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Finances of the Nation

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INSIDE THE BLACK BOX: MARGINAL EFFECTIVE TAX RATES ON CAPITAL IN CANADA—A PRIMER

For almost 60 years, the Canadian Tax Foundation published an annual monograph, Finances of the Nation, *and its predecessor,* The National Finances. *In a change of format, the 2014* Canadian Tax Journal *introduced a new "Finances of the Nation" feature, which presents a series of articles on topical matters related to taxation and public expenditures in Canada. Previous articles include surveys of provincial and territorial budgets for fiscal years 2013-14, 2014-15, and 2015-16, prepared by Vivien Morgan, and four monographs: Kevin Milligan, "The Growth of Government in Canada: A 21st-Century Perspective" and "The Tax Recognition of Children in Canada: Exemptions, Credits, and Cash Transfers"; Kenneth J. McKenzie, "The Corporate Income Tax in Canada—Past, Present, and Future"; and Richard Bird and Michael Smart, "Taxing Consumption in Canada: Rates, Revenues, and Redistribution." In this issue, Kenneth J. McKenzie discusses the impact of marginal effective tax rates (METRs) on business investment in capital. He presents Canadian data illustrating the distorting effects on investment decisions across several key dimensions, and suggests alternative approaches that could achieve a neutral tax system with respect to capital investment.*

The underlying data for the Finances of the Nation *monographs and articles in this journal will be published online in the near future.*

PRÉCIS

Le présent article fournit une introduction au taux effectif marginal d'imposition (TEMI) sur le capital, lequel mesure les distorsions des investissements qui sont introduites par les impôts levés auprès des entreprises. Après une explication du concept du TEMI, l'article présente de façon plus détaillée les formules sous-jacentes au calcul de ce taux puis les chiffres du TEMI pour le Canada, en mettant en évidence les différentes dimensions suivant lesquelles les impôts des sociétés peuvent causer une distorsion des investissements des sociétés. L'article se penche sur certaines approches de base à l'imposition neutre des bénéfices des entreprises dans le contexte des formules de calcul du TEMI.

ABSTRACT

This article provides a primer on the marginal effective tax rate (METR) on capital, which is a measure of the investment distortions introduced by taxes levied on businesses. The article begins with a conceptual explanation of the METR, followed by a more detailed

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presentation of the underlying formulas. METR numbers for Canada are presented, emphasizing different dimensions along which corporate taxes may distort business investment. Some basic approaches to the neutral taxation of business income are discussed in the context of the METR formulas.

KEYWORDS: CORPORATE INCOME TAXES ■ EFFECTIVE INCOME TAX RATES ■ INVESTMENT

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INTRODUCTION

The impact of taxes on business investment in capital is one of the most important areas in the study of taxation. To the extent that taxes discourage capital investment, they can decrease the amount of income generated in the economy, reduce productivity, and lower the overall standard of living. The issue is complicated by the fact that corporate/business tax regimes are complex and can differ substantially across jurisdictions and types of capital. Account must be taken not only of statutory tax rates on business income, for example, but also of other features of the business tax regime, such as tax depreciation allowances, investment credits, and other taxes levied on business capital—property taxes, capital taxes, capital transfer taxes, sales taxes levied on capital, etc.

Economists account for the key elements of the business tax system with respect to investment in a measure called the marginal effective tax rate (METR) on capital. The METR is a summary measure of the *effective* rate of tax imposed on the rate of return generated by the last, or *marginal*, unit of capital that a firm invests in. The marginal unit of capital that just breaks even in the sense that it generates just enough revenue to cover the costs of purchasing and holding the capital.[1]

The use of METRs as a measure of the distortion imposed by taxes on investment has become ubiquitous. Government documents often present METR calculations

1 The concept of the marginal effective tax rate (METR) on capital discussed here is related to an alternative way of measuring tax distortions, referred to as the average effective tax rate on capital (AETR). Under the METR approach, it is presumed that investment projects are continuous and earn a normal economic rate of return at the margin. Under the AETR approach, investment projects are discrete and earn above-normal economic returns. The two approaches are equivalent in the limit as the above-normal rate of return approaches the normal rate of return. See Michael P. Devereux and Rachel Griffith, "Evaluating Tax Policy for Location Decisions" (2003) 10:2 *International Tax and Public Finance* 107-26.

in order to illustrate the impact of various tax changes.[2] Moreover, METRs are often presented as a way to compare the "competitiveness" of tax regimes across different jurisdictions (countries, provinces).[3] Yet it is not clear that the concept is always well understood in public policy discussions.

The purpose of this article is to explain the idea behind the calculation of METRs and to present some data on METRs in Canada, based on a model maintained by the University of Calgary's School of Public Policy (SPP).

I begin with a conceptual explanation of the METR and then move on to a slightly more formal discussion. The latter involves some relatively straightforward mathematics. While an understanding of the underlying formulas is not necessary to appreciate the basic idea behind the computations of the METR, an admittedly somewhat wonkish glimpse inside the black box goes a long way toward solidifying an understanding of the concept, and of the mechanisms through which various tax policy initiatives may affect business investment. This is followed by the presentation of some METR numbers for Canada, sliced and diced along different dimensions. The article concludes with a discussion of some basic approaches to neutral business taxation that does not distort capital investment decisions.

CONCEPTUAL EXPLANATION OF THE METR

There are two main stakeholders that hold an interest in firms: debtholders and equity holders. In order to satisfy these stakeholders, a capital investment must generate a rate of return *after the payment of all business taxes* that is greater than or equal to the hurdle rate of return required by these stakeholders. The hurdle rate is the minimum rate of return acceptable to these stakeholders. It can be thought of as the rate of return that the stakeholders could earn by investing their money elsewhere. Forgoing the hurdle rate of return in order to invest in a firm's capital thus constitutes an implicit cost, an opportunity cost, to the stakeholders that must be covered by the returns to the investment in order to make it viable. The stakeholders will provide the funds for the investment (by way of either debt or equity) only if the capital financed by the funds yields returns that cover this opportunity cost, and therefore generates at least the required hurdle rate of return. A capital project that generates the hurdle rate of return exactly is called the marginal unit of capital. The marginal unit of capital just breaks even in the sense that it generates a return that is just equal to the opportunity cost of the underlying funds.

2 See, for example, Canada, Department of Finance, *Tax Expenditures and Evaluations 2005* (Ottawa: Department of Finance, 2005).

3 See, for example, Duanjie Chen and Jack M. Mintz, "The 2014 Global Tax Competitiveness Report: A Proposed Business Tax Reform Agenda" (2015) 8:4 *SPP Research Papers* [University of Calgary, School of Public Policy] 1-19.

For example, assume that the hurdle rate of return is 4.8 percent.[4] This is the rate of return that the stakeholders could earn by investing their funds elsewhere. Any capital projects that earn a rate of return greater than 4.8 percent, *after the payment of all relevant business taxes*, will be undertaken. So, if a firm invests only in projects with a rate of return equal to or greater than the hurdle rate, and it invests in projects with the highest rate of return first and then moves down the menu of capital projects available to it, the last (marginal) project undertaken will earn an after-tax rate of return of 4.8 percent exactly. The tax system distorts firm investment decisions by changing the marginal investment—that is, by increasing the before-tax rate of return on the marginal capital project required to generate the after-tax hurdle rate of return.

Continuing with the example, say that given the various features of the tax system, discussed in more detail below, in order to earn the hurdle rate of return of 4.8 percent *after* business taxes, an investment must earn a rate of return of 5.8 percent *before* business taxes. The METR is then 17.2 percent, determined as $(0.058 - 0.048)/0.058 = 0.172$.[5] The numerator $(0.058 - 0.048 = 0.01)$ is the *wedge* driven between the before- and after-tax required rate of return on a marginal unit of capital, and measures the increase in the rate of return required to pay the business taxes; the denominator (0.058) is the before-tax rate of return that generates the required after-tax hurdle rate of return (0.048). The METR therefore measures the distortion of the rate of return on the marginal investment by the share of the marginal investment's pre-tax rate of return needed to cover the associated taxes.

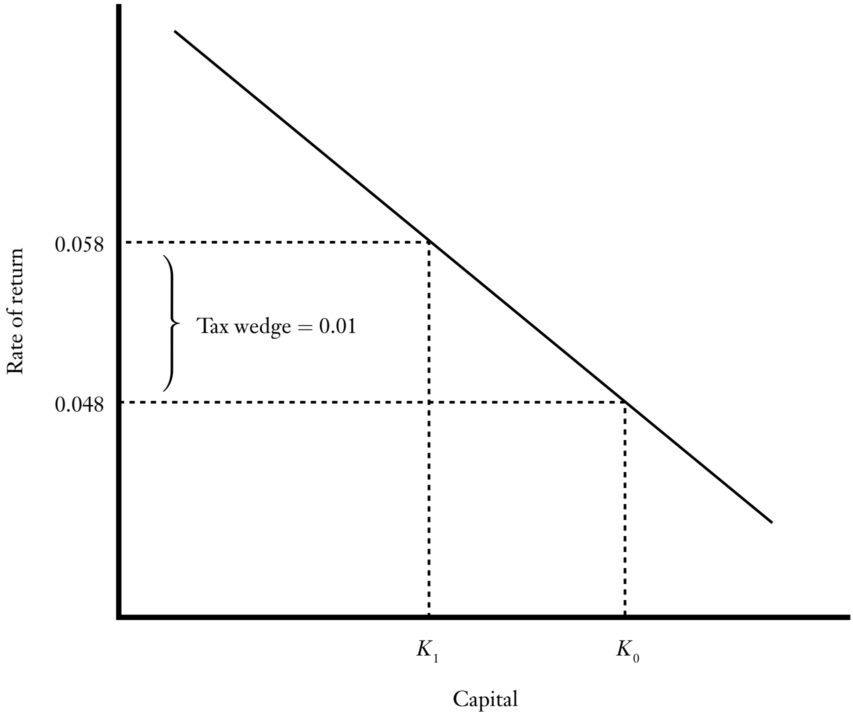
Figure 1 illustrates this idea diagrammatically. The figure depicts a demand curve for capital, with the quantity of capital on the horizontal axis and the opportunity cost of capital, as manifested in the hurdle rate of return required by stakeholders, on the vertical axis. The schedule is downward sloping, reflecting the idea that as the opportunity cost of capital declines, more capital is able to satisfy the hurdle rate of return requirement and more investment occurs. Investment will take place up to the point where a marginal unit of capital just generates the required hurdle rate of return. In the absence of any business taxes, if the hurdle rate of return required by investors is 4.8 percent, the capital stock will be K_0. If, as above, business taxes raise the before-tax rate of return required to generate that hurdle rate of return to 5.8 percent, driving a wedge between the before- and after-tax required rate of return on capital, the capital stock will fall to K_1. Business taxes therefore discourage capital accumulation by increasing the before-tax rate of return required on a marginal investment.

There is considerable empirical evidence that business taxes, as measured by METRs and the related concept of the user cost of capital (introduced below), do indeed affect investment. One of the difficulties with identifying and isolating empirically the impact of business taxes on investment is that tax changes tend to be

4 As will become clear below, this should be thought of as the real (inflation-adjusted) net-of-depreciation rate of return.

5 All calculations are rounded to one decimal point in percentage terms.

FIGURE 1 The Tax Wedge and the Demand for Capital



confounded by other things going on in the economy at the same time. For example, governments may reduce business taxes in a recession in an attempt to stimulate investment. Because tax reductions may affect investment with a lag, simply looking at the raw data may indicate a positive correlation between business taxes and investment, suggesting that increases (decreases) in business taxes are associated with increases (decreases) in investment. And indeed, early empirical studies of taxes and investment tended to show either no impact of taxes on investment or, as suggested, even a small positive correlation. Over the last couple of decades, access to better data and advances in econometric techniques have allowed economists to better isolate and identify the impact of taxes on investment. On the basis of this evidence, reviews of the empirical literature by Hassett and Hubbard and by Hassett and Newmark have concluded that business taxes negatively, and significantly, discourage investment.[6] For example, Hassett and Hubbard concluded that the empirical

6 Kevin A. Hassett and R. Glenn Hubbard, "Tax Policy and Business Investment," in *Handbook of Public Economics* 3 (Elsevier, 2002), 1293-1343; and Kevin A. Hassett and Kathryn Newmark, "Taxation and Business Behavior: A Review of the Recent Literature," in John W. Diamond and George R. Zodrow, eds., *Fundamental Tax Reform: Issues, Choices, and Implications* (Cambridge, MA: MIT Press, 2008), 191-214.

literature suggests that a 1 percent increase in the user cost of capital (and an associated increase in the METR) reduces investment by between 0.5 and 1.0 percent. In a recent update of the state of the empirical literature, Dahlby and Hassett argue that recent advances in the research suggest that the impact may be even larger.[7]

Why are tax distortions of investment in capital important? The wedge driven between the before- and after-tax rates of return on a marginal unit of capital, and the resulting reduction in the amount of capital employed in the economy, means that otherwise profitable investment opportunities are forgone. The revenue that could have been earned from those forgone investments exceeds the opportunity cost of undertaking them, resulting in an overall reduction of income in the economy. In general, this decline in income may be manifested in lower returns to capital stakeholders (debt and equity holders) and/or in lower wages to workers owing to a decline in productivity associated with the reduction of capital in the economy.[8] Moreover, as discussed in more detail below, taxes can distort the allocation of capital across sectors and types of capital, leading to a further overall reduction of income in the economy.

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Some elementary mathematics will help to clarify these ideas. The approach is to build up the METR expression step by step. I begin by considering a firm's investment decision in the absence of taxes. I then consider the impact of a stylized business tax regime, with features common to the tax systems in Canada and other countries. It is shown that business taxes affect the investment decision in two fundamental ways: first, they lower the revenues generated by a marginal unit of capital by taxing those revenues; and second, they lower the cost of that unit of capital by allowing various deductions and credits for the cost of purchasing and financing the capital. By deconstructing the METR in this manner—peering inside the black box—the intention

7 Bev Dahlby and Kevin Hassett, "The Economic Effects of the Corporate Tax: A Review of the Recent Literature," paper presented at the School of Public Policy Conference on the Corporate Income Tax, 2016.

8 See K.J. McKenzie and E. Ferede, "The Incidence of Corporate Income Taxes on Wages: Insights from the Literature and Evidence from Canadian Provinces," *SPP Research Paper*, University of Calgary, School of Public Policy (forthcoming). They show that corporate income taxes are borne to a large extent by labour through lower wages, with $1 of tax revenue raised through an increase in the corporate income tax at the provincial level generating a greater than $1 decline in aggregate wages.

9 In order to keep the discussion tractable, I take some minor liberties in this section. Purists will no doubt object to some of this. For example, I abstract from risk and ignore personal taxes and issues relating to the firm's financial structure. Notwithstanding these liberties, what follows captures the key notions and ideas that lie behind the calculation of METRs. For a more formal approach, see Robin Boadway, Neil Bruce, and Jack Mintz, "Taxation, Inflation, and the Effective Marginal Tax Rate on Capital in Canada" (1984) 17:1 *Canadian Journal of Economics* 62-79.

is to provide greater insight into the way in which various tax policy initiatives affect investment decisions.

To begin, consider a firm's investment decision in the absence of taxes. In this case, the hurdle rate of return required by the firm's stakeholders (debt and equity holders) consists of two components. The first is the *real cost of finance* (r). This can be expressed as the weighted average of the nominal cost of issuing debt and equity, less the expected rate of inflation, as follows:

$$r = i\beta + \rho(1 - \beta) - \pi, \tag{1}$$

where i is the nominal interest rate on the firm's debt (the cost of debt finance), β is the proportion of the firm's investment financed by debt, ρ is the nominal rate of return required by equity holders (the cost of equity finance), and π is the expected rate of inflation. These reflect the hurdle rates of return for the two types of stakeholders discussed above—the opportunity cost of providing the funds to the firm. For example, if the nominal interest rate on the firm's debt (i) is 5 percent, the proportion of the investment financed by debt (β) is 40 percent, the shareholders' nominal required rate of return on equity (ρ) is 8 percent, and the inflation rate (π) is 2 percent, the weighted average real cost of financing a unit of capital for the firm is 4.8 percent [$r = (0.05)\,(0.40) + (0.08)\,(1 - 0.40) - 0.02 = 0.048$].

The second component of the required hurdle rate of return on capital is the economic rate of depreciation. This is the per period percentage reduction in the value of capital owing to wear and tear, obsolescence, etc. Aside from generating a rate of return high enough to cover the cost of financing the investment, an investment must also generate a return that is high enough to compensate for the per period loss in the value of the capital attributable to depreciation. The real rate of return required on a marginal investment by the firm's stakeholders (R) is then equal to the real cost of finance (r) plus the economic rate of depreciation (δ):

$$R = r + \delta. \tag{2}$$

Continuing with the example, if the real cost of finance is 4.8 percent (equation 1), and the economic rate of depreciation is 15 percent, then the real hurdle rate of return required on a marginal unit of capital is 19.8 percent. Subtracting the economic rate of depreciation (δ) gives the real net-of-depreciation hurdle rate of return on capital facing the firm:

$$r^n = R - \delta, \tag{3}$$

which is 4.8 percent in our example. All capital investments must earn this net-of-depreciation rate of return in order to attract the funds from investors to finance the capital, and the marginal investment will earn this rate of return exactly.

Now consider a very simple, stylized business tax system with the following features:[10]

- The statutory corporate income tax rate is $u = 0.25$.
- The purchase price of depreciable assets is written off for tax purposes on a declining balance basis at the statutory capital cost allowance (CCA) rate $\alpha = 0.20$.
- An investment tax credit (ITC) is granted on the purchase price of the asset at the rate $\phi = 0.05$.
- Nominal interest payments on the firm's debt are tax-deductible, but the opportunity cost of equity finance is not.
- An *effective* sales tax at rate $t = 0.05$ is imposed on the purchase of the capital.[11]

In the presence of taxes, the required rate of return in equation 3 should be interpreted as the *after-business-tax* hurdle rate of return. The firm must earn at least this rate of return on an incremental unit of capital *after the payment of taxes* in order to satisfy its stakeholders. With this in mind, we want to determine the *before-tax* rate of return that will generate the *after-business-tax* hurdle rate of return required by the firm's stakeholders.

As noted above, business taxes affect the before-tax rate of return on capital in two basic ways. First, they lower the revenues generated by the capital by taxing that revenue. This *increases* the required before-tax rate of return on the capital. Second, they lower the cost of financing and purchasing the capital by allowing various deductions and credits. This *decreases* the required before-tax rate of return on the capital. The net impact on the required before-tax rate of return depends on which of these effects is proportionately greater. I use this logic to build up the underlying METR equations in stages.

First, as indicated, the imposition of the corporate income tax at rate u lowers the revenues generated by an incremental investment. In order to generate a rate of return of R *after* tax, an incremental unit of capital must generate a rate of return of $R/(1 - u)$ *before* tax. So, for example, in the absence of any deductions for the cost

10 The focus here is on business, or corporate, taxes. Personal income taxes are ignored. This is justified in a small open economy context where capital is perfectly mobile internationally. In this environment, personal income taxes levied on the returns to saving will affect domestic savings, but not domestic investment. See supra note 9.

11 Note the use of the term "effective." The extent to which sales taxes apply to business inputs varies across the provinces. In harmonized sales tax (HST) provinces, which adopt the federal goods and services tax (GST) base, sales taxes are explicitly removed from business inputs by virtue of the application of a multistaged value-added tax. In provinces with single-stage sales taxes, on the other hand, some sales taxes may fall on business inputs. In these provinces, there may also be tax cascading as those taxes are applied at several stages in the supply chain. See Jack Mintz, "British Columbia's Harmonized Sales Tax: A Giant Leap in the Province's Competitiveness" (2010) 3:4 *SPP Briefing Papers* 1-13.

of financing and purchasing capital, or any other taxes levied on capital (so that, in effect, we are just taxing firm revenue at rate u), if the gross-of-depreciation after-tax hurdle rate of return is 19.8 percent and the business-income tax rate is 25 percent, the before-tax required rate of return would be 26.4 percent [0.198/(1 – 0.25) = 0.264]—that is, a 25 percent tax on the revenue from an investment that yields a before-tax rate of return of 26.4 percent will generate an after-tax rate of return of 19.8 percent, which is the minimum gross-of-depreciation rate of return required by stakeholders (equation 2).

Of course, as indicated above, the business tax system does allow for various deductions and credits. These act to lower the after-tax cost of financing and purchasing the capital. First, there is the deduction of nominal interest payments on debt. This lowers the firm's real cost of financing, from r shown in equation 1 to

$$r^f = i(1 - u)\,\beta + \rho(1 - \beta) - \pi. \qquad (4)$$

Note that the deduction is for nominal (not real) debt interest and that there is no corresponding deduction for the required rate of return on equity ρ; this is consistent with the business tax system in Canada and most other countries. As will be discussed in more detail below, this treatment results in a "debt bias" in that corporate income tax tends to provide an incentive for firms to use debt rather than equity to finance capital investments. Given the parameters of our example ($i = 0.05$, $u = 0.25$, $\beta = 0.40$, $\rho = 0.08$, $\pi = 0.02$), the real cost of finance (r^f) facing the firm in the presence of interest deductibility is 4.3 percent, as compared with the 4.8 percent cost of finance facing the firm in the absence of the tax.

There are also tax depreciation deductions for the cost of purchasing the asset under the CCA system. These tax depreciation deductions are claimed over time, typically on a declining balance basis. What is relevant for assessing the impact of these deductions on the required before-tax rate of return on capital is the *present value* of the CCA deductions. With a declining balance CCA rate of α, the present value of the CCA deductions on \$1 spent on capital[12] is

$$A = \alpha/(r^f + \pi + \alpha). \qquad (5)$$

12 With a CCA rate of α, the stream of declining balance depreciation deductions on the purchase of \$1 of capital is α in year 1, $\alpha\,(1 - \alpha)$ in year 2, $\alpha\,(1 - \alpha)^2$ in year 3, $\alpha\,(1 - \alpha)^3$ in year 4, . . . ad infinitum. The present value of the CCA deductions, assuming that the deduction is claimed at the end of each period, is the infinite sum $A = \Sigma_{t=1}\,[\alpha/(1 + r^f + \pi)][(1 - \alpha)/(1 + r^f + \pi)]^{t-1}$. Multiplying both sides of this expression by $[(1 - \alpha)/(1 + r^f + \pi)]$ gives $A[(1 - \alpha)/(1 + r^f + \pi)] = \Sigma_{t=1}\,[\alpha/(1 + r^f + \pi)][(1 - \alpha)/(1 + r^f + \pi)]^t$. Taking the difference gives $A - A[(1 - \alpha)/(1 + r^f + \pi)] = \alpha/(1 + r^f + \pi)$. Solving for A gives $A = \alpha/(r^f + \pi + \alpha)$. The equation can be adjusted for the half-year rule, which allows for half of the depreciation deduction in the first year of purchase. It can also be adjusted for different types of tax depreciation systems, such as straightline, and for things like investment allowances. The key point is that A is the present value of the tax depreciation deductions on \$1 of capital, determined according to whatever tax depreciation system is in place.

Note that the discount rate used to calculate the present value of the CCA deductions is the *nominal after-tax* cost of finance, $r^f + \pi$. This is because CCA deductions are determined on the basis of the original purchase price of the capital asset and are not indexed for inflation. Continuing our example, if the CCA rate (α) is 20 percent, the real after-tax cost of finance (r^f) as calculated above is 4.3 percent, and the inflation rate (π) is 2 percent, the present value of the CCA deductions on a \$1 expenditure on capital is $A = \alpha/(r^f + \pi + \alpha) = 0.20/(0.043 + 0.02 + 0.20) = 0.76$. Also note that the CCA rate in our example ($\alpha = 0.20$) is greater than the economic rate of depreciation on the firm's capital ($\delta = 0.15$). This is said to be a case of "accelerated tax depreciation" because the tax depreciation rate exceeds the underlying economic rate of deprecation.

Because CCA is deducted from the business tax base, which is subject to tax at rate u, it lowers the effective after-tax purchase price of \$1 spent on an incremental unit of capital by uA. The CCA deductions therefore lower the effective after-tax purchase price of \$1 of capital, in present value terms, to $(1 - uA)$. An ITC is also available, at rate ϕ. This lowers the after-tax purchase price of a unit of capital dollar for dollar to $(1 - \phi)$, since it is a credit against business tax liability rather than a deduction. We presume here that, as is the case in Canada, the depreciable base for CCA purposes is reduced by the ITC; thus, the combined impact of the CCA deductions and the ITC is to reduce the effective after-tax purchase price of \$1 spent on incremental capital, in present value terms, to $(1 - \phi) - uA(1 - \phi) = (1 - \phi)(1 - uA)$. If the ITC rate ($\phi$) is 5 percent, the business-income tax rate (u) is 25 percent, and the present value of the CCA deductions is $A = 0.76$, this gives an after-tax effective purchase price of \$1 spent on capital of $(1 - \phi)(1 - uA) = (1 - 0.05)(1 - 0.25)(0.76) = 0.77$.

Finally, while tax depreciation deductions and the ITC lower the after-tax purchase price of \$1 spent on capital, any sales taxes falling on the purchase of capital will raise the purchase price. In a Canadian context, this can occur, for example, if some provincial sales taxes end up falling on business inputs owing to the lack of use of a value-added approach to sales taxation.[13] For example, a provincial sales tax levied at an *effective* rate of 5 percent on capital purchases gives an after-tax purchase price for \$1 of capital of $(1 + t)(1 - \phi)(1 - uA) = (1 + 0.05)(1 - 0.05)(1 - 0.25)(0.76) = 0.81$.

Thus, we see that taxing business revenues increases the required before-tax rate of return on capital while deductions for the nominal interest payments on debt, CCA for depreciation, and ITCs, lower the required rate of return by reducing the effective after-tax cost of financing and purchasing capital. Any sales taxes that fall on capital inputs increase the after-tax purchase price. The combined effect of these features of the business tax regime gives a gross-of-depreciation before-tax rate of

13 See supra note 11.

return on a marginal unit of capital that generates the after-tax hurdle rate of return required by stakeholders of

$$R^g = \frac{(r^f + \delta)(1 + t)(1 - \phi)(1 - uA)}{1 - u}, \tag{6}$$

with r^f given by equation 3. This expression is referred to as the *user cost of capital.*

Using the above parameters, we have

$$R^g = \frac{(0.043 + 0.15)(1 + 0.05)(1 - 0.05)(1 - (0.25)(0.76))}{(1 - 0.25)} = 0.208. \tag{7}$$

Expressing this net of economic depreciation gives

$$r^g = R^g - \delta = 0.208 - 0.15 = 0.058. \tag{8}$$

Thus, in order to generate the 4.8 percent real *after-tax* net-of-depreciation hurdle rate of return on capital required by stakeholders (equation 3), a marginal unit of capital must earn a *before-tax* rate of return of 5.8 percent (equation 8). As discussed above, the METR is then determined as

$$METR = (r^g - r^n)/r^g = (0.058 - 0.048)/0.058 = 0.172, \tag{9}$$

or 17.2 percent. This is the share of the before-tax rate of return of 5.8 percent that is required to pay the taxes associated with a marginal investment that just earns the required after-tax hurdle rate of return of 4.8 percent. Note also that the 17.2 percent METR calculated in this example differs substantially from the statutory corporate income tax rate of 25 percent because of the existence of other taxes, deductions, credits, etc.

The example above made assumptions about various economic parameters (the interest rate on debt, i; the required rate of return to equity, ρ; the inflation rate, π), firm financing (the proportion of investment financed by debt versus equity, β), and the longevity of the capital (as represented by the economic rate of depreciation, δ). It also made assumptions about the parameters of the tax system, most of which are simply given by the tax code (the statutory tax rate, u; the CCA rate, α; the ITC rate, ϕ; the effective sales tax rate, t). Any changes in these parameters will affect the calculations. For example, if the capital is in the nature of a long-lasting building or structure, the economic rate of depreciation would be expected to be lower. The statutory CCA rate that the firm is allowed to use to write off the expenditure for tax purposes would likely be lower as well. Thus, METRs can be calculated for many types of depreciable capital, and may well vary across different types of capital.

Also in this regard, some types of capital employed by firms are in the nature of non-depreciable capital. For example, capital investments in land and inventory can be important in some sectors.[14] It is relatively straightforward to adjust the above expressions for land. Land does not undergo depreciation because of wear and tear or obsolescence, so the economic rate of depreciation (δ) in the above expressions is simply set to zero. Similarly, because there are no CCA deductions associated with land purchases, the CCA rate (α) and the present value of the associated deductions (A) are equal to zero. Moreover, provincial sales taxes do not typically fall on land purchases, so the effective sales tax parameter (t) in the above formulas is also set to zero.[15] Thus, for land, the before-tax rate of return r^g is

$$r^g = \frac{r^f}{1 - u}. \tag{10}$$

For our example, $r^f = 0.043$ (equation 4); with $u = 0.25$, this gives $r^g = 0.057$. Recalling that $r^n = 0.048$, the METR for an incremental investment in land is 15.8 percent $[(0.057 - 0.048)/0.057 = 0.158]$.

Another type of non-depreciable asset is inventory. Firms hold inventories of final and intermediate goods in order to facilitate production and distribution. Holding inventories entails storage costs, which are deductible for tax purposes, but also, and importantly, costs associated with financing those inventories. For tax purposes, the key issue involving inventories is the valuation method. Two common conventions for inventory valuation are LIFO (last in, first out) and FIFO (first in, first out). While there are exceptions, for the most part inventory accounting for tax purposes must follow the FIFO convention in Canada. This means that inventories are valued at their historic cost for tax purposes. The issue here is that this results in the non-deduction of inflationary increases in the value of inventories over the holding period for tax purposes, which increases the before-tax required rate of return. Thus, for inventories, r^g is given by[16]

$$r^g = \frac{(r^f + u\pi)}{1 - u}, \tag{11}$$

14 Another important type of investment is in intangible capital, such as research and development (R & D). This is not discussed here. See Kenneth J. McKenzie, "Measuring Tax Incentives for R&D" (2008) 15:5 *International Tax and Public Finance* 563-81; and John Lester and Jacek Warda, "An International Comparison of Tax Assistance for Research and Development: Estimates and Policy Implications" (2014) 7:36 *SPP Research Papers* 1-42.

15 I ignore property and land transfer taxes. In principle, these can be incorporated into the formulas, but they are often ignored because of data limitations. For an exception, see Adam Found, Benjamin Dachis, and Peter Tomlinson, *What Gets Measured Gets Managed: The Economic Burden of Business Property Taxes*, C.D. Howe Institute E-Brief (Toronto: C.D. Howe Institute, October 16, 2013).

16 See R.W. Boadway, N. Bruce, and J. Mintz, "Corporate Taxation and the Cost of Holding Inventories" (1982) 15:2 *Canadian Journal of Economics* 278-93.

where the term $u\pi$ in the numerator reflects the tax on inflationary increases in the value of inventories using FIFO. Continuing with the example, with $r^f = 0.043$, $u = 0.25$, $\pi = 0.02$, we have $r^g = 0.064$, and the METR on a marginal investment in inventories is 25.0 percent [(0.064 − 0.048)/0.064 = 0.25].

In our example, the METR on a marginal investment in depreciable capital is 17.2 percent, for land it is 15.8 percent, and for inventories it is 25.0 percent. We thus see that the business tax system can generate tax distortions across different types of capital investments, and for our example favours investments in land, followed by depreciable capital and then inventories. An aggregate METR can be calculated as the weighted average of the METRs on the three types of capital. For this example, the aggregate METR is 19.1 percent.[17]

To illustrate the usefulness of the METR approach to evaluating tax policy, consider the impact of a suite of business tax changes on the METR. Continuing with the example, I consider four policy changes, both independently and then as a package:

1. a reduction in the statutory corporate tax rate (u), from 25 percent to 20 percent;
2. elimination of the 5 percent effective sales tax on capital (t);
3. elimination of the 5 percent ITC rate (ϕ); and
4. a decrease in the CCA rate (α), from 20 percent to 15 percent.

This package of tax reforms is consistent with the "lower rate, broader base" approach often advocated by economists. Some of these tax policy initiatives work in different directions. In principle, and perhaps surprisingly, the effect of the reduction in the statutory corporate tax rate on the METR is ambiguous. On the one hand, it clearly decreases the tax rate on revenues, increasing the denominator for R^g in equation 6 and thereby lowering the METR. On the other hand, it increases the after-tax cost of finance by lowering the value of the debt interest deduction (r^f in equations 4 and 6), and for depreciable capital lowers the value of the CCA deductions (uA in equation 6). The elimination of the sales tax on business capital (perhaps accomplished by converting a provincial retail sales tax that falls to some extent on business capital to a harmonized sales tax [HST], which does not), would, all else being equal, be expected to encourage investment by lowering the after-tax purchase price of capital. The elimination of the ITC and the decrease in the CCA rate to equal the economic rate of depreciation of 15 percent, on the other hand, would be expected to discourage investment by increasing the after-tax purchase price of depreciable capital.

17 The aggregate METR is a simple weighted average of the METRs on each type of capital, with a weight of 70 percent on depreciable capital, 5 percent for land, and 25 percent for inventories (roughly consistent with investment data for the Canadian economy). An alternative approach, which would give a similar though somewhat different number, would be to use these weights to calculate a weighted average r^g and then apply the METR formula to this weighted average.

Table 1 shows the impact of each change on the METRs independently for each of depreciable capital, land, and inventories, and for the weighted average aggregate METR. The last row of the table also gives the METR for the entire package. These calculations can be verified by making the appropriate substitutions into the formulas above.

The reduction in the corporate tax rate from 25 percent to 20 percent, all else being equal, reduces the METR on depreciable capital from 17.2 percent to 13.1 percent, while the METR on land falls to 12.7 percent, and on inventories to 20.0 percent. The weighted average aggregate METR falls to 14.8 percent. The elimination of the 5 percent sales tax on business capital lowers the METR on depreciable capital substantially to zero, but has no impact on the METRs for land or inventories, which are not typically subject to sales tax; the aggregate METR falls to 7.0 percent. The elimination of the 5 percent ITC increases the METR on depreciable capital substantially to 30.3 percent, increasing the aggregate METR to 28.3 percent. The decrease in the CCA rate from 20 percent to 15 percent modestly increases the METR on depreciable capital to 21.9 percent, and the aggregate METR to 22.4 percent.

It is noteworthy that the removal of the sales tax on business capital and the elimination of the ITC have a large and disproportionate impact on the METR on depreciable capital (in opposite directions): the elimination of the sales tax on capital lowers the METR from 17.1 percent to zero, and the elimination of the ITC raises the METR to 30.3 percent. Referring to equation 6, the reason for this is that both the sales tax, through the $(1 + t)$ term, and the ITC, through the $(1 - \phi)$ term, have a direct and significant impact on the after-tax purchase price of capital; as a result, they have a large impact on the METR. Contrast this to the change in the corporate income tax rate, which (as discussed above) has mitigating and offsetting effects, and the CCA rate, which is filtered through a present value calculation.

Given that these policy changes move the METRs in different directions, and by different magnitudes, it is not clear what the net impact of making all four changes to the business tax regime would be. Considered as a package, the illustrative "lower rate, broader base" tax policy changes increase the METR on depreciable capital slightly from 17.2 percent to 18.0 percent, while they lower the METR on land to 12.7 percent and inventories to 20.0 percent. In aggregate, the weighted average METR falls slightly from 19.1 percent to 18.2 percent.

While simplified and stylized, the basic approach described above, with various modifications, underlies much of the modern economic analysis of the impact of taxes on business investment. In the following section, I present calculations based on a more complex and sophisticated METR model developed by the SPP.[18]

18 I thank the SPP and, in particular, Bev Dahlby and Phil Bazel for providing me with the METR numbers. It is also important to acknowledge Duanjie Chen and Jack Mintz as the force behind the development of the SPP's METR model and its predecessors for over two decades.

TABLE 1 Estimated Impact of Policy Changes on Marginal Effective Tax Rates (METRs) for Different Types of Capital Investment (Percent)

	Depreciable capital	Land	Inventories	Aggregate
Base case	17.2	15.8	25.0	19.1
$u = 0.20$	13.1	12.7	20.0	14.8
$t = 0$	nil	15.8	25.0	7.0
$\phi = 0$	30.3	15.8	25.0	28.3
$\alpha = 0.15$	21.9	15.8	25.0	22.4
Tax reform package	18.0	12.7	20.0	18.2

Note: Calculations are based on the equations in the text. Component u is the statutory corporate income tax rate; t is the effective sales tax rate; ϕ is the investment tax credit rate; α is the statutory capital cost allowance rate. “Aggregate” refers to the weighted average METR; see the text for details.

SOME NUMBERS

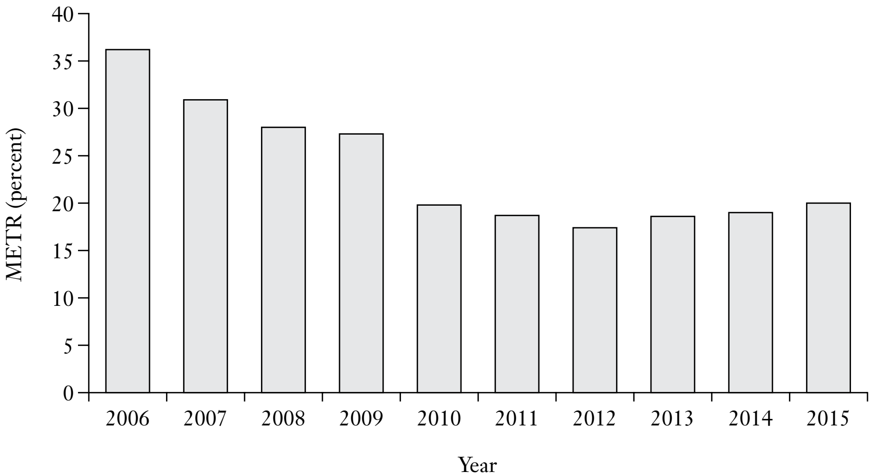
In principle, METRs can be computed for a wide range of types of capital, employed by firms in different sectors, operating in different jurisdictions. Depending on how the resulting calculations are aggregated, using capital weights that vary across these different dimensions, METRs can be used to help identify several types of distortions caused by business taxes. Four common dimensions are considered here:

1. *Intertemporal distortions*. In this case, METRs are aggregated across the various classes of capital, over all sectors, for a particular jurisdiction. The resulting METR measures the overall tax distortion for aggregate investment in a particular jurisdiction.
2. *Inter-asset distortions*. In this case, METRs within a jurisdiction are disaggregated into broad classes of capital, with a view to determining the extent to which the tax system distorts the allocation of capital across types of capital.
3. *Interjurisdictional distortions*. In this case, METRs are aggregated over classes of capital and sectors, but computed for different jurisdictions—for example, countries or provinces—with a view to determining the extent to which tax systems distort the allocation of capital across jurisdictions.
4. *Intersectoral distortions*. In this case, METRs are disaggregated to the sectoral level, for a particular jurisdiction, with a view to determining the extent to which the tax system distorts the allocation of capital across business sectors within the jurisdiction.

Of course, there are any number of combinations of these basic dimensions that can also be considered.

Consider first the intertemporal distortions at the aggregate level for Canada. Figure 2 shows the SPP’s METR calculations for aggregate capital in Canada from 2006 to 2015, incorporating both federal and provincial business taxes. In 2006, the aggregate METR on capital was very high, at around 36 percent. Over the next several years, it fell markedly, reaching a low of around 17.5 percent in 2012. This was

FIGURE 2 Intertemporal Distortions: Changes in Marginal Effective Tax Rates (METRs) on Aggregate Capital, Canada, 2006-2015



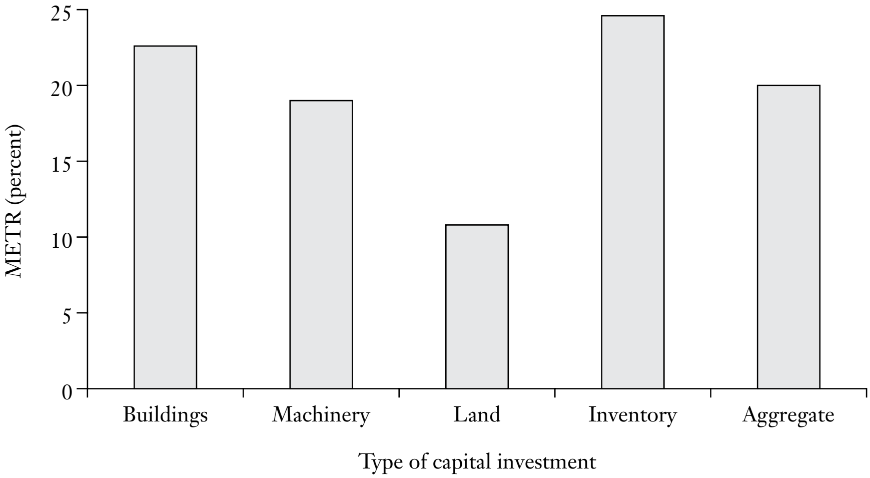
Note: Rates shown include both federal and provincial business taxes.

largely due to two factors: (1) reductions in the statutory corporate income tax rate at the federal level, accompanied by some base broadening; and (2) the adoption of the HST in several provinces, resulting in the removal of provincial sales taxes on capital in those provinces. Since 2012, the aggregate METR has crept up slightly, to about 20 percent in 2015. This is largely due to increases in statutory corporate income tax rates in some provinces, as well as the renunciation of the HST and the restoration of the provincial sales tax in British Columbia in 2013.

Figure 3 shows METRs for Canada for 2015, but now disaggregated by the type of capital investment. As discussed above, in principle, METRs can be calculated for any number of asset classes. Typically, four broad types of capital are distinguished in METR models: machinery and equipment (M & E), land, buildings, and inventories. As is evident from figure 3, there is some variation in METRs across types of capital, with land bearing the lowest METR at just under 11 percent and inventories the highest at almost 25 percent. This suggests that the tax system may distort investment across types of capital, particularly in favour of land. As will be discussed below, these differences in the METRs on different types of capital can manifest themselves in intersectoral and interjurisdictional distortions when different industries in different provinces rely on different asset mixes.

Figure 4 shows the SPP's aggregated METR calculations for Canada and for each of the provinces in 2015. These provide insights into potential interjurisdictional distortions caused by the tax system. While the aggregate METR for Canada in 2015 is 20 percent, there are substantial differences across the provinces, ranging from a low of just over 6 percent in New Brunswick to a high of just over 28 percent in

FIGURE 3 Inter-Asset Distortions: Marginal Effective Tax Rates (METRs) on Different Types of Capital Investment, Canada, 2015

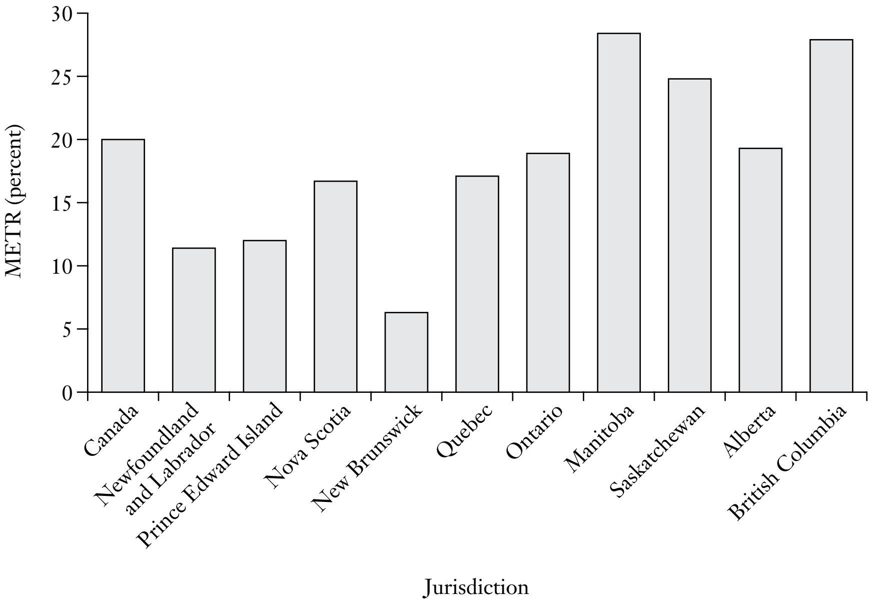


Note: Rates shown include both federal and provincial business taxes.

Manitoba. The differences reflect variations in statutory corporate tax rates, ITCs, and provincial sales taxes across the provinces, as well as industrial/sectoral differences in the mix of capital employed across the provinces. For example, the low METRs in three of the Atlantic provinces reflect the lack of a provincial sales tax levied on business inputs (because these provinces have adopted the HST), as well as the Atlantic investment tax credit (AITC) granted by the federal government. While the AITC has been phased out, some investments in Atlantic Canada continue to receive the credit. Similarly, but with the opposite effect, the higher METRs in Manitoba, Saskatchewan, and British Columbia reflect the taxation of business inputs owing to their non-adoption of the HST. As discussed above, sales taxes on capital and ITCs can have a disproportionate impact on the METR.

Figure 5 shows METRs for Canada for 2015 but now disaggregated by sector, highlighting the presence of intersectoral distortions. Again, a wide variation in the taxation of capital investment is evident, with the METR ranging from a low of about 9 percent in the forestry sector to a high of about 25 percent in construction and "other services." These differences reflect several things. Some classes of capital in some sectors benefit from accelerated CCA writeoffs relative to the economic rate of depreciation, while others receive ITCs. As discussed above, these tax measures lower the after-tax purchase price of capital. Also, statutory tax rates vary across provinces where the various sectors are more or less prominent. As indicated previously, another factor is differences in the types of capital employed in the various sectors, and the extent to which those different types of capital may be favoured or not by the tax system (see figure 3).

FIGURE 4 Interjurisdictional Distortions: Aggregate Marginal Effective Tax Rates (METRs), Canada and Provinces, 2015

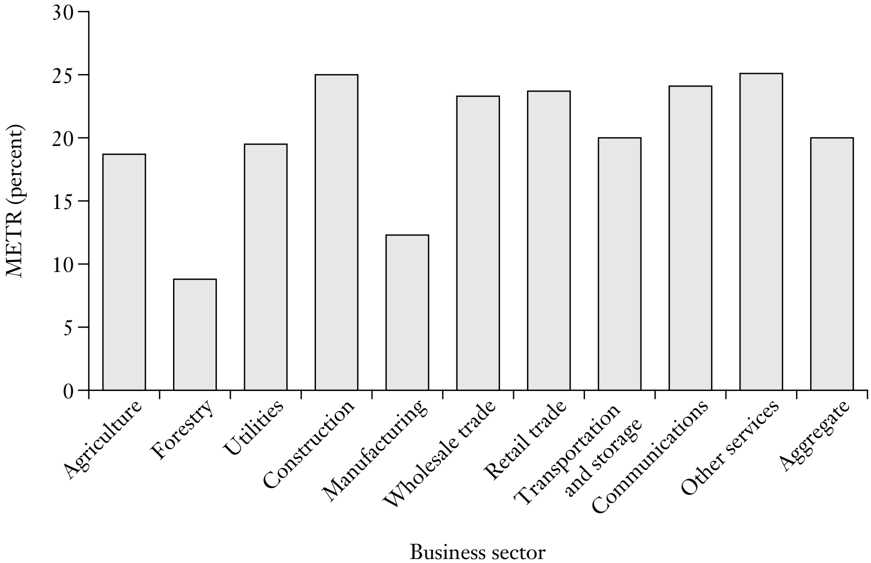


As noted above, there are several alternative ways to slice and dice METR numbers. The data presented here illustrate just some of the key dimensions along which business taxes generate distortions on capital investment.

SOME NEUTRALITY RESULTS

The METRs reported above suggest that business taxes in Canada distort the overall level of capital investment in the economy, as well as the allocation of capital across assets, jurisdictions, and sectors. Since this in turn results in a reduction of income in the economy, some economists have advocated for reforms to the business tax regime that would eliminate the tax wedge between the before- and after-tax hurdle rate of return, resulting in a so-called *neutral tax system*—that is, one that generates a METR of zero. It is important to emphasize in this connection that a zero METR does not mean that the business tax system generates no tax revenue for the government. Recall from the discussion above that the METR measures the distortion caused by the tax system *at the margin*, for an incremental unit of capital that generates a rate of return that is just equal to the after-tax hurdle rate of return. Investment projects that generate a rate of return that is greater than the hurdle rate of return, called *inframarginal* investments, will pay positive taxes even if the METR is zero. In this regard, Boadway has calculated that moving to a neutral business tax

FIGURE 5 Intersectoral Distortions: Marginal Effective Tax Rates (METRs) on Different Business Sectors, Canada, 2015



Note: Rates shown include both federal and provincial business taxes.

would reduce corporate tax revenues in Canada by about 20 percent, which suggests that much of the revenue from the corporate income tax in Canada is generated by inframarginal investments.[19]

There are three basic approaches to neutral business taxation commonly considered by economists: an imputed profits tax, a cash flow tax, and an allowance for corporate capital tax (ACC). I proceed by explaining how each of these approaches affects the formulas discussed above and generates a neutral business tax regime with a METR of zero.

As a starting point, for all three approaches, investment incentives such as ITCs and any additional taxes on capital, such as sales taxes on business capital, would be eliminated. In terms of the above equations, this involves setting the effective sales tax on capital (t) and the ITC rate (ϕ) at zero.

The imputed profits approach to neutral business taxation maintains the basic structure of the income tax regime described above, with some modifications to allow for the proper deduction of the full opportunity costs of financing and holding the capital. The first modification involves the treatment of the cost of finance. As discussed above, under the actual tax system, nominal debt interest costs are

19 Robin Boadway, "Tax Policy for a Rent-Rich Economy" (2015) 41:4 *Canadian Public Policy* 253-64.

deducted, while the cost of equity finance is not. This results in a debt bias in the income tax system for two reasons: (1) the opportunity cost of equity finance is not allowed as a deduction; and (2) nominal, rather than real, interest expenses are deducted. The imputed profits approach to neutral taxation involves the deduction of the real cost of both debt and equity finance. In terms of the above equations, under an imputed profits tax the real after-tax cost of finance (equation 4) becomes

$$r^f = [i\beta + \rho(1 - \beta) - \pi]\,(1 - u). \tag{12}$$

The second modification required to turn the business-income tax into a neutral imputed profits tax concerns tax depreciation. Recall from the discussion above that the tax depreciation rate (α) may differ from the economic depreciation rate (δ). If $\alpha > \delta$, as in the example employed above, the CCA rate is said to be accelerated. Also, recall that under the Canadian tax system, CCA deductions are not indexed for inflation. Neutral imputed profits taxation requires two modifications to the treatment of tax depreciation. The first modification is to set the CCA rate equal to the economic depreciation rate; thus, $\alpha = \delta$. The second modification is to index the CCA base for inflation. The result of these modifications is to change the present value of the CCA deductions on \$1 of capital from $A = \alpha/(r^f + \pi + \alpha)$ in equation 5 to $A = \delta/(r^f + \delta)$, where the discount rate used to determine the present value of the CCA deductions under a neutral imputed profits tax is the *real* after-tax cost of finance (r^f) rather than the *nominal* cost of finance ($r^f + \pi$).

Substituting these modified expressions for r^f and A into equations 4 and 6 above (recalling that $t = \phi = 0$), and doing a little bit of algebra, it can be shown that $r^g = r^n$, and therefore that the METR on depreciable capital under a neutral imputed profits tax is zero. It can be seen from equation 10 that the METR on land will also be zero. For inventory, all that is required is that LIFO inventory evaluation be allowed for tax purposes; this will eliminate the taxation of inflationary increases in the value of inventories (the $u\pi$ term in equation 11).

The imputed profits approach to neutral business taxation is attractive in the sense that it maintains the basic structure of the business tax regime but allows for the deduction of the true economic costs of financing and holding capital. The difficulty is that, to get it right, the government requires a great deal of information that is not directly observable, including the market value of the firm's equity, the opportunity cost of that equity (ρ), and the economic rate of depreciation (δ). Economists have therefore developed alternative approaches to neutral business taxation that, in principle, are easier to implement.

The first, and simplest, of these approaches is cash flow taxation. Under this approach, rather than attempting to measure the true opportunity cost of capital on a yearly imputed basis, and allow it as a deduction as under an income tax, the tax base is simply equal to non-financial cash flows. There is thus no deduction for the opportunity cost of debt or equity finance, and r^f in equation 4 becomes

$$r^f = i\beta + \rho(1 - \beta) - \pi. \tag{13}$$

Moreover, rather than writing off the purchase price of capital over time, as under the CCA system, capital expenditures are fully written off and expensed immediately when they are incurred. In terms of the above equations, this means that the present value of the tax depreciation deductions simply becomes $A = 1$. Substituting these into the above equations, it is straightforward to show that $r^g = r^n$, and therefore that the METR on capital is zero and the cash flow tax is neutral with respect to investment.

One of the difficulties with the cash flow approach, discussed in more detail below, is that the tax base may fluctuate a good deal from year to year. Moreover, in years when businesses engage in significant capital expansions, the cash flow base may well be negative. The final approach to neutral business taxation, which addresses this to some extent, is the ACC.[20] The idea behind the ACC is to mimic the cash flow tax in present value terms. Rather than immediately expensing capital expenditures, as under the cash flow tax, expenditures are written off over time at an arbitrary rate α, as under the CCA system. As with the cash flow tax, there is no cost-of-finance deduction, so the real cost of finance is as in equation 13. However, the cost-of-finance deduction is replaced with an allowance for corporate capital, which is equal to the cost of finance multiplied by the undepreciated capital cost for CCA purposes. Thus, as above, the present value of the CCA deductions is $A = \alpha/(r^f + \pi + \alpha)$, while the present value of the ACC deduction is $B = (r^f + \pi)/(r^f + \pi + \alpha)$.[21] The present value of the CCA deductions plus the ACC deduction is therefore $A + B = 1$. Thus, the ACC tax is equivalent in present value terms to a cash flow tax. Note that this result is independent of the CCA rate (α). Accordingly, the ACC is neutral regardless of the tax depreciation rate; there is no need for the tax depreciation rate to equal the economic depreciation rate; and, indeed, the tax depreciation rate can change from year to year with no implications for investment. While the ACC tax is equivalent to a cash flow tax in present value, the ACC tax base is less susceptible to fluctuations in capital expenditures than the cash flow tax. This is one of its attractive features.

One issue that bears mentioning, and was alluded to in the discussion of the cash flow tax, is the possibility that the tax base is negative. This is possible under all three approaches, but most particularly the cash flow approach. The neutrality of

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20 The idea behind the ACC was first introduced by Robin Boadway and Neil Bruce; thus, it is often referred to as the Boadway-Bruce tax. See Robin Boadway and Neil Bruce, "A General Proposition on the Design of a Neutral Business Tax" (1984) 24:2 *Journal of Public Economics* 231-39.

21 With a declining balance CCA rate of α and a nominal interest rate of $r^f + \pi$, the stream of ACC deductions on the purchase of \$1 of capital is $r^f + \pi$ in year 1, $(r^f + \pi)(1 - \alpha)$ in year 2, $(r^f + \pi)(1 - \alpha)^2$ in year 3, $(r^f + \pi)(1 - \alpha)^3$ in year 4, . . . ad infinitum. The present value of the ACC deduction, assuming that the deduction is claimed at the end of each period, is the infinite sum $B = \Sigma_{t=1} [(r^f + \pi)/(1 + r^f + \pi)][(1 - \alpha)/(1 + r^f + \pi)]^{t-1}$. Multiplying both sides of this expression by $[(1 - \alpha)/(1 + r^f + \pi)]$ gives $B[(1 - \alpha)/(1 + r^f + \pi)] = \Sigma_{t=1} [(r^f + \pi)/(1 + r^f + \pi)][(1 - \alpha)/(1 + r^f + \pi)]^t$. Taking the difference, $B - B[(1 - \alpha)/(1 + r^f + \pi)] = (r^f + \pi)/(1 + r^f + \pi)$, and solving for B gives $B = (r^f + \pi)/(r^f + \pi + \alpha)$.

all three taxes with respect to investment requires full loss offsetting, or the equivalent thereof in present value terms. Full loss offsetting means that if the tax base is negative, the firm receives a "rebate" from the government. The equivalence of this in present value terms can be achieved by allowing any tax losses to be carried forward indefinitely at a specified rate of interest to reduce future tax liabilities.

CONCLUDING COMMENTS

This article has provided a primer on the concept of the marginal effective tax rate, which has become ubiquitous in tax policy discussions. While the idea is relatively straightforward from a conceptual perspective, it is useful to peer inside the black box to develop a stronger understanding of the approach, and an appreciation for the implications of various types of tax policy initiatives for investment incentives.

As shown above, while substantial progress has been made over the past decade, the business tax regime in Canada continues to generate distortions in the rate of return to capital, which manifests itself in intertemporal, inter-asset, interjurisdictional, and intersectoral distortions. These distortions result in a reduction of income in the economy.

I have outlined three broad approaches to achieving a neutral business tax regime that does not distort investment decisions. In my view, the most promising approach would involve some variation of the ACC, because of its flexibility, its simplicity, and the way it handles the volatility of the tax base.[22]

22 For a more detailed discussion, see Robin Boadway and Jean-François Tremblay, *Corporate Tax Reform: Issues and Prospects for Canada*, Mowat Research Paper no. 88 (Toronto: University of Toronto, School of Public Policy and Governance, Mowat Center, April 2014); and Boadway, supra note 19.