MEASURING EFFECTIVE TAX RATES

Overview

A.1 Chapter 7 used three different types of effective tax rate to illustrate the combined impact of different aspects of each business tax system on business incentives to undertake various types of investment and on after-tax returns to savers. This appendix provides more detail on how these statistics were calculated.

A.2 Taxes affect firms' investment decisions through two channels. First, taxes affect the net cash flows from an investment. Taxes decrease both the net revenue flow from an investment and the net costs associated with the investment, through the deductibility of business expenses and through various forms of capital allowances, including depreciation.

A.3 Taxes have two distinct effects on the cost of financing an investment, one of which reduces financing costs and the other of which raises them. Most obviously, the tax deductibility of interest expense means debt finance is cheaper with taxes. Taxes also lower the cost of other forms of finance since, in the presence of taxation, potential providers of finance to a firm will not be able to obtain as high an after-tax rate of return from other investment opportunities. Where taxes mean potential investors face a lower 'opportunity cost' (that is, the return forgone by not investing elsewhere) of investing in a particular firm, the firm will be able to obtain cheaper finance.

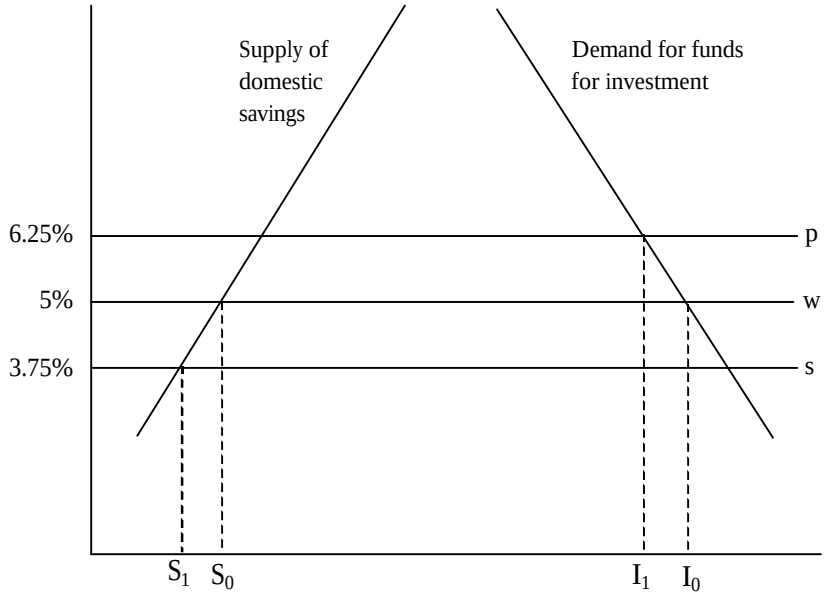
A.4 The other, potentially offsetting, effect of taxes on financing costs arises when taxes result in higher before-tax market interest rates and required dividend yields. Chapter 7 explained how, in an open economy, business taxes payable by non-residents are likely to rise before-tax interest rates.

A.5 The openness of the Australian economy was explicitly allowed for in the assessment of the effects of each of the fourteen different business tax systems examined in Chapter 7. Figure A.1 depicts the country described in Example 7.1. The country is a capital importer, since at prevailing interest rates the domestic

demand for funds for investment exceeds domestic savings. In Example 7.1, it is assumed that in the absence of taxes, non-residents are willing to supply capital at 'the' world interest rate of 5 per cent. At this interest rate, domestic savings are S_0, domestic investment is I_0 and capital imports are $I_0 - S_0$.

A.6 The example examined the consequences of introducing two taxes: a tax of 20 per cent on interest paid to non-residents and a tax of 40 per cent on interest paid to residents. Because non-residents will not lend to the country unless they can obtain the same after-tax rate of return available from investing elsewhere, the before-tax interest rate increases to 5/(1-.2) = 6.25 per cent. Meanwhile, the after-tax return to residents is 6.25(1-.4) = 3.75 per cent. Because the 'break-even' rate of return, below which firms will not proceed with an investment, has increased from 5 per cent to 6.25 per cent, investment falls to I_1. And because the after-tax rate of return to domestic savers has fallen from 5 per cent to 3.75 per cent, domestic savings fall to S_1.

Figure A.1: Effect of taxes on the demand for and supply of investment funds



A.7 In the diagram, the break-even rate of return to investment is labelled as *p*, the world interest rate as *w*, and the after-tax rate of return to savers as *s*. Using these symbols, some definitions follow:

- The marginal effective tax rate (METR) is $\frac{p - s}{p}$.

  TheMETR measures the percentage difference between the (real) minimum before-tax rate of return to an

investment and the (real) after-tax rate of return to a domestic saver who finances the investment.

- The effective tax rate on investment is $\frac{p - w}{p}$.

  The effective tax rate on investment measures the percentage difference between the minimum required rate of return to an investment in the presence of taxes and the minimum rate of return required for the investment to proceed in the absence of taxes.

- The effective tax rate on savings is $\frac{w - s}{w}$.

  The effectivetax rate on savings measures the percentage difference between the real rate of return to savings in the absence of taxes and the real rate of return in the presence of taxes.

A.8 Real world business taxes are not generally calculated by explicit reference to the rate of return to an investment. To calculate effective tax rates, it is therefore necessary to determine the effect that various tax rules have on rates of return. In addition, there is not in reality a single 'world' interest rate. While rates of return required by non-resident lenders will indeed be affected by taxes on non-residents, as assumed in the example, the extent of the effect will depend on both the detail of the tax system and the tax rules applying in the non-resident's home jurisdiction. Rates of return required by non-resident lenders will also depend on the risk characteristics of the investments they are financing and on expected inflation.

A.9 Consequently, it is in practice a complex exercise to derive estimates for real world tax systems of the minimum real required before-tax rate of return (p), the minimum real required rate of return if Australia exempted all capital income from tax (w), and the real after-tax rate of return to savers (s). In practice, it is necessary to take one of these rates of return as given and calculate the implied values of the other two rates of return based on the theoretical relationships between the variables given the detail of the tax system.

A.10 In this study, *w* is taken as given, and defined as the risk-adjusted real rate of return at which foreigners would be willing to lend to Australian firms if Australia did not levy any taxes on income from capital. This assumption reflects the openness of Australia to both inward and outward capital flows, and the likelihood that Australia's tax system does not appreciably influence world interest rates.

The nominal before — tax interest rate

A.11 How do we get from w to p and s? Starting with s, savers always have the option of depositing their funds in a bank, where they will earn a before-tax nominal interest rate i. Savers will only undertake alternative investments if they offer a real risk-adjusted rate of return at least equal to the real after-tax rate of return obtainable from investing in a bank or a government bond. So s is defined as

$$s = i(1-m) - \pi \qquad (1)$$

where i is the nominal interest rate, m the personal tax rate levied on interest income, and π the inflation rate.

A.12 As explained above, it is assumed that the nominal interest rate is based on the world interest rate (w), adjusted for taxes on non-residents. Specifically, it is assumed that:[1]

$$i^j = \frac{w+\pi}{1-\hat{t}_N^j} \qquad (2)$$

where j stands for interest and dividends. The term $\hat{t}_N^j$ stands for the 'non-creditable' tax rate on non-residents' interest and dividend income — that is, for Australian taxes that do not give rise to offsetting reductions in taxes payable in non-residents' home countries. There is an explanation below on the calculation of $\hat{t}_N^j$ in determining the effects of the various surveyed countries' tax regimes.

A.13 The fact that $\hat{t}_N^j$ varies for different sources of finance creates some conceptual difficulties in determining the characteristics of the 'marginal' suppliers of different types of finance to domestic firms. For all countries in the survey, the 'non-creditable' tax rate levied on non-residents' dividend receipts is significantly higher than the corresponding rate on interest, implying that the before-tax rate of return to equity will exceed the before-tax return to debt. Suppose, for example, that the real world interest rate is 10 per cent, there is no inflation, the non-creditable tax rates on debt and equity, respectively, are 0 per cent and 40 per cent, and the domestic personal tax rate is 40 per cent. Then the implied before- and after-tax rates of return are 10 per cent and 6 per cent for debt, and 16.7 per cent and 10 per cent for equity. Because residents can obtain a markedly higher after-tax rate of return from investing in equity, it would be expected that 'clienteles' would form, with residents specialising in equity investments and non-residents being the primary suppliers of debt

1 This formulation follows Hansson and Stuart (1986). It embodies two key assumptions: that taxes levied by Australia do not appreciably affect world interest rates and that movements in the exchange rate reflect differences between the expected Australian inflation rate and inflation rates elsewhere in the world.

finance. In turn, to the extent firms are able to meet their requirements for equity finance from domestic rather than foreign investors, it should be expected that the pre-tax return to equity would be driven down — just because a country is in aggregate a net capital importer, it does not necessarily follow that it is a net importer of all types of capital.

A.14 In practice, however, such specialisation is not observed, at least in extreme forms, and it is very difficult to determine just who the marginal suppliers of finance are in the different capital markets. For the purposes of this study, it is assumed that the required pre-tax return to equity conforms fully with (2). To the extent that this assumption means that the cost of equity finance is too high, the effect will be to overstate for all 14 countries the degree to which taxes on capital affect returns to investment rather than savings.

The discount rate

A.15 Turning now to the relationship between w and p, the required real before-tax rate of return to capital, recall that p is the real rate of return at which it is just worth proceeding with an investment. Equivalently, p is the rate of return which results in an investment having a net present value of zero, when all cash flows associated with the investment are discounted at the opportunity cost of capital.

A.16 Most of the effective tax rate literature assumes new investment is financed with the same mixture of new equity, retained earnings and debt as a firm's existing investments. This approach effectively involves assuming that firms will not use the cheapest available source of finance to fund their new investments (or, equivalently, that they do not have available to them tax planning schemes for reducing the apparent after-tax cost of more expensive sources of finance).

A.17 While the standard approach is taken in some of these calculations, also calculated are METRs for each country's business tax system under the polar assumptions that investment is fully debt financed and that it is fully equity financed. This approach makes explicit the extent to which the different tax systems distort companies' financing decisions.

Debt

A.18 So long as interest expense is fully tax deductible at the tax rate, the after-tax cost to a firm of using debt to fund its investments is the nominal interest rate less the value to the company of the deduction for interest expense. (In common with most studies of effective tax rates, it is assumed throughout the analysis that firms are able to fully realise the value of any tax deductions; that is, they are never in a tax loss situation.)

New equity

A.19 As explained above, before-tax returns to equity finance are assumed to be determined in accordance with equation (2); that is, by the rate of return on equity required by a non-resident investor. However, a further assumption is that the marginal supplier of equity finance is in fact a resident who can benefit in full from any available imputation credits. It follows that the discount rate for equity-financed investment will depend on resident savers' marginal tax rates and on the extent to which the company and individual tax systems are integrated.

Retained earnings

A.20 The opportunity cost of funding investment out of retained earnings is the after-tax rate of return which would have been obtained by the firm's shareholders if the retained earnings had been distributed and invested elsewhere. This amount will depend on:

- the nature and amount of any taxes collected on distribution, including whether the present value of these taxes is affected by their timing;
- the nature and amount of any credits available to shareholders on distribution, again including the effect of timing on their present value; and
- the extent to which gains in the firm's value are taxable where those gains are due solely to the retention of earnings.

A.21 All these factors may vary across different categories of a firm's shareholders. However, because earnings which have not been distributed cannot be attributed to a particular group of shareholders, it is necessary to assume that the cost of capital for investment

financed out of retained earnings must be the same for all shareholders.[2]

The break-even rate of return

A.22 The break-even rate of return (p) for an asset is the real rate of return which results in the present value of all (non-financing) cash flows associated with the asset equaling zero. To determine p, it is necessary to account for both non-tax cash flows and for tax-related cash flows. In the latter category, this includes explicitly accounting for both taxes on revenue flows and for the discounted value of any tax allowances available to the firm.

A.23 Rather than reproduce the actual formulas for p for different assets, this section explains the main factors impacting on p, and provides some simplified examples.

Depreciable assets

A.24 Taxable income from depreciable assets is generally calculated as the net cash flow from the asset, less an allowance for depreciation. The present value of tax deductions for depreciation will be higher the more rapidly a taxpayer is permitted to depreciate an asset for tax purposes. And, other things being equal, taxpayers will not require as large a cash flow from an asset if depreciation deductions have a relatively high present value — higher tax depreciation allowances result in lower values of p.

Example A.1

A firm is considering spending $100 on an asset which will generate a constant net cash flow each year for ever. Although the asset does not actually depreciate, the tax rules allow the firm to deduct $25 of the asset's cost over the next 4 years. The firm's discount rate is 5% and the tax rate is 30%. The minimum annual cash flow (C), which the asset needs to generate to make it just worth purchasing will result in:

$$\$100 = \underbrace{\frac{C}{0.05}(1 - 0.30)}_{\text{After-tax cash flow}} + \underbrace{0.30\left(\frac{\$25}{1.05} + \frac{\$25}{(1.05)^2} + \frac{\$25}{(1.05)^3} + \frac{\$25}{(1.05)^4}\right)}_{\text{Present value of depreciation deductions}}$$

$$= \frac{C}{0.05}(1 - 0.30) + \$26.00$$

2 King and Fullerton (1984:29).

We can rearrange this expression to find that

$$C = \frac{0.05 (\$100 - \$26.60)}{1 - 0.30}$$

$$= \$5.20$$

The minimum rate of return at which the asset is worth purchasing is 5.2%.

Alternatively, if the firm was not permitted to depreciate the asset for tax purposes, the minimum cash flow would conform with

$$\$100 = \underbrace{\frac{C}{0.05}(1 - 0.30)}_{\text{After-tax cash flow}}$$

$$\Longrightarrow \quad C = \$7.14$$

The depreciation deductions have decreased the break-even rate of return by just under 2 percentage points.

A.25 Various factors which were taken account of in calculating actual values of p for depreciable assets include the rates at which assets actually depreciate (economic depreciation), non-indexation of tax depreciation deductions and investment tax credits allowed by some surveyed countries.

Research and development expenditure

A.26 Expenditure on 'research and development' is generally incurred for the purpose (or in the hope) of creating an on-going revenue stream. In this respect, an R&D asset is identical to any other depreciable capital asset. However, the modelling incorporates two differences between R&D assets and other depreciable assets:

- Generally, a high proportion of R&D expenditure is unsuccessful. *Ex ante*, firms which engage in R&D expect a high proportion of their R&D expenditure will be unsuccessful, but that the successful expenditure will generate enough revenue for the firm to earn at least a normal rate of return on its entire outlay. Therefore outlays on unsuccessful projects are included together with outlays on successful projects when modelling R&D projects.
- R&D projects are typified by longer lags between expenditure being incurred and the derivation of any

associated revenue streams. The modelling also recognised this characteristic.

Inventory

A.27 The return to holding inventory can be thought of as the reduction in costs faced by a business relative to the costs it would incur if it did not hold inventory. The tax treatment of inventory varies mainly according to whether the inventory is sold within the tax year in which it is acquired or whether it is held over balance date. In the former case, most tax systems effectively tax the full nominal return to inventory as it accrues. However, when stock is held over balance date, taxpayers are generally able to defer paying tax on accruing gains, reducing the effective tax rate.

A.28 In this study, effective tax rates on inventory are calculated as a weighted average of the effective tax rate on inventory sold in the tax year it is produced and the effective tax rate on inventory sold in a year subsequent to the year in which it is produced.

Inventory sold within a tax year

A.29 Where inventory is valued on a 'first in, first out' (FIFO) basis and is sold in the year it is produced or acquired, tax is collected on the difference between the sale price and cost. Because the sale price will reflect any price changes due to inflation over the period between the stock being acquired and sold, but cost will not, the effect is to tax both the real return and any diminution in the value of the taxpayer's capital due to inflation.

Example A.2

A firm is able to obtain a nominal after-tax rate of return of 7 per cent on bank deposits. The inflation rate is 2 per cent and the tax rate is 30 per cent. What is the firm's break-even real rate of return to holding inventory? In this case, we can calculate p as the solution to

$$7 = (p + 2)(1 - 0.30)$$

implying $p = 8$ per cent. If instead there was no inflation and the after-tax interest rate was 5 per cent, the firm would be satisfied with a real before-tax rate of return to holding inventory of 7.1 per cent.

A.30 Some countries allow firms to value inventory for tax purposes on a 'last in, first out' (LIFO) basis. Under this system, taxpayers are effectively able to deduct purely inflationary increases in stock values. If only real returns to holding inventory are taxed,

break-even real rates of return are lower in the presence of inflation than they would otherwise be.

Inventory held over balance date

A.31 Inventories on hand at balance date are normally valued at 'cost' for tax purposes. Valuing closing stock at cost rather than its market value has two effects:

- It results in tax on the profit on the stock being deferred until the stock is sold.
- To the extent 'cost' as defined for tax purposes falls short of full cost, the taxpayer effectively gets an interest free loan from the government in the period the stock is acquired, with the 'loan', along with tax on the proceeds from reinvesting the loan, being repaid when the stock is sold (since tax is then paid on the difference between sale price and tax cost).

A.32 Because both these factors reduce the present value of tax payable, break-even real rates of return are lower on stock held over one or more balance dates.

Land

A.33 Most jurisdictions tax rental income when it is received, although the treatment of capital gains varies across jurisdictions: capital gains may not be taxed at all; just real gains may be taxable; or nominal capital gains may be taxable. As before, the lower the tax impost, the lower the required real before-tax rate of return.

Application of the methodology

Non-creditable tax rate on non-residents

A.34 The key determinant of the nominal interest rate in this study is what we refer to as the 'non-creditable' tax rate on non-residents, t^{J}_{N}. Australian taxes on interest and dividends paid to a non-resident will only affect the cost of capital in Australia to the extent they result in an increase in tax payable by the non-resident. At one extreme, if Australian taxes are fully creditable against a non-resident's home country tax liability, the non-resident will not require any increase in the before-tax rate of return as compensation for paying additional tax. At the other, a non-resident may require full compensation (in

the form of a higher before-tax rate of return) for Australian taxes if they are not creditable at all.

A.35 For each tax system included in the study, the non-creditable tax rate on non-residents' returns to debt and equity is calculated as

the nominal tax rate on non-residents' returns to debt and equity

less

the weighted-average value of credits currently available to non-residents for Australian taxes.

A.36 To keep the exercise manageable, it is assumed that other countries' willingness to allow credits for Australian taxes would not change if Australia adopted, say, France's tax system, even though entitlements to credits for foreign taxes are generally determined by a combination of legislative provisions and double tax agreements.

Nominal tax rates on non-residents

A.37 Nominal tax rates on non-residents are calculated simply as a combination of the applicable statutory company tax rate and withholding tax rates on interest and dividends. Since interest expense is deductible under the tax systems of all of the 14 countries included in this study, only withholding taxes (if any) are levied on interest paid to non-residents.

A.38 The nominal tax rate on dividends is invariably higher, since dividends are not deductible under any of the countries' tax systems. The study focuses on nominal tax rates on new equity undertaken by way of portfolio investment. For investment funded out of new equity, for example, where the amount of non-resident withholding tax collected on dividends is independent of the amount of company tax paid, the nominal tax rate on dividends is

$$1-(1-t_R)(1-t_W)$$

where τ_R is the company tax rate and τ_W the dividend withholding tax rate. For a company tax rate of 36 per cent and a dividend withholding tax rate of 15 per cent, the implied nominal tax rate on non-residents' returns to equity is 45.6 per cent.

A.39 In calculating nominal tax rates on non-residents, a judgement is made in respect of each country about the extent to which withholding taxes are in fact enforced. In most instances, it is assumed interest withholding taxes are routinely avoided.

Value to non-residents of foreign tax credits for Australian tax

A.40 References to the 'value' of foreign tax credits for tax paid in Australia are alluding to the amount (if any) by which paying tax in Australia on income sourced from Australia results in the non-resident's home jurisdiction collecting less tax on the income. It is notoriously difficult to determine the true value to non-residents of credits which may be available to them in their home jurisdictions for taxes paid in Australia. The estimated value of foreign tax credits used in this study should therefore be regarded as an approximation only, with the relative difference between the different countries' tax systems being of more significance than the absolute values.

A.41 It is straightforward to determine the value of foreign tax credits to non-resident providers of capital to Australia who reside in countries which exempt income sourced from Australia. Clearly, the amount of tax paid in Australia has no effect at all on the amount of home country tax paid by such investors. Approximately 13 per cent of foreign capital invested in Australia originates from Belgium, France, Germany, Hong Kong and Switzerland, all of which exempt Australian income from tax.

A.42 For other jurisdictions, the value to a non-resident of credits for Australian tax will depend on the detail of the tax rules prevailing in the non-resident's home jurisdiction, whether or not the non-resident is a taxpayer, whether there is an imputation system in the non-resident's jurisdiction and, if there is, how it treats foreign taxes. Additional complications arise when the non-resident is from a jurisdiction such as Japan or the United States which allows surplus credits in respect of income sourced from countries other than Australia to be offset against tax payable on Australian-sourced income, potentially reducing the value of credits for Australian tax.

A.43 The weighted average value of credits to non-residents for Australian taxes is calculated in the following way:

- by estimating for each of the major exporters of capital to Australia the effective credits available (expressed in percentage terms) in respect of $1 of fully taxed interest or dividend income received from Australia; and

- by weighting each of these figures by the estimated percentage of foreign investment into Australia that is financed from each of these sources.[3]

A.44 In determining the value of credits, it is assumed (arbitrarily) that 40 per cent of portfolio investment from credit countries is by investors who cannot use credits (for example, tax exempt pension funds) and that the average lag between a credit being allowed and it subsequently being clawed back on distribution is 10 years.[4]

A.45 Table A.1 shows the assumptions made about the value of foreign tax credits for different categories of non-resident investors.

Table A.1: Non–creditable tax rates under each tax system

Country	Interest %	Equity (Portfolio) %
Australia	0.0	36.0
Canada - non-manufacturing	0.0	41.4
Canada - manufacturing	0.0	35.5
Chile	2.4	26.8
France	0.0	42.9
Germany	0.0	34.4
Ireland	0.0	32.0
Ireland - manufacturing	0.0	10.0
Japan	6.0	49.7
Netherlands	0.0	38.6
New Zealand	1.2	26.9
Singapore	3.3	26.0
Sweden	0.0	28.6
Taiwan	3.3	26.4
United Kingdom	0.0	31.0
United States	0.0	36.2

3 The weights are derived from the Australian Bureau of Statistics publication 5352.0, *International Investment Position, Australia: Supplementary Country Statistics* for the last available year, 1995-96.

4 This assumption is relevant for countries with imputation systems which discriminate between domestic and foreign taxes. While most countries claw back credits on distribution, we are only concerned about situations where this results in foreign sourced income being taxed relatively more harshly than domestic sourced income.

A.46 Table A.2 provides summary details of the data used to determine the value of foreign tax credits.

Table A.2: Weights for determining value of credits

Country	Total foreign investment %	Foreign tax credit rules
Belgium/Luxembourg	2.2	Exempts Australian-source income
Canada	1.5	Credits Australian tax; no pass-through
France	1.6	Exempts Australian-source income
Germany	2.1	Exempts Australian-source income
Hong Kong	4.7	Exempts Australian-source income
Japan	12.6	Credits Australian tax; effective pass-through
Netherlands	3.8	Credits Australian tax (to 35%); effective pass-through
New Zealand	2.8	Credits Australian tax (to 33%); no pass-through
Singapore	3.1	Credits Australian tax (to 26%); pass-through to shareholders
Switzerland	2.8	Exempts Australian-source income
United Kingdom	29.9	Credits Australian tax (to 31%); no pass-through
United States	33	Credits Australian tax (to 35%); effective pass-through
Total allocated	100	

Key assumptions

A.47 The following parameter values were used in the modelling exercise:

- w was set equal to 10 per cent. As explained in Chapter 7, in the presence of inflation, the results are very sensitive to this variable.
- Other than cases where the inflation rate is explicitly set equal to zero, the inflation rate was set to 2 per cent. Again, the results would in some cases be substantially different under alternative assumptions.
- 15 per cent of inventory is assumed to be held over balance date and the 'cost' of closing stock is assumed to equal 90 per cent of its full cost.
- The real rate of appreciation in land prices was set at 1.5 per cent and the average holding period for land at 10 years.

- Development expenditure was assumed to comprise 75 per cent of total mining expenditure and 25 per cent exploration expenditure, with there being on average a two-year lag between exploration expenditure being incurred and any resulting revenue flows commencing.
- R&D expenditure is assumed to be split 50:50 between capital and current expenditure, and that there is on average a one-year lag between expenditure on R&D and any resulting revenue flows commencing.

A.48 Table A.3 summarises the detailed features of each country's tax system which were accounted for in the analysis.

Key limitations

A.49 The key limitations of analyses of marginal effective tax rates have been documented by a number of authors. Comprehensive explanations can be found in Fullerton (1985) and the OECD (1991). The more important points are summarised below:

- In this type of model, taxpayers act as if future cash flows and tax rules are known with certainty. This means that the results mask differences in effective tax rates between projects involving equivalent capital outlays but with varying riskiness in their cash flows.[5]
- The approach does not distinguish between positive and negative taxable income, which is equivalent to assuming tax losses are cashed out. The effect is to (a) underestimate ETRs on projects which generate losses which cannot be used immediately and (b) to overestimate the incentive effects of taxes on firms with past losses. Both factors will impact more on riskier projects, which are more likely to generate losses.
- Effective tax rate analyses generally assume the same tax structure/rates and inflation rate (are expected to) remain in place over the entire project life, and that capital markets are perfect, with taxes being the only reason for divergences between borrowing and lending interest rates.

5 Risk will affect effective tax rates in three ways. First, if taxable income does not equal economic income, effective tax rates will vary with the discount rate as documented by King and Fullerton (op cit: 282-90). Secondly, the probability of the firm going into tax loss will be positively correlated with risk. Thirdly, the relationship between inflation and effective rates is a function of the actual, rather than the risk-adjusted, real interest rate.

- Taxes only affect investment/savings via their effect on the cost of capital. This assumption will be less realistic for 'cash constrained' firms.
- The approach does not use data on actual taxes paid. Among other things, this makes it difficult to incorporate satisfactorily the effects of tax planning into the analysis or to easily reconcile estimated ETRs with observed tax collections.
- Like any analysis which focuses just on the effects of taxes, the approach does not take account of differences across countries in the amount of government expenditure of benefit to business. The results therefore do not indicate the overall impact on businesses of each of the 14 countries' governments.
- The analysis makes no allowance for any of a wide range of ways in which a business tax system may impact on macroeconomic variables such as growth rates, the inflation rate and the current account.
- While the analysis does provide a good indication of the extent to which a business tax system distorts rates of return to different investments, it does not provide any indication of how businesses react to these distortions.

Table A.3: Features of tax systems incorporated in effective tax rates model

Country	Company Tax	Plant	Structures	Inventory	Gains on land	Research & Development	Mining Exploration & Development	Integration
Australia	36	30db	4db	FIFO	real	current: 125% deductible, capital 125% 3sl	Exploration 100%, development 10sl	Full imputation
Canada — manf	36[a]	39db	5db	FIFO	nominal	100% deductible + 20% ITC		Partial imputation
Canada — other	43[a]	29db	5db	FIFO	nominal	100% deductible + 20% ITC	Exploration 100%, development 30dv	Partial imputation
Chile	15	16.7sl	7.7sl	FIFO	nominal	current 100%, capital 1–6 yrs	Exploration 100% deductible	Full imputation
France	40[b]	15sl	5sl	FIFO	nominal	current 100%, capital depreciation	Exploration 100% deductible	Partial imputation
Germany	31.65[c]	15sl	5sl	LIFO	nominal	current 100%, capital depreciation	Exploration 100% deductible	Full imputation
Ireland — manf	10	15sl	4sl	FIFO	nominal	1%		No integration[d]
Ireland — other	32	15sl	4sl	FIFO	nominal	100%	Exploration 100% development depreciation, 20% credit	No integration[d]
Japan	48[e]	12sl	4sl	LIFO	nominal	Current 100%, capital accelerated depreciation, 20% credit	Exploration 100%	No integration
Netherlands	35	10sl	4db	LIFO	nominal	Current 100%, capital depreciation	Exploration 100%	No integration
New Zealand	33	26.4db[f]	4db	FIFO	none	Current 100%, capital 5sl	100% 2yrs in advance	Full imputation
Singapore	26	33.3sl, 20%ITC	3db, 25%ITC	FIFO	nominal	100%	Exploration 100%	Full imputation
Sweden	28	30db	5db	FIFO	nominal	Current 100%, capital amortised	Exploration 100%	No integration
Taiwan	25	23db	4db	LIFO	nominal	Current deductible, capital 2sl, ITC 5-20%	Exploration 100%	Full imputation
United Kingdom	31	25db	4sl	FIFO	nominal	100%	Exploration 100% deductible	Partial imputation
United States	35	32db	6db	LIFO	nominal	Current 100%, capital accelerated, ITC 20% increase exploration	Exploration & development 100%	No integration

(a) Average Federal plus provincial tax rate.
(b) Rate applying from 1 January 1999.
(c) Germany has both a split rate and an imputation system. Retained earnings are taxed at 47 per cent (52.5 per cent with solidarity surcharge); distributed earnings are taxed at 30 per cent.
(d) Ireland currently has a partial imputation system, but is repealing it with effect from 6 April 1999.
(e) Includes local taxes.
(f) Includes 20 per cent 'loading'. Loading does not apply to structures.

db	declining balance
sl	straight line
ITC	investment tax credit
dv	diminishing value

References

Auerbach, Alan J. and James R. Hines Jr, (1988), 'Investment tax incentives and frequent tax reforms', *AEA Papers and Proceedings*, pp.211-16.

Boadway, Robin and Neil Bruce (1992), 'Problems with integrating corporate and personal income taxes in an open economy', *Journal of Public Economics*, 48, pp.39-66.

Bradford, David and Charles Stuart (1986), 'Issues in the measurement and interpretation of effective tax rates', *National Tax Journal*, 39, pp.307-16.

Copeland, Thomas E. and J. Fred Weston (1988), *Financial Theory and Corporate Policy*, Addison-Wesley (3rd ed).

Fullerton, Don (1985), 'Which effective tax rate? A reply', *National Tax Journal*, 38, pp.109-110.

Gravelle, Jane G. (1985), 'Which effective tax rate? A comment and extension', *National Tax Journal*, 38, pp.103-108.

Hansson, Ingemar and Charles Stuart (1986), 'The Fisher hypothesis and international capital markets', *Journal of Political Economy*, 94(6), pp.1330-37.

Iwamoto, Yasushi (1992), 'Effective tax rates and Tobin's *q*', *Journal of Public Economics*, 48, pp.225-237.

Jorgenson, D. (1993), 'Introduction and Summary', in D.W. Jorgenson and R. Landau (eds) *Tax Reform and the Cost of Capital: An International Comparison*, Brookings, Washington D.C.

King, Mervyn A. (1974), 'Taxation and the cost of capital', *Review of Economic Studies*, 41(1), pp.21-35.

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

McKenzie, Kenneth J. (1994), 'The implications of risk and irreversibility for the measurement of marginal effective tax rates', *Canadian Journal of Economics*, 27(3), pp.604-619.

_____ J. Mintz, and Kimberly A. Scharf (1997), 'Measuring effective tax rates in the presence of multiple inputs: a production based approach', *International Tax and Public Finance*, 4(3), pp.337-59.

_____ M. Mansour, and Ariane Brule (1998), *The calculation of marginal effective tax rates*, Working Paper 97-15, Canadian Technical Committee on Business Taxation.

OECD (1991) Taxing Profits in a Global Economy: Domestic and International Issues.