Appendix

Data

The main sources of information for the data compiled in the AEI International Tax Database are: (1) PricewaterhouseCoopers, "Corporate Taxes—Worldwide Summaries" and "Individual Taxes—Worldwide Summaries"; (2) Coopers and Lybrand, "International Tax Summaries"; (3) Ernst and Young, "Worldwide Corporate Tax Guide 2001"; (4) International Bureau for Fiscal Documentation, Loose-Leaf Services; and (5) embassies and ministries of taxation in individual countries. Historical information was gathered from Georgetown Law Library and the Library of Congress. The revenue data have been obtained from the OECD.

Methodology

The effective average tax rate (EATR) can be computed as the difference between the pretax and posttax economic rent scaled by the net present value of the pretax income stream Y_i^* associated with investment strategy i. Conceptually, the EATR can be expressed as follows,

$$\zeta_i = \frac{(R_i^* - R_i)}{Y_i^*}$$

where $R_i^* = Y_i^* - F_i$ is the pretax economic rent and F_i equals the fixed cost. $R_i = (1 - \tau_i)Y_i^* - (1 - A_i)F_i$ is the posttax economic rent calculated as the net present value of the income stream posttax minus the net cost of the investment. A_i is the net present value of tax allowances per unit of investment and τ_i is the combined statutory tax rate.

We find τ, the combined national and subnational top statutory tax rate, in the OECD tax database. It accounts for the national deductibility of subnational tax payments where applicable.

We calculate A, the net present value of allowances per unit of investment divided by τ, using depreciation allowance data from the AEI International Tax Database. In particular, the database provides a measure for Φ, the rate at which capital expenditure can be offset against tax. We also take assumptions for the real annual discount rate, r =10%, and the expected annual inflation rate, π =3.5%, from Michael Devereux, Rachel Griffith, and Alexander Klemm, "Corporate Income Tax Reforms and International Tax Competition," *Economic Policy* 17, no. 35 (October 2002): 451–95.

Assuming away interest taxation at the shareholder level, we calculate the shareholder's nominal discount rate, $\rho = (1 + r)*(1 + \pi) - 1 = 13.85\%$. Using these inputs, we calculate A for several cases based on requirements that vary by country:

Straight line depreciation is required and there is one offset rate for all years.
$A = (\Phi*(1 + \rho)/\rho)*(1 - (1/((1 + \rho)^(1/\Phi))))$

Declining balance depreciation is required and there is one offset rate for all years.
$A = \Phi*(1 + \rho)/(\rho + \Phi)$

Straight line depreciation is required and there is a different offset rate for subsequent years.
$A = \Phi_1 + (\Phi_2*(1 + \rho)/\rho)*(1 - (1/((1 + \rho)^(((1 - \Phi_1)/\Phi_2) + 1)))) - \Phi_2$

Declining balance depreciation is required and there is a different offset rate for subsequent years.
$A = \Phi_1 + (\Phi_2*(1 - \Phi_1)*(1 + \rho)/((1 + \rho)*(\rho + \Phi_2)))$

Straight line depreciation or declining balance depreciation may be chosen, but the method must be consistent for all years. There is one rate for all years.
$A_1 = (\Phi*(1 + \rho)/\rho)*(1 - (1/((1+\rho)^(1/\Phi))))$

$A_2 = \Phi*(1 + \rho)/(\rho + \Phi)$

$A = \max(A_1, A_2)$

Straight line depreciation or declining balance depreciation may be chosen, but the method must be consistent for all years. There is a different offset rate for subsequent years.
$A_1 = \Phi_1 + (\Phi_2*(1 + \rho)/\rho)*(1 - (1/((1 + \rho)^(((1 - \Phi_1)/\Phi_2)+1)))) - \Phi_2$

$A_2 = \Phi_1 + (\Phi_2*(1 - \Phi_1)*(1 + \rho)/((1 + \rho)*(\rho + \Phi_2)))$

$A = \max(A_1, A_2)$

Instances where straight line depreciation or declining balance depreciation may be chosen and the method need not be consistent for all years are calculated ad hoc. Additionally, depreciation data were not available after 2007, so A values for 2008–2010 are set equal to values in 2007.

Allowances change very infrequently, so this assumption is unlikely to bias the results.

Taking the further assumption that the economic depreciation rate is δ =12.25% from Devereux, Griffith, and Klemm, we can calculate the effective marginal tax rate.
$EMTR = ((\delta + r)*(\tau - \tau*A))/((\delta + r)*(1 - \tau *A) - (\delta*(1 - \tau)))$

Before deriving the effective average tax rate, we must calculate the net present value of the economic rent generated, R_t, and the net present value of the pretax economic rent R_t^*. We assume that the financial return, p, is 20%.

$R_t = -(1 - (A* \tau)) + (1/(1 + \rho))*((1+\pi)*(p + \delta)* (1 - \tau)+(1+\pi)*(1 - \delta)*(1 - (A * \tau)))$

$R_t^* = (p - r)/(1 + r))$

Then we obtain the EATR by dividing the difference of the pretax and posttax economic rent by the net present value of the pretax income stream, net of depreciation p/(1 + r).

$EATR = (R_t^* - R_t)/(p/(1 + r))$

Author calculations are available upon request.

Example

Canada's tax policy in the late 1980s provides a good example of how depreciation allowances can affect the effective average corporate tax rate. In 1986, Canada provided a 33 percent depreciation allowance and required depreciation to be calculated with the straight line method. In 1987, Canada undertook base-broadening tax reform and lowered its depreciation allowance to 20 percent calculated with the declining balance method. The large allowance cut corresponded with a 24 percent drop in A, the net present value of allowances over τ. A fell from 0.88 to 0.67. At the same time, though, Canada cut its combined top statutory tax rate from 49.8 percent in 1986 to 48.5 percent in 1987. The net effect on Canada's effective average corporate tax rate was a large increase, from 31.4 percent to 42.0 percent. Large allowance cuts overwhelmed smaller statutory rate cuts.