the corporate income tax or non-corporate entities that are taxed on a "pass through" basis, with business income attributed to the individual owners and taxed only under the personal income tax. Economic neutrality with respect to decisions regarding organizational form is also generally desirable, so that firms may select the form of business organization that best meets their needs without worrying about differential tax consequences.[7] However, since the business tax in Colombia applies to virtually all businesses, this issue is largely irrelevant in Colombia.

Effects of Inflation

In many countries, another important benefit of METR calculations is that they demonstrate how tax rate differentials, as well as the level of business and capital income taxation, vary with the rate of inflation. However, since the Colombian tax system is fully indexed for inflation, this issue also does not arise for the calculations presented in this study.

---

[7] As in the case of resource allocation, there may be externalities associated with the choice of organizational form; for example, tax enforcement may be less costly for firms that are publicly held corporations.

III. MODELING THE TAX SYSTEM IN COLOMBIA

This section describes how the taxation of business and capital income in Colombia is modeled for purposes of the METR calculations. It begins with an overview of the current tax system in Colombia, focusing solely on national taxes on business and capital income.[8] The description is not meant to be comprehensive; rather, the focus is on the tax provisions that are relevant to the calculation of the METRs. In particular, this analysis requires details on the tax treatment of investment in the five major capital assets defined by the tax system – (1) inventories, (2) land, (3) structures, (4) machinery, equipment and furniture, and (5) computer equipment and vehicles – which are provided below. The discussion then turns to a description of the capital stock weights used to calculate the business subsector METRs, as well as some additional assumptions required to conduct the analysis.

The Business Income Tax

Although the business income tax in Colombia is commonly referred to as the corporate income tax, it is broader in its coverage than most such taxes, as it applies to all business entities including limited liability companies and partnerships. The details of the business income tax are as follows.

Tax Rate

The standard tax rate under the corporate income tax is 35 percent. However, a temporary ten percent surtax, first enacted in Ley 788 of 2002 and then extended through 2007 in Ley 863 enacted in 2003, increases the effective statutory rate to 38.5 percent. There is also a preferential business tax rate, with a ten percent surtax, of 22 percent; this rate applies to companies in activities related to health, sports, formal education, culture, scientific/technological/ecological research, environmental protection, or social development, as

---

[8] Municipal taxes on property and on gross receipts (the tax on industry and commerce) are thus ignored.

long as they reinvest all profits in those activities. Finally, a variety of activities, such as publishing firms, liquor producers, livestock producers, firms investing in "privileged" or tax-free zones, certain types of cooperatives, and public service enterprises (water, sewerage, electricity, telephones and gas), are exempt from tax and are not considered in the analysis.[9]

Inflation Adjustment

Colombia has an extensive system of full inflation indexation, using a balance sheet adjustment approach similar to that utilized by Chile.[10] Accordingly, the analysis ignores any residual effects of inflation on the METRs, which are all calculated in real terms. Such an approach seems reasonable, since the system applies to all business assets[11] and the current inflation rate is quite low (approximately 5-6 percent), so that any errors in inflation adjustment would have relatively small effects on the calculated METRs.

Treatment of Non-Depreciable and Depreciable Assets

The income tax system defines five different classes of assets for tax purposes. The tax treatment of these assets is as follows.

Inventories

The cost of inventories is generally calculated using the "First-In, First-Out" or FIFO method, with the value of inventories adjusted for inflation. Such treatment implies that the cost of goods sold will reflect the original value, adjusted for inflation since the time of purchase, and is appropriate under an income tax. Purchases of inventories are not eligible for the special 30 percent partial expensing deduction – described below – that was enacted as an investment incentive in 2003, and is scheduled to expire in 2007.

---

[9] See World Bank (2004).

[10] See McLure, Mutti, Thuronyi and Zodrow (1990, Chapter 7) for a general discussion of inflation adjustment issues under an income tax with an application to Colombia.

[11] Until recently, inventories were not adjusted for inflation, but this omission was rectified in the 2003 reform.

Land

Like inventories, land is not a depreciable asset, and therefore does not receive any deductions for depreciation under an income tax. Purchases of land are also not eligible for the special 30 percent partial expensing deduction.

Structures

Structures are depreciated straight line over 20 years, with the inflation adjustment system implying that such deductions are indexed for inflation. Purchases of structures are also not eligible for the special 30 percent partial expensing deduction.[12]

Machinery, Equipment and Furniture

Purchases of machinery, equipment and furniture (including office equipment) are depreciated straight line over ten years, adjusted for inflation.[13] In addition, investment in these assets benefits from a special "partial expensing" deduction equal to 30 percent of the price of the asset. This investment incentive is inappropriately designed to be overly generous because the tax basis of the asset is not reduced to reflect partial expensing, implying that investors effectively get to deduct 130 percent of the cost of the asset, with a deduction equal to 40 percent of the purchase price in the first year, and 10 percent in each of the subsequent nine years.[14]

Computer Equipment and Vehicles

Purchases of computer equipment and vehicles are depreciated straight line over five years, adjusted for inflation. In addition, investment in these assets also benefits from the special

---

[12] It appears that some purchases of structures have received this deduction, but it is not allowed under the tax law.

[13] In addition, accelerated depreciation is provided in the form of a shift differential for asset that are used for multiple shifts. Assuming that these shift differentials roughly reflect actual increases in the economic depreciation of the affected assets, they should have relatively minor effects on METRs and are ignored in the analysis.

[14] As described in Zodrow (2003b), partial expensing should be designed so that some fraction α of the purchase price of the asset is expensed and the remaining fraction (1- α) receives deductions for real economic depreciation. As will be shown below, allowing the expensed fraction to be deducted twice is far too generous. In addition, Zodrow (2003b) notes that the revenue cost of partial expensing can be reduced by having it apply only to incremental investments, that is investment above some benchmark level.

"partial expensing" deduction equal to 30 percent of the price of the asset, with no basis adjustment. This implies that investors effectively get to deduct 130 percent of the cost of the asset, with a deduction equal to 50 percent of the purchase price in the first year, and 20 percent in each of the subsequent four years.

Withholding Taxes

Interest expense is fully deductible, but generally subject to withholding at a 7 percent rate. Dividends are not deductible, and dividends paid abroad are also subject to withholding at a 7 percent rate.

The Wealth Tax

A temporary wealth tax, with the proceeds used to finance the war against the guerrillas, was enacted in 2003 and is currently in force through 2006. The tax is assessed at a rate of 0.3 percent on gross wealth (with no deduction for debt), and is assumed to apply to all of the assets considered in the calculations.[15] The wealth tax is not deductible against the income tax.[16]

The Value Added Tax

In principle, the value-added tax should be irrelevant for an METR calculation, since VAT paid on purchases of capital assets (inventories and depreciable assets other than structures) should be fully creditable. However, the Colombian VAT requires that such credits be spread out over three years – with a 50 percent credit in the first year and 25 percent credits in the subsequent two years. (Imported capital goods are an exception, as they are zero-rated, so there is no VAT to credit.) Such treatment reduces the present value of the credit, implying that a reduced value-added tax is effectively imposed on the purchase of the capital asset.

---

[15] The wealth tax applies only to firms with assets in excess of 3,000,000 Colombian pesos.

[16] The METR calculations do not consider the wealth-based presumptive income tax, which is primarily an anti-evasion device. Note, however, that since the Colombian income tax provides for a presumptive return of six percent on net wealth (gross wealth minus debt), the implied effective tax rate can be quite high under this regime for equity-financed investments. Specifically, under the presumptive income tax regime, the effective tax rate is

14

Specifically, the three-year credit implies that the effective value-added tax is equal to $t[1-0.5-0.25(1+r^f)^{-1}-0.25(1+r^f)^{-2}]$, where t is the statutory rate and r^f is the firm's discount rate. The METR results calculate separately the effects of delayed crediting for the VAT, for the cases in which the standard rate of 16 percent applies as well as for the preferential rate of 7 percent, which applies to certain goods, especially some machinery and equipment purchased by the agriculture and food processing industries. Since even delayed crediting of the VAT is scheduled to expire in 2005, a separate set of calculations is performed for the case in which the VAT is not credited at all.

No additional import duties are imposed on business imports of capital assets.

Capital Income Taxation under the Personal Income Tax

Colombia has an integrated business and personal income tax system, as dividends paid from earnings that are subject to the business tax are exempt from tax at the individual level. Capital gains are subject to tax at the individual level, at an effective average rate – according to statistics complied by DIAN – of approximately 14 percent, twice the withholding rate of 7 percent applied to some gains. However, the effective annual accrual tax rate on capital gains is much lower, reflecting deferral of tax until realization of gains and the absence of taxation at death. Deferral is usually estimated to reduce the effective tax rate by one-half, with a roughly similar reduction for the absence of taxation of death. The effective annual accrual tax rate on capital gains in Colombia is thus very low (e.g., on the order of 3-4 percent), and since dividends are untaxed, the individual level tax on equity income is even lower, presumably on the order of 2-3 percent. Accordingly, individual level taxation of equity income is ignored in the METR calculations; if considered, it would simply add approximately 2-3 percentage points to the reported METRs.

---

zero for a debt-financed investment (since tax is based on net wealth), and equals the ratio of the presumptive rate of return (six percent) to the actual rate of return for an equity-financed investment.

On the other hand, dividends paid abroad are subject to a withholding tax at a 7 percent rate. This withholding tax is included in the appropriate METR calculations.

Interest paid is also subject to withholding, typically also at a 7 percent rate. Interest income is subject to tax at the personal level, although apparently fairly little interest income is actually reported. The calculations consider the cases in which interest income is taxed only at the 7 percent withholding rate and at the 14 percent rate characteristic of capital income in the form of both interest and capital gains.

The Financial Transactions or Bank Debit Tax

Colombia also has a financial transactions or bank debit tax that was introduced in 1998 at a rate of 0.2 percent, and increased in 2003 to a rate of 0.4 percent through 2007. Since the METR calculations do not consider financial intermediation, the financial transactions tax is not included in the calculations. However, it should be noted that although the use of taxes on various financial transactions is spreading, especially in Latin America, these taxes are generally perceived by public finance economists as highly undesirable. Such taxes increase the cost of capital and do so in an erratic manner with differential cascading effects across industries, encourage financial disintermediation, distort production decisions since they apply only to certain transactions and to intermediate as well as final transactions, and encourage a wide variety of wasteful avoidance and evasion activities designed to minimize the number of transactions subject to tax. For these reasons, serious consideration should be given to eliminating the financial transactions or bank debit tax; at a minimum, the current rate should not be further increased.[17]

---

[17] See Arbeláez, Burman and Zuluaga (forthcoming) for a highly critical analysis of the financial transactions or bank debit tax in Colombia.

Asset Weights for Subsector METR Calculations

Finally, METRs can also be calculated for typical investments in various business subsectors in Colombia as weighted averages of the five asset METRs, where the weights are estimates of the fraction of the capital stock in the subsector accounted for by each asset. The weights used in the business subsector METR calculations are provided in Table 1. These were derived using income tax data – required for calculating the wealth-based presumptive income tax – on gross capital stocks (before deductions for debt) for the fifteen business subsectors listed in the table. Data for 2003 were used to estimate the capital stock weights for inventories and fixed assets, while more disaggregated data for 1997 were used to split the weight for fixed assets into weights for land, structures and "other depreciable assets". Unfortunately, no data are available to split the weight for "other depreciable assets" into the required categories "machinery, equipment and furniture" and "computers and vehicles." This split was simply assumed to be (1) 90%-10% in the case of the mining and chemicals subsectors, (2) 70%-30% in the case of the cars and accessories, and hotels and restaurants subsectors, (3) 60%-40% in the large commerce, small commerce, and transportation, storage and communication subsector, (4) 50%-50% in the financial services, other services, and sports and leisure subsectors, and (5) 80%-20% in all other subsectors. The resulting business subsector METRs should thus clearly be viewed as tentative. Nevertheless, since the asset METRs for "machinery, equipment and furniture" and "computers and vehicles" in general do not differ greatly, the errors introduced by this approximation should not be significant.

Additional Assumptions Made in the METR Calculations

Several additional assumptions must be made to conduct the METR analysis. Economic depreciation is assumed to be exponential for all depreciable assets (which are assumed to last

forever) at rates that reflect recent estimates of economic depreciation in the U.S.[18] The assumed

rates of economic depreciation used are 3 percent for structures, 14 percent for machinery and

equipment and furniture, and 30 percent for computers and vehicles. The real interest rate for

debt-financed investment is assumed to be 4 percent, with an equity premium for equity-financed

investment of 5 percent.[19] The calculations consider a wide variety of financing options, with

the debt share of investment finance ranging from zero to 60 percent.

IV. RESULTS OF THE METR CALCULATIONS FOR COLOMBIA

This section presents METRs for the current tax system in Colombia, and analyzes its

economic effects. Results are presented for the five capital assets defined by the tax system

(inventories, land, structures, machinery, equipment and furniture (including office equipment),

and computers and vehicles). Results are also presented for the fifteen business subsectors listed

in Table 1, calculated as weighted averages of the asset METRs, using the weights specified in

that table.

The results of the METR calculations under current law are most clearly understood if

several preliminary calculations that highlight specific features of the tax system are first

analyzed, with additional features added sequentially. To focus initially on the business income

tax, suppose that all other taxes in the Colombian tax system, including withholding taxes on

interest and dividends, the wealth tax, and the value-added tax are zero. To abstract initially

from the well-known tax advantage of full interest deductibility with debt finance, suppose

further that all investments are entirely equity financed. Finally, to isolate the effects of the

---

[18] Although these figures are plausible, they are nevertheless quite tentative since there are no data on actual depreciation rates in Colombia.

[19] As noted above, with a fully indexed income tax system, the inflation rate, currently 5.5 percent in Colombia, does not enter into the METR calculations.

deductions for depreciation from those of the special partial expensing allowance, suppose initially that the latter is zero as well.

Under these circumstances, the METRs associated with the current business income tax are given in the first column of Table 2. The effective tax rate on investment in inventories and land, which do not depreciate and thus receive no depreciation allowances, is simply the statutory tax rate inclusive of the 10 percent surtax, or 38.5 percent. By comparison, the METRs on the remaining assets vary between 29.2-32.5 percent, reflecting in each case the extent to which the present value of depreciation allowances over the life of the asset exceed the present value of actual economic depreciation, as implied by the assumed economic depreciation rates. (Recall that, as noted by Zodrow (2002), depreciation allowances in Colombia are fairly generous because they were not adjusted when inflation indexing was introduced.) These results indicate that tax system favors considerably investment in depreciable assets over investment in inventories and land, but that there is little tax distortion across the three depreciable assets. These effects are also reflected in the business subsector METRs, which vary from 31.1-36.7 percent, with relatively lower effective tax rates in those sectors that use depreciable assets relatively intensively; these include hotels and restaurants, transport, storage and communications, financial and other services, sports and leisure, and electricity, gas and steam. Since the range of business subsector METRs is fairly narrow, however, tax distortion of the allocation of investment across subsectors is fairly limited.

The next three columns of Table 2 demonstrate that, like most corporate income tax systems that allow deductions for interest expense but not for the payment of dividends, the Colombian business income tax is biased toward debt finance. Note, however, that this problem is less critical in Colombia than in many other countries, since dividends are not taxed at the individual level as long as tax is paid on the distributions at the firm level. Nevertheless, as long as interest income at the individual level is taxed at a lower rate (in this case, zero) than the

business tax rate at which interest expense is deducted, the tax system will favor debt finance. The magnitude of this effect is gauged by examining the changes in METRs as the debt-capital ratio, denoted as β, increases from zero to 60 percent in 20 percent increments. For example, the asset METRs range from 29.2-38.5 percent with no debt, but decline uniformly as β increases, ranging from 12.3-27.3 percent when the debt-capital ratio is 60 percent. Note also that the variation in METRs across assets increases as the debt-capital ratio increases, increasing the extent to which the tax system distorts the allocation of investment across assets. However, this effect is muted for the variation in METRs across business subsectors.

The following two tables present variations on these themes. First, Table 2a considers the same case as Table 2, but increases the interest withholding tax rate (or the tax rate applied to interest income at the individual level) to the statutory business income tax rate of 38.5 percent. This eliminated completely the advantage of deducting interest expense at a tax rate higher than the rate applied to interest income. As a result, both the asset and the business subsector METRs show little variation with the debt-capital ratio, declining only slightly. Thus, increasing the withholding tax rate in this fashion would eliminate the tax bias favoring debt finance under the Colombian business income tax.

However, the results in Table 2a are still characterized by METR differentials across assets and, to a lesser extent, across business sectors, with investment in depreciable assets favored over investment in inventories and land. This feature of the tax system could be eliminated by reducing depreciation allowances – that is, by increasing the lives over which straight line depreciation deductions are taken. Specifically, suppose that depreciable lives were increased, from 20 years to 50 years for structures, from 10 years to 14 years for machinery, equipment and furniture, and from 5 years to 7 years for computers and vehicles. Under these circumstances, the tax system would be virtually neutral across all types of investments, as the present value of straight line deductions under the tax system would approximately equal the

present value of the appropriate deductions under the assumed exponential depreciation rates for each type of asset. This is shown in Table 2b, which assumes the same tax structure as the previous table, including interest withholding at a 38.5 percent rate, but reduces the deductions for tax depreciation as described above. In this case, all of the asset and business subsector METRs are very close to the statutory rate of 38.5 percent (and are nearly independent of the debt-capital ratio, as in the case of the results presented in Table 2a).

Of course, the actual interest withholding rate in Colombia of 7 percent is far below the statutory business income tax rate of 38.5 percent. The results in Table 3 show that the current withholding rate has only a modest effect in limiting the tax advantage of debt finance. For example, with 60 percent debt finance, the METRs with withholding at the 7 percent rate are only approximately 2 percentage points higher than with no withholding at all. In addition, interest income that is reported in Colombia is taxed at an average rate of 14 percent. The results in Table 3a show that such individual level taxation, modeled as an increase in the withholding rate to 14 percent, further mitigates the tax advantage of debt finance by increasing the asset METRs by approximately another 2 percentage points. Nevertheless, the tax advantage of debt finance still exists at such withholding rates, as asset METRs range from 17.2-31.4 percent with withholding at a 14 percent rate, relative to a range of 25.8-38.5 percent with withholding at a 38.5 percent rate. Finally, investments by foreigners are also subject to a withholding tax of 7 percent when funds are repatriated by a Colombian subsidiary to its foreign parent. The results in Table 3b add such a dividend withholding tax to the basic tax structure, on the assumption that earnings are immediately repatriated to the parent. In this case, the METRs on equity-financed increase, reflecting withholding on equity income. For example, with all equity finance, the addition of dividend withholding increases the range of METRs from 29.2-38.5 percent to 34.2-42.8 percent, with smaller increases for the cases of partial equity financing. These results, however, presumably overstate actual METRs on equity-financed investment with dividend

withholding in most cases, since such taxes may be deferred for a long period by retaining them within the company.

The effects of adding partial expensing, which applies to all depreciable assets other than structures, are shown in Table 4. The effects of partial expensing are dramatic, both because the fraction expensed is relatively large at 30 percent, but especially because tax basis for depreciation purposes is not adjusted for partial expensing, which implies that firms are effectively able to write-off 130 percent of the cost of the affected assets over their lives. As noted previously, this investment incentive is thus inappropriately designed and is far too generous, especially for the short-lived category of computers and vehicles, where 50 percent of the purchase price of the asset is written off in the first year of the investment, with an additional 80 percent written off over the next four years. As a result, the METRs under the business income tax, including withholding on interest payments at a 7 percent rate and assuming all equity finance, fall from 32.5 percent to 0.1 percent for investment in machinery, equipment and furniture, and from 29.2 percent to a subsidy of 67 percent (an METR of -67 percent) for investment in computers and vehicles (compare Tables 3 and 4). Thus, partial expensing with no basis adjustment eliminates all tax liability in the former case and creates a huge investment subsidy in the second case, even without the benefits of debt finance. These effects naturally imply huge tax differentials across assets, which range from -67 to 38.5 percent, and similar though more muted differentials across business subsectors, which range from -12.3 to 31 percent.

Moreover, the decline in METRs is even more dramatic if part of the investment is debt-financed, with the METR falling to -54.2 percent for investment in machinery, equipment and furniture with 60 percent debt finance and to a subsidy greater than 1000 percent for investment in computers and vehicles. (These results are not particularly meaningful, as the METR concept is not well suited to analyzing subsidies; with sufficiently large subsidies, METRs become

arbitrarily large as the denominator of the effective tax rate, the gross return required, becomes very small.) The differentials of METRs across investment in different assets and different business subsectors are similarly huge, indicating huge distortions of the allocation of investment.

These somewhat bizarre results, especially for the cases with large levels of debt finance, are due almost entirely to the lack of basis adjustment for partial expensing. This is illustrated in Table 5, which provides results for the same case as in the previous table, but with a basis adjustment so that firms receive depreciation deductions for only 70 percent of the purchase price of machinery, equipment and furniture and for computers and vehicles, since 30 percent of such investment is immediately expensed. In this case, METRs fall for the assets that receive partial expensing, but far more modestly. For example, with all equity finance, the METR falls from 32.5 percent without partial expensing to 0.1 percent for partial expensing with basis adjustment for investment in machinery, equipment and furniture, and from 29.2 percent to 22.4 percent for investment in computers and vehicles. Although granting partial expensing only for these assets still results in significant METR differential across assets and business subsectors, the variation in effective tax rates is far less than without basis adjustment. For example, with all equity finance, asset METRs vary from 22.4-38.5 percent and business subsector METRs vary from 28.1-35.8 percent. METRs still fall as debt finance increases, but again not as wildly as without basis adjustment. For example, with 60 percent debt finance, asset METRs range from 10.2-29.3 percent and business subsector METRs range from 13.7-25.7 percent. Thus, partial expensing with basis adjustment results in lower but still positive METRs, and far narrower ranges – and thus much smaller distortions of the allocation of investment – across assets and business subsectors. These results demonstrate that a first priority for reform should be "fixing" the partial expensing investment incentive by adding a basis adjustment so that the purchase price of the asset is deducted only once, as described in Zodrow (2003b). Most of the following

discussion assumes that such a reform is enacted, thus avoiding results with hugely negative METRs.

Consider next the effects of the temporary wealth tax, which is assessed at a rate of 0.3 percent and is not deductible against the business income tax. The results in Table 6 demonstrate that the wealth tax has a relatively minor effect on METRs. For example, with partial expensing with basis adjustment, interest withholding at a rate of 7 percent, and all equity finance, the addition of the wealth tax increases asset METRs from a range of 22.4-38.5 percent to a range of 25.5-40.5 percent. Moreover, the effects of the wealth tax only increase modestly as the extent of debt finance increases. For example, under the same circumstances but 60 percent debt finance, the addition of the wealth tax increases asset METRs from a range of 10.2-29.3 percent to a range of 16.4-33.3 percent.

The imposition on purchases of certain capital goods of the value-added tax with delayed crediting (a 50 percent credit in the first year, with 25 percent credits in each of the following two years) also has only a limited effect on METRs. This is demonstrated in Table 7 (compared with Table 5), which considers the business income tax with partial expensing with basis adjustment, interest withholding at a rate of 7 percent, and no wealth tax. With all equity finance, the imposition of the VAT at the standard rate of 16 percent with three-year crediting increases the affected assets by 0.6-2.6 percentage points. These effects show very little variation with the extent of debt finance. For example, with 60 percent debt finance, the imposition of the VAT with three-year crediting increases the affected assets by 0.6-2.6 percentage points by 0.4-2.7 percentage points.

However, that is not to say that imposition of the VAT on the purchases of certain capital assets would not dramatically increase METRs if it were not credited at all, as is currently scheduled to occur. Instead, the VAT, as a tax on the purchase price of a capital asset rather than on its net income, can have significant effects if it is not credited (as is appropriate for a

24

consumption-based tax). The results in Table 7a (compared with Table 5) show this clearly, as the imposition of an uncredited VAT at a rate of 16 percent, in the case of partial expensing with a basis adjustment, interest withholding at a 7 percent rate, and no wealth tax, significantly affects the METRs, especially in the cases of debt finance. For example, with all equity finance, the uncredited VAT increases the METRs on the affected assets by from 8.5-28.3 percentage points. By comparison, with 60 percent debt finance, the uncredited VAT increases the METRs on the affected assets by from 9.8-42.5 percentage points. In addition, an uncredited VAT results in wide variations in METRs across assets and business sectors and thus large tax-induced distortions in the allocation investment. For example, asset METRs with an uncredited VAT vary from 29.5-50.7 percent with all equity finance, and from 14.8-52.7 percent with 60 percent debt finance. The variation in business subsector METRs is considerably more muted but still reflects some distortions of the allocation of investment. For example, subsector METRs with an uncredited VAT vary from 37.3-44.4 percent with all equity finance, and from 28.0-40.7 percent with 60 percent debt finance. Thus, another clear direction for the Colombian tax system is the delayed crediting of the VAT should not be allowed to expire and, indeed, consideration should eventually (when revenue needs are less pressing) be given to allowing the standard consumption tax treatment of full immediate crediting of all VAT paid on purchases of capital assets.

The previous discussion strongly suggests that the addition of the wealth tax and the VAT with three-year crediting is by no means important enough to offset the deleterious effects of partial expensing with no adjustment of basis; that is, the lack of basis adjustment under partial expensing cannot be justified as counteracting the disincentive effects of the wealth tax or the creditable VAT. This is illustrated in Table 8, which presents METRs for the current tax system in Colombia, including partial expensing with no basis adjustment, interest withholding at a 7 percent rate, a VAT at a 16 percent rate with three-year crediting, and the wealth tax at a

0.3 percent rate. These results indicate that, due to partial expensing with no basis adjustment, METRs are very low or negative on investments in the affected assets (machinery, equipment and furniture, and computers and vehicles) but are much higher on the other assets, especially non-depreciable land and inventories. As a result, the current tax system results in huge distortions across assets and smaller but still significant distortions across business subsectors. For example, asset METRs range from -44.8 to 41 percent for all equity-financed investments and from -412% to 31.7 percent for investments financed with 60 percent debt. By comparison, business subsector METRs range from -1.6 to 34.4 percent for all equity-financed investments and from -136 to -1.2 percent for investments financed with 60 percent debt. Such huge distortions and low tax rates (or subsidies) imply highly inefficient tax biases that result in serious capital misallocation, coupled with little in the way of revenue especially for investments with a significant fraction of debt finance.

Finally, a standard prescription for tax reform in Colombia (see Zodrow (2002) and World Bank (2004)), at least in the long run, is broadening the base of the business income tax coupled with reduction in the statutory rate. Such reforms have long been recommended on efficiency, equity and simplicity grounds, as they reduce tax-induced distortions in the economy, increase the uniformity of the tax burden on individuals and firms, and avoid the complexities associated with high rates and generous tax incentives. The implications of such a base-broadening rate-reducing reform are analyzed in Table 9. These results assume a reduction in the statutory rate to 30 percent, coupled with complete elimination of partial expensing. Asset METRs under this approach, including interest withholding at a 7 percent rate, the current wealth tax at a rate of 0.3 percent, and the VAT at a rate of 16 percent with three-year crediting, would range from 25.1-32.9 percent with all equity finance and 12.8-21.6 percent with 60 percent debt finance. Moreover, the variation in METRs would be even smaller for the business subsectors, where METRs would range from 20.8-24.0 percent with all equity financing, and

from 16.1-27.2 percent with 60 percent debt finance. Thus, such a reform would result in moderate overall average effective tax rates, and a relatively small dispersion about those average rates.

Furthermore, even this fairly narrow range of METRs could be further narrowed by reducing current deductions for depreciation as outlined above – that is, if the straight line depreciable lives of structures were increased to 50 years for structures, 14 years for machinery, equipment and furniture, and 7 years for computers and vehicles. The results for this case, with a 30 percent statutory rate, no partial expensing, interest withholding at a 7 percent rate, the current wealth tax at a rate of 0.3 percent, and the VAT at a rate of 16 percent with three-year crediting, are shown in Table 10. These results indicate that such a reform would yield a tax system that would have virtually uniform rates across all assets and business subsectors at any given level of debt finance, less variation in METRs across methods of finance (since the difference in the rate at which interest is deducted and taxed is reduced), and a relatively low overall level of taxation, determined primarily by the statutory rate. For example, asset METRs would vary only from 32.3-33.7 percent with all equity finance, and from 20.5-21.6 percent with 60 percent debt finance. The variation in business subsector METRs would be virtually non-existent, with METRs ranging from 25.1-25.9 with all equity finance, and ranging from 26.3-27.2 with 60 percent debt finance. Such a reform is well worthy of consideration in Colombia.

V. CONCLUSION

Several conclusions can be drawn from the marginal effective tax rate (METR) analysis of the Colombian tax system presented in this report. First, as described in Zodrow (2002), depreciation deductions under the income tax are relatively generous, as they were not adjusted when the tax system was indexed for inflation in 1988. As a result, the METRs under the business income tax for all equity-financed investments, neglecting partial expensing and withholding taxes, range from 29.2-32.5 percent for investments in depreciable assets while they

equal the statutory rate of 38.5 percent for investments in non-depreciable inventories and land. This implies a moderate degree of distortion of the allocation of investment across different types of assets. This range of asset METRs is, however, sufficiently narrow that the METRs on the various business subsectors do not vary greatly, ranging only from 31-37 percent.

Second, the business income tax system in Colombia, like most corporate income taxes, is biased toward debt finance, although the problem is less critical in Colombia than in many other countries since dividends are not taxed at the individual level. Nevertheless, to the extent interest income is not fully taxed at the individual level, a bias favoring debt finance exists, as all the METRs decline as the debt-capital ratio increases. For example, METRs range from 29.2-38.5 percent with no debt, but range from 12.3-27.3 percent when the debt-capital ratio increases to 60 percent. In addition, distortions across asset types and business subsectors increase somewhat as the level of debt finance increases. This variability in METRs with the method of finance could be greatly reduced by increasing the withholding tax applied to interest payments. Indeed, with a withholding rate that matches the statutory business income tax rate of 38.5 percent (so that interest recipients are taxed at the same rate as which interest deductions are taken), virtually all of the variability in METRs with the method of finance disappears. (The viability of such a reform is unclear, however, as it would give rise to significant capital flight.) Moreover, the remaining variability in METRs across assets and business subsectors could be virtually eliminated by reducing the depreciation deductions allowed under the current inflation indexed income tax system. Indeed, if the straight line depreciable lives of structures were increased to 50 years for structures, 14 years for machinery, equipment and furniture, and 7 years for computers and vehicles, all METRs under the business income tax with no partial expensing and no withholding taxes would fall in the very narrow range of 36.7-38.5 percent.

Third, the modest degree of withholding under current law (7 percent) results in only a limited reduction in the variability of METRs with respect to the debt-capital ratio. For example,

the range of METRs under the business tax without partial expensing and 60 percent debt finance increases from 12.3-27.3 percent with no withholding to 14.8-29.3 percent with 7 percent withholding, and to 17.2-31.4 percent if withholding were increased to the average tax rate imposed on reported interest income of 14 percent. In addition, for investments by foreigners, withholding on dividends imposed at a 7 percent rate increases the METRs on the equity-financed component of investment. For example, METRs under the business income with no partial expensing and interest withholding at a 7 percent rate increase from 29.2-38.5 percent to 34.2-42.8 percent when the withholding rate on dividends goes from zero to 7 percent.

Fourth, the granting of partial expensing at a rate of 30 percent for investments in depreciable assets other than structures has a huge effect on their METRs. This is especially true because this investment incentive is inappropriately designed and is thus overly generous, since the tax basis of the asset is not reduced to reflect partial expensing, implying that investors effectively get to deduct 130 percent of the cost of the asset. As a result, the METRs under the business income tax, including withholding on interest payments at a 7 percent rate and assuming 100 percent equity finance, fall from 32.5 percent to 0.1 percent for investment in machinery, equipment and furniture, and from 29.2 percent to a subsidy of 67 percent (an METR of -67 percent) for investment in computers and vehicles. The decline in METRs is even more dramatic if part of the investment is debt-financed, with the METR falling to -54.2 percent for investment in machinery, equipment and furniture with 60 percent debt finance and to a subsidy greater than 1000 percent for investment in computers and vehicles. (Recall that the METR concept is not well suited to analyzing subsidies, since with sufficiently large subsidies, METRs become arbitrarily large as the denominator of the effective tax rate, the gross return required, becomes very small.) These results demonstrate that a first priority for reform should be "fixing" partial expensing by adding a basis adjustment so that the purchase price of the asset is deducted only once, as described in Zodrow (2003b). This would result in METRs that vary from 22.4-

38.5 percent with all equity finance and from 10.2-29.3 percent for 60 percent debt finance, and such a reform is assumed in most of the subsequent discussion in order to avoid highly negative METRs.[20]

Fifth, the 0.3 percent wealth tax has a relatively minor impact on investment incentives under the Colombian tax system. For example, with partial expensing with basis adjustment and interest withholding at 7 percent, the addition of the wealth tax increases METRs by roughly 2-6 percentage points.

Sixth, the delay in crediting the VAT on purchases of capital equipment (the VAT is credited over a three-year period rather than immediately) also has only a modest effect on METRs. For example, with partial expensing with basis adjustment and interest withholding at 7 percent, the addition of the VAT with three-year crediting increases METRs on the affected assets by between 0.5-2.7 percentage points. However, the VAT, as a tax on the purchase price of a capital asset rather than on its net income, can have significant effects if it is not credited (as is appropriate for a consumption-based tax). For example, with partial expensing with basis adjustment and interest withholding at 7 percent, the addition of an uncredited VAT increases METRs on the affected assets by between 8.5-42.5 percentage points. In addition, an uncredited VAT results in wide variations in METRs across assets and business sectors, with METRs varying from 29.5-50.7 percent with all equity finance, and from 14.8-52.7 percent with 60 percent debt finance. Thus, delayed crediting of the VAT should not be allowed to expire, and consideration should be given to implementing the standard treatment of full immediate crediting.

Seventh, as would be expected from the previous discussion, the addition of the wealth tax and the VAT with three-year crediting by no means offsets the deleterious effects of partial

---

[20]   Note that tax distortions across assets cannot be eliminated, even with all equity finance, unless partial expensing applies to investments in all types of assets, including inventories, land and structures.

expensing with no adjustment of basis. METRs for the current system, including the business income tax with partial expensing with no adjustment of basis and interest withholding, the wealth tax and the VAT, are very low or negative on investment in machinery, equipment and furniture and on investment in computers and vehicles. Coupled with METRs that range from 18.2-41.0 percent on investment in structures and non-depreciable assets, the tax system results in huge distortions across assets and across business subsectors, with METRs ranging from -44.8 to 41 percent for all equity financed investments and -412% to 31.7 percent for investments financed with 60 percent debt.

Finally, rate reduction coupled with base-broadening may be an attractive route for reform of the Colombian business income tax system. The above analysis shows that the negative effects on investment incentives of a high statutory rate under the business income tax can be offset with the appropriate tax incentives, such as partial expensing with basis adjustment. Moreover, the use of investment incentives avoids the transitional problem of lowering the tax burden on existing capital that arises with a statutory rate reduction. However, the use of such incentives, coupled with a statutory corporate tax rate that is relatively high (especially by Latin American standards), suffers from two important problems. First, a high statutory tax rate creates incentives for multinationals to use accounting manipulations, such as transfer pricing schemes or judicious allocations of loans, to shift revenues away from, and deductions to, the high rate jurisdiction. Such manipulations can dramatically reduce revenues in countries with relatively high statutory tax rates such as the current rate in Colombia. A second less obvious but perhaps critical issue is whether a high statutory rate creates the perception in the international business community of an unfavorable tax regime, if even if the effects of the high statutory rate are greatly mitigated with investment incentives. Both of these considerations

suggest that a lower-rate, broad-based approach to corporate taxation may be more desirable than one characterized by a high statutory rate and generous investment incentives.[21]

One such approach would be to adopt for all businesses the 22 percent statutory rate currently applicable to only a small number of mostly quasi-public sector enterprises in Colombia, coupled with elimination of partial expensing. METRs under this approach, including interest withholding at a 7 percent rate, the current wealth tax, and the VAT with three-year crediting, would range from 18.8-25.2 percent with all equity finance and 12.8-21.6 percent with 60 percent debt finance. Such a system would thus result in a fairly low overall tax burden and few distortions across assets or subsectors. Moreover, even this fairly narrow range of METRs could be further narrowed by reducing current deductions for depreciation as outlined above, resulting in a tax system that would have virtually uniform rates across all assets and business subsectors at any given level of debt finance (24.5-26.1 percent with all equity finance, and 20.5-21.6 percent with 60 percent debt finance), less variation in METRs across methods of finance (since the difference in the rate at which interest is deducted and taxed is reduced), and a relatively low overall level of taxation, determined primarily by the statutory rate.

In summary, the METR analysis suggests that a number of reforms of the Colombian tax system are worthy of consideration. Most importantly, the system of partial expensing should be amended by allowing for a basis adjustment in the calculation of depreciation deductions. Alternatively, partial expensing could be replaced by a rate reduction that would reduce incentives for revenue-reducing transfer pricing and other manipulations by foreign multinationals and reduce distortions across assets, business subsectors and methods of finance.

---

[21]   Another commonly noted point is that the effects of investment incentives may be muted for firms based in countries, such as the United States, that tax their multinationals on a residence basis, subject to a foreign tax credit for taxes paid abroad, as incentives in the host country may simply be offset by higher taxes in the home country. It should also be noted, however, that many factors, including the existence of countries that tax on a territorial basis or allow tax sparing, the existence of many firms with excess foreign tax credits, and the fact that home taxes are deferred until profits are repatriated, suggest that the importance of this "Treasury transfer effect" is limited in many cases.

In either case, consideration should be given to reducing depreciation deductions to reduce tax distortions across assets and business subsectors. Moreover, delayed crediting of the VAT should not be allowed to expire, and should in the long run be replaced with the standard treatment of full immediate VAT crediting of all business purchases. Finally, consideration should be given to an increase in interest withholding to reduce the existing tax bias favoring debt finance, although this is severely complicated by the extent to which such a change would encourage domestic capital flight to Miami and elsewhere.

APPENDIX: CALCULATION OF MARGINAL EFFECTIVE TAX RATES

The calculation of METRs is outlined in this annex (for further details, consult Boadway, Bruce and Mintz, 1984, or King and Fullerton, 1984). Consider an investment in an asset that costs q, has a marginal revenue product of c, and lasts forever but depreciates exponentially at a constant rate of economic depreciation δ. Suppose further that the corporate income tax rate is u, the net indirect tax rate on the purchase of the asset, due to non-creditable VATs, is t (which is included in the tax basis of the asset), and a wealth tax, not deductible against the corporate income tax, is assessed on the market value of the asset, net of any indirect taxes, at rate w. Let z be the present value of the depreciation deductions allowed under the income tax, per dollar of investment, over the life of the asset. For example, if the tax code allows exponential (declining balance) deductions at rate α, with no adjustment for inflation,

$$ z = \int_0^\infty \alpha e^{-\alpha t} e^{-(r_f + \pi)t} dt = \frac{\alpha}{\alpha + r_f + \pi} , $$

where r_f is the firm's real discount rate. In addition, a deduction for partial expensing at rate n is granted (with no adjustment of basis). To calculate the firm's discount rate r_f, assume that the debt-asset ratio is fixed at β, the nominal interest rate is i and the nominal return required by equity holders (which reflects dividends and capital gains) is ρ, in which case

$$ r_f = \beta(1-u)i + (1-\beta)\rho, $$

reflecting the deductibility of interest payments coupled with the lack of deductibility of payments to shareholders.

The calculation of a marginal effective tax rate (METR) assumes that a marginal investment in an asset just breaks even, that is, that the net benefits generated by the investment,

taking into account all tax factors, just equals the after-tax net cost of the investment. For a depreciable asset, assuming that the wealth tax is not deductible against the business income tax, this requires

$$(1-un)(1+t)q = (1-u)\int_0^\infty ce^{-\delta t}e^{\pi t}e^{-(r_f+\pi)t}dt + u(1+t)qz - w\int_0^\infty qe^{-\delta t}e^{\pi t}e^{-(r_f+\pi)t}dt$$

$$(1-un)(1+t) = \frac{(1-u)(c/q)}{\delta+r_f} + u(1+t)z - \frac{w}{\delta+r_f}$$

$$c/q = \frac{(1-un)(1+t)(\delta+r_f)}{(1-u)} - \frac{u(1+t)z(\delta+r_f)}{(1-u)} + \frac{w}{(1-u)}$$

The gross return to the asset, net of depreciation, is thus

$$r_g = c/q - \delta = \frac{(1+t)(\delta+r_f)}{(1-u)}\left[1-u(n+z)\right] + \frac{w}{(1-u)} - \delta \; .$$

For land and inventories, the gross return is obtained by setting the depreciation rate in this expression equal to zero. Finally, letting r_n denote the real return to investment received by the saver, net of the combined withholding and any personal income tax burden on interest, t_i, and net of the combined withholding and any personal income tax burden on dividends, t_d,

$$r_n = \beta(1-u)i + (1-\beta)\rho - \pi,$$

the marginal effective tax rate on the investment is

$$METR = \frac{r_g - r_n}{r_g} \; .$$

Note that in the case of a foreign investor, this effective tax rate does not take into account any exchange rate effects or the effects of any foreign tax credits.

Table 1. Business Subsector Capital Stock Weight

35

Subsector	Inventories	Land	Structures (20 years)	Machinery and Equipment (10 yrs)	Computers and Vehicles (5 yrs)
Agriculture and fishing	0.201	0.098	0.463	0.190	0.047
Mining	0.093	0.037	0.041	0.747	0.083
Food processing	0.256	0.040	0.215	0.391	0.098
Leather and textiles	0.487	0.018	0.112	0.306	0.077
Wood, cork and paper	0.302	0.024	0.122	0.442	0.111
Chemicals	0.377	0.027	0.126	0.424	0.047
Processing of mineral products	0.321	0.044	0.167	0.375	0.094
Electricity, gas and steam	0.013	0.101	0.201	0.548	0.137
Construction	0.495	0.276	0.102	0.101	0.025
Cars and accessories	0.599	0.021	0.215	0.116	0.050
Large scale commerce	0.588	0.020	0.193	0.119	0.080
Small scale commerce	0.438	0.032	0.292	0.143	0.095
Hotels and restaurants	0.071	0.065	0.510	0.247	0.106
Transportation, storage, communication	0.027	0.059	0.157	0.454	0.303
Financial services	0.061	0.063	0.497	0.189	0.189
Other services	0.069	0.116	0.283	0.266	0.266
Sports and leisure	0.094	0.102	0.445	0.180	0.180

TABLE 2. METRs UNDER BUSINESS INCOME TAX
(PE=0, BA=0, WHI=0, WHD=0, VAT=0, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	38.5%	36.0%	32.6%	27.3%
Land	38.5%	36.0%	32.6%	27.3%
Structures	29.5%	25.7%	20.3%	12.3%
Machinery, equipment and furniture	32.5%	29.3%	25.0%	18.5%
Computers and vehicles	29.2%	26.1%	21.9%	15.5%

METRs by Business Subsector				
Agriculture and fishing	32.8%	29.5%	24.9%	18.1%
Mining	32.9%	29.8%	25.5%	19.2%
Food processing	33.3%	30.2%	25.9%	19.5%
Leather and textiles	34.9%	32.1%	28.1%	22.0%
Wood, cork and paper	33.7%	30.7%	26.5%	20.3%
Chemicals	34.4%	31.4%	27.3%	21.1%
Processing of mineral products	33.9%	30.9%	26.7%	20.4%
Electricity, gas and steam	32.1%	28.9%	24.5%	17.9%
Construction	36.7%	34.0%	30.3%	24.6%
Cars and accessories	35.4%	32.5%	28.5%	22.5%
Large scale commerce	35.3%	32.4%	28.4%	22.4%
Small scale commerce	34.1%	31.1%	26.9%	20.5%
Hotels and restaurants	31.5%	28.0%	23.3%	16.2%
Transport, storage, communication	31.5%	28.4%	24.0%	17.4%
Financial services	31.1%	27.7%	23.0%	16.0%
Other services	31.9%	28.7%	24.2%	17.6%
Sports and leisure	31.8%	28.4%	23.8%	16.9%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 2a. METRs UNDER BUSINESS INCOME TAX
(PE=0, BA=0, WHI=0.385, WHD=0, VAT=0, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	38.5%	38.5%	38.5%	38.5%
Land	38.5%	38.5%	38.5%	38.5%
Structures	29.5%	28.5%	27.3%	25.8%
Machinery, equipment and furniture	32.5%	32.1%	31.6%	31.1%
Computers and vehicles	29.2%	29.0%	28.7%	28.5%

METRs by Business Subsector				
Agriculture and fishing	32.8%	32.2%	31.5%	30.7%
Mining	32.9%	32.5%	32.1%	31.6%
Food processing	33.3%	32.9%	32.4%	31.9%
Leather and textiles	34.9%	34.7%	34.4%	34.0%
Wood, cork and paper	33.7%	33.4%	33.0%	32.6%
Chemicals	34.4%	34.1%	33.7%	33.3%
Processing of mineral products	33.9%	33.5%	33.1%	32.7%
Electricity, gas and steam	32.1%	31.7%	31.1%	30.5%
Construction	36.7%	36.6%	36.4%	36.2%
Cars and accessories	35.4%	35.1%	34.8%	34.4%
Large scale commerce	35.3%	35.0%	34.7%	34.4%
Small scale commerce	34.1%	33.8%	33.3%	32.8%
Hotels and restaurants	31.5%	30.8%	30.1%	29.1%
Transport, storage, communication	31.5%	31.1%	30.7%	30.1%
Financial services	31.1%	30.5%	29.8%	28.9%
Other services	31.9%	31.4%	30.9%	30.3%
Sports and leisure	31.8%	31.2%	30.5%	29.7%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 2b. METRs UNDER BUSINESS INCOME TAX
(SLOWER DEPR., PE=0, BA=0, WHI=0.385, WHD=0, VAT=0, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	38.5%	38.5%	38.5%	38.5%
Land	38.5%	38.5%	38.5%	38.5%
Structures	38.8%	38.7%	38.6%	38.2%
Machinery, equipment and furniture	38.7%	38.5%	38.3%	38.0%
Computers and vehicles	37.0%	36.9%	36.8%	36.7%

METRs by Business Subsector				
Agriculture and fishing	38.6%	38.5%	38.4%	38.2%
Mining	38.5%	38.4%	38.2%	38.0%
Food processing	38.5%	38.4%	38.3%	38.1%
Leather and textiles	38.5%	38.4%	38.3%	38.2%
Wood, cork and paper	38.4%	38.3%	38.2%	38.0%
Chemicals	38.5%	38.4%	38.3%	38.2%
Processing of mineral products	38.5%	38.4%	38.3%	38.1%
Electricity, gas and steam	38.4%	38.3%	38.2%	37.9%
Construction	38.5%	38.5%	38.4%	38.4%
Cars and accessories	38.5%	38.5%	38.4%	38.3%
Large scale commerce	38.5%	38.4%	38.3%	38.2%
Small scale commerce	38.5%	38.4%	38.3%	38.2%
Hotels and restaurants	38.6%	38.4%	38.3%	38.0%
Transport, storage, communication	38.2%	38.0%	37.9%	37.7%
Financial services	38.4%	38.3%	38.2%	37.9%
Other services	38.2%	38.1%	38.0%	37.8%
Sports and leisure	38.4%	38.3%	38.2%	38.0%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 3. METRs UNDER BUSINESS INCOME TAX
(PE=0, BA=0, WHI=0.07, WHD=0, VAT=0, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	38.5%	36.5%	33.6%	29.3%
Land	38.5%	36.5%	33.6%	29.3%
Structures	29.5%	26.2%	21.6%	14.8%
Machinery, equipment and furniture	32.5%	29.8%	26.2%	20.8%
Computers and vehicles	29.2%	26.7%	23.1%	17.8%

METRs by Business Subsector				
Agriculture and fishing	32.8%	30.0%	26.1%	20.4%
Mining	32.9%	30.3%	26.7%	21.4%
Food processing	33.3%	30.7%	27.1%	21.7%
Leather and textiles	34.9%	32.5%	29.2%	24.2%
Wood, cork and paper	33.7%	31.2%	27.7%	22.5%
Chemicals	34.4%	31.9%	28.5%	23.4%
Processing of mineral products	33.9%	31.4%	27.9%	22.6%
Electricity, gas and steam	32.1%	29.4%	25.7%	20.2%
Construction	36.7%	34.5%	31.4%	26.7%
Cars and accessories	35.4%	33.0%	29.7%	24.7%
Large scale commerce	35.3%	32.9%	29.6%	24.6%
Small scale commerce	34.1%	31.6%	28.1%	22.8%
Hotels and restaurants	31.5%	28.5%	24.5%	18.6%
Transport, storage, communication	31.5%	28.9%	25.2%	19.7%
Financial services	31.1%	28.3%	24.2%	18.3%
Other services	31.9%	29.2%	25.4%	19.9%
Sports and leisure	31.8%	28.9%	25.0%	19.3%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 3a. METRs UNDER BUSINESS INCOME TAX
(PE=0, BA=0, WHI=0.14, WHD=0, VAT=0, WT=0)

METRs by Asset	$\beta=0$	$\beta=0.2$	$\beta=0.4$	$\beta=0.6$
Inventories	38.5%	36.9%	34.7%	31.4%
Land	38.5%	36.9%	34.7%	31.4%
Structures	29.5%	26.7%	22.9%	17.2%
Machinery, equipment and furniture	32.5%	30.3%	27.4%	23.1%
Computers and vehicles	29.2%	27.2%	24.4%	20.2%

METRs by Business Subsector				
Agriculture and fishing	32.8%	30.5%	27.3%	22.7%
Mining	32.9%	30.8%	27.9%	23.7%
Food processing	33.3%	31.2%	28.3%	24.0%
Leather and textiles	34.9%	33.0%	30.4%	26.4%
Wood, cork and paper	33.7%	31.7%	28.9%	24.7%
Chemicals	34.4%	32.4%	29.6%	25.6%
Processing of mineral products	33.9%	31.8%	29.0%	24.9%
Electricity, gas and steam	32.1%	29.9%	26.9%	22.5%
Construction	36.7%	35.0%	32.5%	28.8%
Cars and accessories	35.4%	33.5%	30.8%	26.8%
Large scale commerce	35.3%	33.4%	30.7%	26.8%
Small scale commerce	34.1%	32.1%	29.2%	25.0%
Hotels and restaurants	31.5%	29.1%	25.8%	20.9%
Transport, storage, communication	31.5%	29.4%	26.4%	22.0%
Financial services	31.1%	28.8%	25.5%	20.7%
Other services	31.9%	29.7%	26.7%	22.2%
Sports and leisure	31.8%	29.4%	26.3%	21.6%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 3b. METRs UNDER BUSINESS INCOME TAX
(PE=0, BA=0, WHI=0.07, WHD=0.07, VAT=0, WT=0)

METRs by Asset	$\beta=0$	$\beta=0.2$	$\beta=0.4$	$\beta=0.6$
Inventories	42.8%	40.5%	37.3%	32.4%
Land	42.8%	40.5%	37.3%	32.4%
Structures	34.5%	30.9%	25.9%	18.5%
Machinery, equipment and furniture	37.2%	34.3%	30.2%	24.2%
Computers and vehicles	34.2%	31.3%	27.3%	21.4%

METRs by Business Subsector				
Agriculture and fishing	37.5%	34.4%	30.2%	23.9%
Mining	37.6%	34.7%	30.7%	24.8%
Food processing	38.0%	35.1%	31.1%	25.1%
Leather and textiles	39.5%	36.8%	33.1%	27.5%
Wood, cork and paper	38.4%	35.6%	31.7%	25.9%
Chemicals	39.0%	36.2%	32.4%	26.7%
Processing of mineral products	38.5%	35.7%	31.8%	26.0%
Electricity, gas and steam	36.9%	33.9%	29.8%	23.6%
Construction	41.2%	38.7%	35.2%	29.9%
Cars and accessories	39.9%	37.3%	33.5%	27.9%
Large scale commerce	39.8%	37.2%	33.5%	27.8%
Small scale commerce	38.7%	35.9%	32.0%	26.1%
Hotels and restaurants	36.3%	33.1%	28.7%	22.1%
Transport, storage, communication	36.3%	33.4%	29.3%	23.2%
Financial services	36.0%	32.8%	28.4%	21.8%
Other services	36.7%	33.7%	29.5%	23.3%
Sports and leisure	36.5%	33.5%	29.2%	22.7%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 4. METRs UNDER BUSINESS INCOME TAX
(PE=0.3, BA=0, WHI=0.07, WHD=0, VAT=0, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	38.5%	36.5%	33.6%	29.3%
Land	38.5%	36.5%	33.6%	29.3%
Structures	29.5%	26.2%	21.6%	14.8%
Machinery, equipment and furniture	0.1%	-9.6%	-25.1%	-54.2%
Computers and vehicles	-67.0%	-111.7%	-224.1%	-1043.5%

METRs by Business Subsector				
Agriculture and fishing	22.0%	15.9%	4.7%	-44.2%
Mining	0.7%	-10.7%	-32.1%	-122.6%
Food processing	11.2%	1.7%	-17.2%	-111.4%
Leather and textiles	17.7%	9.9%	-5.4%	-80.0%
Wood, cork and paper	8.7%	-1.5%	-22.3%	-128.0%
Chemicals	16.1%	8.7%	-4.9%	-58.4%
Processing of mineral products	12.7%	3.6%	-14.5%	-104.9%
Electricity, gas and steam	1.2%	-11.1%	-36.3%	-166.3%
Construction	31.0%	27.0%	19.9%	-7.8%
Cars and accessories	26.9%	21.6%	11.5%	-36.6%
Large scale commerce	23.8%	17.2%	3.8%	-68.8%
Small scale commerce	20.3%	12.7%	-2.9%	-89.3%
Hotels and restaurants	13.2%	4.1%	-14.4%	-112.5%
Transport, storage, communication	-12.3%	-30.9%	-72.9%	-335.4%
Financial services	6.8%	-5.4%	-32.2%	-196.7%
Other services	-2.4%	-18.2%	-54.0%	-282.6%
Sports and leisure	8.7%	-3.0%	-28.5%	-184.7%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 5. METRs UNDER BUSINESS INCOME TAX
(PE=0.3, BA=1, WHI=0.07, WHD=0, VAT=0, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	38.5%	36.5%	33.6%	29.3%
Land	38.5%	36.5%	33.6%	29.3%
Structures	29.5%	26.2%	21.6%	14.8%
Machinery, equipment and furniture	25.2%	22.4%	18.5%	12.7%
Computers and vehicles	22.4%	19.7%	15.9%	10.2%

METRs by Business Subsector				
Agriculture and fishing	31.1%	28.2%	24.3%	18.5%
Mining	26.9%	24.1%	20.3%	14.7%
Food processing	29.8%	27.1%	23.4%	17.8%
Leather and textiles	32.2%	29.7%	26.3%	21.1%
Wood, cork and paper	29.7%	27.1%	23.5%	18.1%
Chemicals	31.0%	28.4%	24.9%	19.5%
Processing of mineral products	30.5%	27.9%	24.3%	18.9%
Electricity, gas and steam	27.2%	24.4%	20.5%	14.6%
Construction	35.8%	33.6%	30.4%	25.7%
Cars and accessories	34.2%	31.8%	28.4%	23.3%
Large scale commerce	33.9%	31.5%	28.1%	23.0%
Small scale commerce	32.4%	29.9%	26.3%	20.9%
Hotels and restaurants	28.9%	26.0%	21.8%	15.7%
Transport, storage, communication	26.2%	23.4%	19.5%	13.7%
Financial services	28.5%	25.5%	21.4%	15.3%
Other services	28.1%	25.3%	21.5%	15.7%
Sports and leisure	29.2%	26.3%	22.4%	16.4%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 6. METRs UNDER INCOME AND WEALTH TAXES
(PE=0.3, BA=1, WHI=0.07, WHD=0, VAT=0, WT=0.003)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	40.5%	38.9%	36.6%	33.3%
Land	40.5%	38.9%	36.6%	33.3%
Structures	32.1%	29.4%	25.7%	20.4%
Machinery, equipment and furniture	28.1%	25.9%	22.9%	18.6%
Computers and vehicles	25.5%	23.4%	20.6%	16.4%

METRs by Business Subsector				
Agriculture and fishing	33.6%	31.3%	28.2%	23.8%
Mining	29.7%	27.5%	24.6%	20.4%
Food processing	32.4%	30.2%	27.3%	23.1%
Leather and textiles	34.6%	32.7%	30.0%	26.1%
Wood, cork and paper	32.3%	30.3%	27.5%	23.4%
Chemicals	33.5%	31.5%	28.7%	24.7%
Processing of mineral products	33.1%	31.0%	28.2%	24.1%
Electricity, gas and steam	30.0%	27.7%	24.7%	20.4%
Construction	38.0%	36.2%	33.7%	30.1%
Cars and accessories	36.5%	34.6%	31.9%	28.0%
Large scale commerce	36.2%	34.3%	31.6%	27.7%
Small scale commerce	34.8%	32.8%	29.9%	25.8%
Hotels and restaurants	31.6%	29.2%	26.0%	21.3%
Transport, storage, communication	29.0%	26.8%	23.8%	19.5%
Financial services	31.2%	28.8%	25.6%	20.9%
Other services	30.8%	28.6%	25.6%	21.3%
Sports and leisure	31.9%	29.6%	26.4%	21.9%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 7. METRs UNDER INCOME TAX AND CREDITED VAT
(PE=0.3, BA=1, WHI=0.07, WHD=0, VAT=0.16, WT=0)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	39.1%	37.0%	34.1%	29.7%
Land	38.5%	36.5%	33.6%	29.3%
Structures	29.5%	26.2%	21.6%	14.8%
Machinery, equipment and furniture	26.7%	23.9%	20.0%	14.2%
Computers and vehicles	25.0%	22.3%	18.5%	12.9%

METRs by Business Subsector	β=0	β=0.2	β=0.4	β=0.6
Agriculture and fishing	31.6%	28.8%	24.8%	19.0%
Mining	28.3%	25.5%	21.7%	16.1%
Food processing	30.8%	28.1%	24.3%	18.8%
Leather and textiles	33.1%	30.6%	27.2%	22.0%
Wood, cork and paper	30.9%	28.2%	24.6%	19.2%
Chemicals	32.0%	29.4%	25.8%	20.5%
Processing of mineral products	31.5%	28.9%	25.2%	19.8%
Electricity, gas and steam	28.4%	25.6%	21.7%	15.9%
Construction	36.3%	34.1%	30.9%	26.1%
Cars and accessories	34.9%	32.4%	29.0%	23.9%
Large scale commerce	34.6%	32.2%	28.8%	23.6%
Small scale commerce	33.2%	30.6%	26.9%	21.5%
Hotels and restaurants	29.6%	26.6%	22.5%	16.4%
Transport, storage, communication	27.7%	24.9%	21.0%	15.2%
Financial services	29.3%	26.3%	22.2%	16.2%
Other services	29.3%	26.5%	22.6%	16.8%
Sports and leisure	30.0%	27.1%	23.1%	17.2%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 7a. METRs UNDER INCOME TAX AND UNCREDITED VAT
(PE=0.3, BA=1, WHI=0.07, WHD=0, VAT=0.16, WT=0)

METRs by Asset	$\beta=0$	$\beta=0.2$	$\beta=0.4$	$\beta=0.6$
Inventories	47.0%	45.2%	42.8%	39.1%
Land	38.5%	36.5%	33.6%	29.3%
Structures	29.5%	26.2%	21.6%	14.8%
Machinery, equipment and furniture	44.4%	43.7%	42.8%	41.6%
Computers and vehicles	50.7%	51.2%	51.8%	52.7%

METRs by Business Subsector				
Agriculture and fishing	37.8%	35.6%	32.5%	28.0%
Mining	44.4%	43.5%	42.3%	40.7%
Food processing	42.3%	40.8%	38.8%	35.8%
Leather and textiles	44.4%	42.9%	40.9%	38.0%
Wood, cork and paper	43.9%	42.7%	41.0%	38.5%
Chemicals	43.7%	42.2%	40.3%	37.5%
Processing of mineral products	43.1%	41.7%	39.7%	36.8%
Electricity, gas and steam	41.7%	40.5%	38.8%	36.4%
Construction	42.7%	40.9%	38.3%	34.5%
Cars and accessories	42.9%	41.1%	38.5%	34.6%
Large scale commerce	43.4%	41.7%	39.2%	35.6%
Small scale commerce	41.6%	39.8%	37.2%	33.3%
Hotels and restaurants	37.3%	35.2%	32.3%	28.1%
Transport, storage, communication	43.7%	42.8%	41.6%	39.9%
Financial services	38.0%	36.1%	33.4%	29.4%
Other services	41.4%	40.0%	38.1%	35.4%
Sports and leisure	38.6%	36.7%	34.0%	30.2%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 8. METRs UNDER CURRENT TAX SYSTEM
(PE=0.3, BA=0, WHI=0.07, WHD=0, VAT=0.16, WT=0.003)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	41.0%	38.9%	36.0%	31.7%
Land	40.5%	38.4%	35.6%	31.4%
Structures	32.1%	28.9%	24.5%	18.2%
Machinery, equipment and furniture	7.4%	-1.1%	-14.2%	-37.3%
Computers and vehicles	-44.8%	-76.9%	-146.5%	-412.0%

METRs by Business Subsector				
Agriculture and fishing	26.4%	21.1%	12.4%	-8.8%
Mining	8.4%	-1.0%	-17.1%	-57.2%
Food processing	17.5%	9.8%	-4.0%	-41.6%
Leather and textiles	23.2%	16.7%	5.4%	-24.9%
Wood, cork and paper	15.6%	7.2%	-7.8%	-49.5%
Chemicals	21.6%	15.2%	4.7%	-20.1%
Processing of mineral products	18.9%	11.4%	-1.8%	-38.0%
Electricity, gas and steam	9.0%	-0.9%	-18.8%	-69.6%
Construction	34.4%	30.8%	25.0%	12.0%
Cars and accessories	31.0%	26.4%	18.7%	-1.2%
Large scale commerce	28.5%	23.0%	13.3%	-14.4%
Small scale commerce	25.4%	19.2%	8.0%	-24.5%
Hotels and restaurants	19.0%	11.6%	-1.7%	-39.3%
Transport, storage, communication	-1.6%	-15.9%	-43.8%	-136.0%
Financial services	14.0%	4.4%	-13.8%	-72.1%
Other services	6.7%	-5.5%	-29.2%	-108.6%
Sports and leisure	15.6%	6.4%	-10.9%	-66.4%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 9. METRs UNDER REFORMED TAX SYSTEM (PE)
(PE=0.3 BA=1, SLOWER DEPR, WHI=0.07, WHD=0, VAT=0.16, WT=0.003)

METRs by Asset	$\beta=0$	$\beta=0.2$	$\beta=0.4$	$\beta=0.6$
Inventories	41.0%	39.4%	37.0%	33.6%
Land	40.5%	38.9%	36.6%	33.3%
Structures	32.1%	29.4%	25.7%	20.4%
Machinery, equipment and furniture	34.4%	32.4%	29.8%	25.8%
Computers and vehicles	33.8%	31.9%	29.3%	25.5%

METRs by Business Subsector				
Agriculture and fishing	35.3%	33.0%	30.0%	25.6%
Mining	35.1%	33.1%	30.5%	26.6%
Food processing	35.8%	33.8%	31.0%	26.9%
Leather and textiles	37.4%	35.5%	32.9%	29.1%
Wood, cork and paper	36.2%	34.2%	31.6%	27.7%
Chemicals	36.7%	34.8%	32.2%	28.3%
Processing of mineral products	36.4%	34.4%	31.7%	27.7%
Electricity, gas and steam	34.6%	32.5%	29.7%	25.6%
Construction	39.1%	37.3%	34.8%	31.2%
Cars and accessories	38.0%	36.0%	33.4%	29.5%
Large scale commerce	37.9%	36.0%	33.4%	29.5%
Small scale commerce	36.8%	34.7%	31.9%	27.9%
Hotels and restaurants	34.0%	31.7%	28.6%	24.1%
Transport, storage, communication	34.4%	32.4%	29.6%	25.6%
Financial services	34.0%	31.7%	28.5%	24.0%
Other services	34.8%	32.7%	29.8%	25.6%
Sports and leisure	34.5%	32.3%	29.3%	24.9%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 10. METRs UNDER REFORMED INCOME TAX (LR)
(30% RATE, PE=0, WHI=0.07, WHD=0, VAT=0.16, WT=0.003)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	32.9%	31.6%	29.8%	27.2%
Land	32.3%	31.0%	29.3%	26.8%
Structures	25.1%	22.9%	20.0%	16.1%
Machinery, equipment and furniture	28.8%	27.0%	24.7%	21.4%
Computers and vehicles	27.2%	25.6%	23.4%	20.3%

METRs by Business Subsector				
Agriculture and fishing	28.2%	26.4%	24.0%	20.6%
Mining	29.0%	27.3%	25.0%	21.8%
Food processing	29.0%	27.3%	25.0%	21.8%
Leather and textiles	30.3%	28.7%	26.6%	23.7%
Wood, cork and paper	29.5%	27.8%	25.6%	22.5%
Chemicals	29.9%	28.3%	26.1%	23.0%
Processing of mineral products	29.5%	27.8%	25.6%	22.5%
Electricity, gas and steam	28.2%	26.5%	24.1%	20.8%
Construction	31.4%	29.9%	28.0%	25.2%
Cars and accessories	30.4%	28.9%	26.8%	23.8%
Large scale commerce	30.4%	28.9%	26.8%	23.8%
Small scale commerce	29.5%	27.8%	25.6%	22.5%
Hotels and restaurants	27.3%	25.4%	22.8%	19.3%
Transport, storage, communication	28.1%	26.3%	24.0%	20.7%
Financial services	27.1%	25.2%	22.7%	19.2%
Other services	28.0%	26.3%	23.9%	20.6%
Sports and leisure	27.6%	25.8%	23.3%	19.9%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

TABLE 10a.   METRs UNDER REFORMED INCOME TAX (LR)
(30% RATE, SLOWER DEPR, PE=0, WHI=0.07, WHD=0, VAT=0.16, WT=0.003)

METRs by Asset	β=0	β=0.2	β=0.4	β=0.6
Inventories	32.9%	31.6%	29.8%	27.2%
Land	32.3%	31.0%	29.3%	26.8%
Structures	32.5%	31.2%	29.2%	26.3%
Machinery, equipment and furniture	33.7%	32.1%	30.0%	27.0%
Computers and vehicles	33.1%	31.6%	29.6%	26.7%

METRs by Business Subsector				
Agriculture and fishing	32.8%	31.4%	29.5%	26.7%
Mining	33.5%	32.0%	29.9%	27.0%
Food processing	33.1%	31.7%	29.7%	26.9%
Leather and textiles	33.1%	31.7%	29.8%	27.0%
Wood, cork and paper	33.2%	31.8%	29.8%	26.9%
Chemicals	33.2%	31.7%	29.8%	27.0%
Processing of mineral products	33.1%	31.7%	29.7%	26.9%
Electricity, gas and steam	33.2%	31.7%	29.7%	26.8%
Construction	32.8%	31.4%	29.6%	27.0%
Cars and accessories	32.9%	31.5%	29.7%	27.0%
Large scale commerce	32.9%	31.5%	29.7%	27.0%
Small scale commerce	32.9%	31.5%	29.6%	26.9%
Hotels and restaurants	32.9%	31.5%	29.5%	26.6%
Transport, storage, communication	33.2%	31.7%	29.7%	26.8%
Financial services	32.9%	31.4%	29.5%	26.6%
Other services	33.0%	31.5%	29.6%	26.7%
Sports and leisure	32.9%	31.4%	29.5%	26.6%

Notation: PE=partial expensing, BA=basis adjustment for partial expensing (1=yes, 0=no)

WHI=withholding on interest, WHD=withholding on dividends, VAT=value-added tax

WT=wealth tax, β=debt/capital ratio

REFERENCES

Arbeláez, María Angélica, Len Burman and Sandra Zuluaga (forthcoming). "Bank Debit Tax in Colombia," in Richard Bird, James Poterba and Joel Slemrod (eds.), *Fiscal Reform in Colombia: Problems and Prospects.* Cambridge MA: MIT Press.

Boadway, Robin, Neil Bruce and Jack Mintz (1984). "Taxation, Inflation, and the Effective Marginal Tax Rate on Capital in Canada," *Canadian Journal of Economics* 17: 62-79.

Echavarría, Juan José and George R. Zodrow (forthcoming). "Foreign Direct Investment and the Business Tax in Colombia," in Richard Bird, James Poterba and Joel Slemrod (eds.), *Fiscal Reform in Colombia: Problems and Prospects.* Cambridge MA: MIT Press.

Gordon, Roger H. and James R. Hines, Jr. (2002). "International Taxation," in Alan J. Auerbach and Martin Feldstein (eds.), *Handbook of Public Economics Volume IV*. New York: Elsevier.

Gugl, Elisabeth and George R. Zodrow (2004). "International Tax Competition and Tax Incentives in Developing Countries." Paper presented at a conference on "Challenges of Tax Reform in a Global Economy," Andrew Young School of Policy Studies, Georgia State University, May 24-25, 2004.

Harberger, Arnold (1995). "The ABCs of Corporation Tax Incidence: Insights into the Open-Economy Case," in *Policy and Economic Growth.* Washington, DC: American Council for Capital Formation.

King, Mervyn and Don Fullerton (1984). *The Taxation of Income From Capital.* Chicago: University of Chicago Press.

McLure, Charles E., Jr. and George R. Zodrow (1997). "Thirty Years of Tax Reform in Colombia," in Wayme Thirsk (ed.), *Recent Experience with Tax Reform in Developing Countries.* Washington DC: The World Bank.

Mintz, Jack M. (1995). "Tax Holidays and Investment," in Anwar Shah (ed.), *Fiscal Incentives for Investment and Innovation.* Oxford: Oxford University Press, for the World Bank.

World Bank (2004). "Colombia Public Expenditure Review." Washington DC: World Bank.

Zodrow, George R. (2002). "World Bank Tax Reform Proposals for Colombia." Washington DC: The World Bank.

Zodrow, George R. (2003). "Reflections on the Economic Theory of Local Tax Incentives," *State Tax Notes* 28, No. 10 (June 9), pp. 891-900.

Zodrow, George R. (2003a). "Tax Competition and Tax Coordination in the European Union," *International Tax and Public Finance,* 10, pp. 651-671.

Zodrow, George R. (2003b). "Incremental Partial Expensing as an Investment Incentive Option in Colombia." Washington DC: The World Bank.

Zodrow, George R. and Charles E. McLure, Jr., 1991. "Implementing Direct Consumption Taxes in Developing Countries," *Tax Law Review* 46: 405-487.