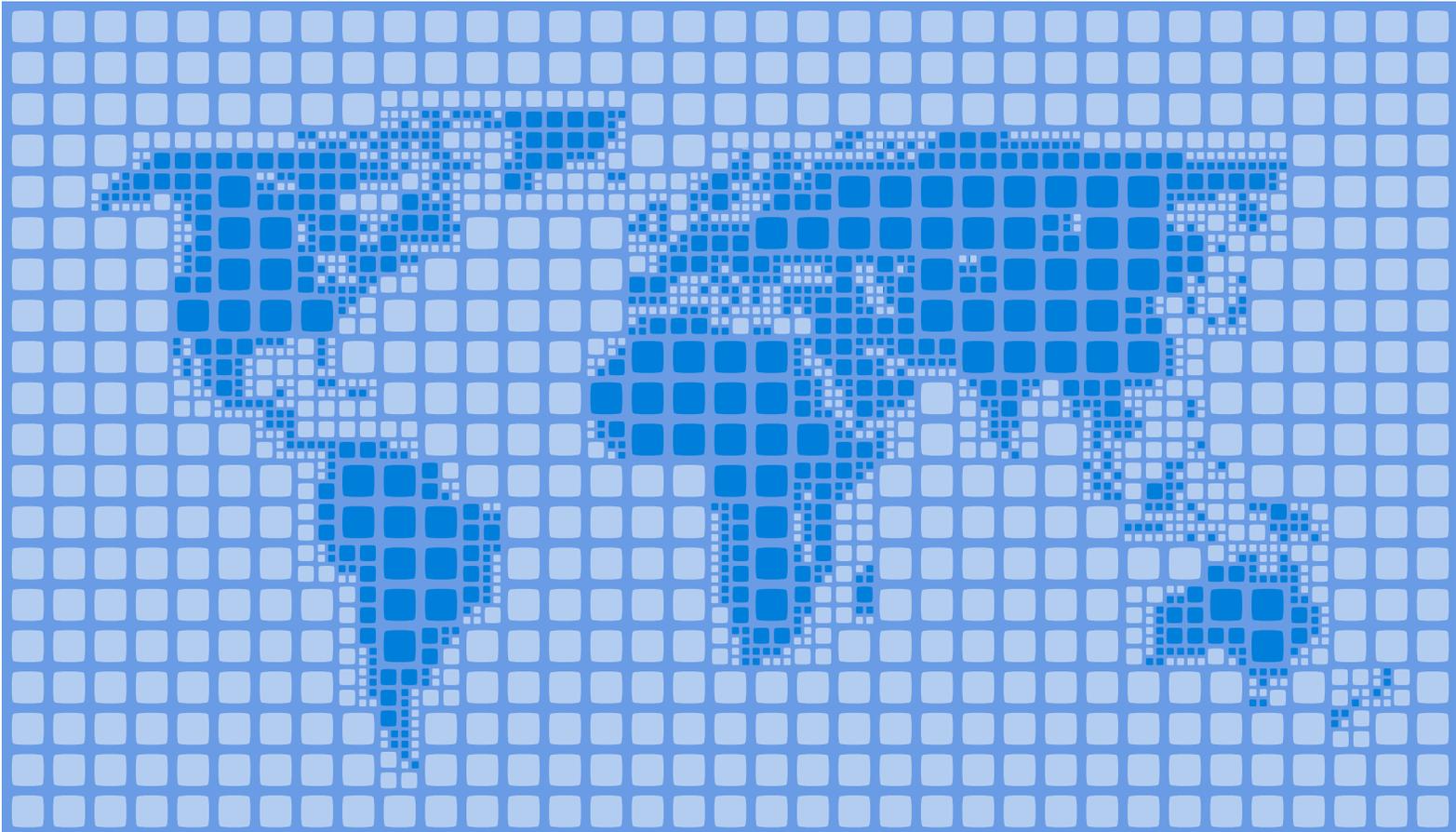


Taxation of Inbound Direct Investment: Economic Principles and Tax Policy Considerations

Bev Dahlby

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1. Introduction

Foreign direct investment (FDI) in Canada is an important conduit for technology transfers that boost productivity, and it fosters competition in domestic markets. Taxation of the income generated by foreign-owned corporations is also an important source of revenues for Canadian governments. Tax policies that affect the level and financing of FDI in Canada have to strike a balance between promoting economic activity and generating the revenues that are needed to finance the activities of government that make Canada a productive place to work and an enjoyable place to live. This report focuses on the broad economic principles that should guide tax policies that affect inbound FDI in Canada.

A brief outline of the report is presented below. In Section 2, we review some basic economic models of the taxation of the return to capital in a small open economy. These models show that the inability to fully tax location-specific economic profits can justify a source-based tax on the return to capital. However, computations based on this simple model, which neglect tax treatment of foreign source income and the use of corporate income taxes (CIT) to tax both pure profits and the return on shareholders' equity, indicate that the optimal tax rate on the return to capital would be relatively low. We then show how the tax treatment of foreign source income by the home country can affect the optimal corporate income tax levied by a host country. While these models provide some insights with regard to optimal tax policies, they ignore important issues in the taxation of FDI, in particular the ability of multinational enterprises (MNEs) to shift taxable income from high tax to low tax affiliates through transfer pricing and debt placement. The latter issue is the main focus of the remainder of the report. In Section 3, we review the main theories of the capital structure of the firm and the determinants of its debt level. The main focus is on the tradeoff theory which emphasizes the tax incentives to using debt in the financial structure of the firm. The other theories of capital structure, the pecking-order model and the agency theory, are also briefly discussed and the applicability of these theories to the financing of FDI by multinational enterprises is briefly discussed. In Section 4, we adapt the methodology used in a recent report of the Organisation for Economic Co-operation and Development (OECD) to illustrate the implications of different methods of financing FDI. The computations presented in this section provide a concrete way of describing how tax planning by MNEs can affect the average effective tax rate (AETR) and the marginal effective tax rate (METR) on a foreign investment by a multinational. In Section 5, we review the empirical literature on the determinants of the financial structures of MNEs' foreign investments. The main conclusions from the econometric studies of debt placement and profit-shifting activities by MNEs are the following:

- Higher host-country tax rates reduce the taxable incomes reported by MNEs' foreign subsidiaries in those countries.
- Higher host-country tax rates lead to higher debt levels in the MNEs' foreign subsidiaries.
- Both the internal (related-party) debt and the external (third-party) debt of the foreign subsidiaries are responsive to tax differentials.

- The responsiveness of foreign subsidiary debt and profit to tax incentives is lower in partially-owned subsidiaries than in wholly-owned subsidiaries.
- Higher host-country taxes discourage MNEs from forming joint ventures and encourage the establishment of majority-owned or wholly-owned subsidiaries.

Two empirical studies are discussed in detail — Jog and Tang (2001) and Huizinga and Laeven (2008). The former examines the effects of tax changes in Canada and the United States in the 1980s on the incentive of U.S.-controlled firms to increase debt in Canada. The latter study measures the degree of tax base shifting in the European Union (EU) through transfer pricing and debt placement strategies and provides some insights into why some countries' tax bases are more susceptible to these effects than others.

The last section of the paper deals with thin capitalization regulations. It begins with a review of two empirical studies dealing with the effects of thin capitalization measures. We then consider the welfare effects of thin capitalization regulations in an oligopolistic market. Thin capitalization measures are often justified as measures to “protect the domestic tax base” and “level the playing field” in the host country's market. We use a simple duopoly model of a domestically produced and consumed product, with a foreign-owned firm and one domestically-owned firm, to show that a thin capitalization regulation may increase product prices paid by domestic consumers. The model suggests that a thin capitalization regulation may be a relatively high cost source of tax revenues if the domestic demand for products in oligopolistic markets is price elastic. Finally, we discuss two proposals for extending the thin capitalization measures — a proposal by Williamson and Garland (1996) to extend the thin capitalization regulation to all debt held by foreign-controlled firms and a proposal by Lanthier and Mintz (2007) to extend thin capitalization regulations to all Canadian firms as a way of dealing with the use of debt to finance outbound investment.

2. Taxing the return to capital in a small open economy¹

Taxing foreign direct investment is part of the larger issue of the appropriate level of taxation on the return to capital. The following proposition describes the optimal tax policy for a small economy, whose capital market is completely integrated with world capital markets:

Proposition 1: *The government of a small open economy should not impose a source-based tax on the return to capital if it can set other taxes (such as destination-based consumption taxes, wage taxes, and profits taxes) at their optimal values.²*

A source-based capital tax is a tax on the return to capital earned on investments within a country. If the economy is fully integrated into world capital markets, but its demand for and supply of capital are small compared to the world capital market, then any tax that the country imposes on the return to capital will increase the return that investors require in order to supply capital to the economy. This means that the return to capital will increase by the full amount of any tax that the country imposes on the return to capital in order to compensate investors for the tax. Therefore the burden of any source-based capital taxation will be shifted to other inputs — labour and other resources (such as land or mineral resources) — that are relatively immobile or fixed in supply. The increase in the gross return that investors require in order to invest in the economy means that investment will decline, labour productivity will decline because of the reduction in capital, wage rates will fall, and total output will decline.³

Since labour and “land” bear the full burden of the tax on capital, the same effective tax burden could be achieved by directly taxing the wage incomes and land rents, without reducing the economy’s total production to the same extent as the tax on capital. In other words, it would be to workers’ advantage if the capital tax were eliminated and taxes on labour incomes were increased to replace the lost revenue because the increase in their direct tax burden would be more than offset by the increase in gross wage incomes from the higher level of investment that would occur as a result of the reduction in the cost of capital for the economy. Thus it is more efficient to tax labour and land directly because eliminating the source-based taxes on capital would not change the ultimate incidence of taxation in the economy, and it would reduce the total distortions caused by the tax system.

Proposition 1 runs counter to popular views that capital should bear its “fair share” of the tax burden, but this proposition implies that capital, including the capital provided by foreigners through direct investment, never bears its “fair share” because the gross return to capital adjusts so that the burden of the capital tax is shifted to the other major inputs to the economy, land and labour. It might be argued that the proposition is not relevant for most countries, including Canada, because, while capital is highly mobile, it is not perfectly mobile. However, as the

1 Section 2 draws on material in Dahlby (2008, Chapter 7).

2 See, for example, Gordon (1986) and Bruce (1992).

3 See Arulampalam, Devereux, and Maffini (2008) on empirical studies of the extent to which the corporate income tax is shifted to workers through lower wage rates.

The Incidence of a Tax on Capital in a Small Open Economy

Figure A1 shows the impact of a tax on the return to capital in a small open economy. Investors require an after-tax rate of return of ρ in order to justify investments in this economy. In the absence of taxation, the cost of capital to the economy would be equal to $c_0 = \rho + \delta$ where δ is the rate at which the capital stock depreciates. Under these conditions, the total amount of capital invested in the economy would equal K_0 where the cost of capital is equal to the marginal productivity of capital, which is given by the curve F_K . If the government imposes a tax on the return to capital that is equal to t_K per unit of capital, then the cost of capital to the economy would increase by the full amount of the tax from $c_0 = \rho + \delta$ to $c_1 = \rho + \delta + t_K$ and the level of investment in the economy would decline to K_1 . The tax revenue generated by the tax on capital would be equal to the area $fghb$.⁴ The incomes of the other inputs, labour and land, would decline from area aeb to area afg , or decline by $fgeb$. The excess burden of the tax on capital — the difference between the harm that the tax imposes on the private sector and the tax revenue collected — would be equal to the triangle ghe . A measure of the efficiency loss from the tax is the ratio of the excess burden of the tax to the revenue collected. This average excess burden (AEB) would be equal to the ratio of area ghe to area $fghb$.

As we have stressed, part of the burden of the capital tax will be shifted to workers through lower wages and part of the burden will be borne by the owners of resources through lower rents. The shifting of the burden to workers is shown in the Figure A2. The F_L^0 curve represents the marginal productivity of labour with the capital stock equal to K_0 , i.e., before the capital tax is imposed, and the supply curve of labour is S_L . It is assumed that the marginal productivity of labour decreases as more labour is employed and that the amount of labour supplied to the economy increases as workers' wage rates increase. Assuming a competitive labour market, the wage rate is initially W_0 and L_0 units of labour are employed. With the introduction of the tax on capital and the decline in the capital stock to K_1 , the marginal productivity of labour would decline and the F_L curve would shift down to F_L^1 leading to a reduction in the wage rate to W_1 and a decline in employment to L_1 . The decline in labour income from W_0L_0 to W_1L_1 represents the shifting of the capital tax burden to workers. Resource rents would also decline because of the decline in the amount of labour and capital employed in the economy.

Figure A1: The Effect of a Tax on the Return to Capital in a Small Open Economy

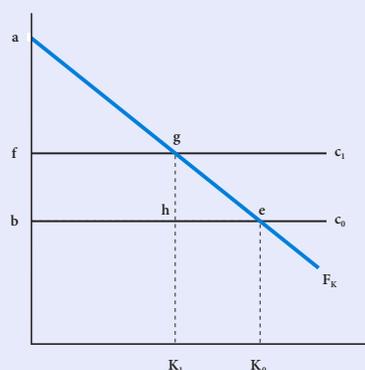
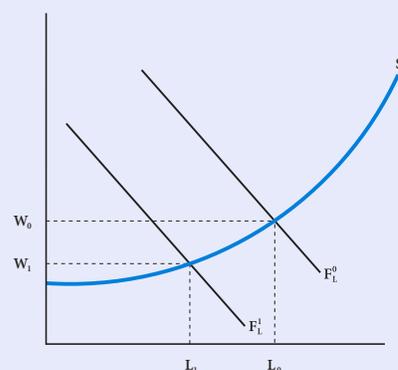


Figure A2: The Labour Market Effect of a Tax on Capital



4 This assumes that the government does not collect taxes from labour and land.

globalization and integration of capital markets proceed, the model predicts that countries will find it in their interest to cut the tax rates on the return to capital. This model then forms the basis for the view that globalization of capital markets and tax competition have set off a “race to the bottom” with more of the tax burden being shifted to workers over time as economic integration proceeds and a borderless capital market becomes a reality.

A number of empirical studies have rejected the simple notion that there has been a sharp decline in corporate income taxes levied in developed countries. Devereux (2006) found that while there has been a general decline in statutory CIT rates over the last 40 years in OECD countries, there has been a general increase in CIT revenues as a percentage of GDP. A general upward trend in CIT revenues as a share of GDP was also found by Stewart and Webb (2006), but they reported little or no evidence of convergence in these ratios among OECD countries.⁵ Base-broadening measures, such as a reduction in present value of depreciation allowances for tax purposes, may be one factor accounting for the divergence in the trends in statutory tax rates and corporate tax revenues. (See Devereux, Griffith, and Klemm (2002) on the base broadening measures adopted by OECD countries.) There is also evidence that the tax burden on internationally mobile investment has declined. Yoo (2003) found that the effective marginal tax rate on inward FDI in OECD countries declined by an average of 8.0 percentage points in the 1990s. Hines (2007) found that the average effective tax rate on U.S. multinationals in 39 countries declined from 42.6 percent in 1982 to 26.2 percent in 1999. He also found that in 1982 larger countries had higher statutory CIT rates, but by 1999 the positive relationship between country size and tax rates had disappeared. Clausing (2008) studied the trends in CIT rate in 36 OECD and European countries from 1979 to 2002 and found that more integrated countries had lower corporate tax rates, while countries with bigger governments and higher personal income tax rates chose higher CIT rates. She also found that the peak of the Laffer curve for corporate tax revenues was at a statutory rate of around 30 percent for EU member countries and around 40 percent for other OECD countries. See also Bartelsman and Beetsma (2003), Clausing (2007), and Devereux (2006) for estimates of the Laffer curve for CIT revenues. Overall, the results from these studies indicate that while the corporate income tax has not “faded away”, countries have made adjustments to their tax system in light of the increased mobility and importance of international capital flows and FDI.

The existence of pure profits or economic rents provides one of the main motivations for foreign direct investments and in turn a reason why the governments of small open economies continue to levy source-based capital taxes. Proposition 1 only holds if the government of the small open economy can capture all of the economic rent or pure profit generated by investment in the economy, i.e., only if the tax rate on pure profit is 100 percent. However, governments are often limited in their ability to tax economic rents because these rents cannot be readily measured and taxes on economic rent can be evaded, or otherwise avoided, if the tax rates are high compared to other income sources. For example, as the rate of tax on pure profits increases, profits may be re-characterized as other forms of income that are taxed at lower rates. Gordon and MacKie-Mason (1994) have argued that if the tax rate on pure profits exceeds the tax rate on wage income, recorded economic profits will quickly “disappear”

5 See also Auerbach (2006) on the trend in CIT revenues.

Further Discussion of Proposition 2

Suppose that the average tax rate on wage income and economic rents is τ , with $0 < \tau < 1$. In the absence of a tax on capital, the government would collect revenue equal to $R^0 = \tau(\mathbf{abe})$ where \mathbf{abe} is the total payments to labour and resources in Figure A1. If the government taxes capital, its total revenue would be equal to $R^1 = \mathbf{fghb} + \tau(\mathbf{afg})$. The change in the government's total tax revenues would be equal to $\Delta R = (1 - \tau)(\mathbf{fghb}) - \tau(\mathbf{ghe})$. Note that if τ is relatively high, ΔR would be negative and the capital tax would reduce total tax revenues. It will be assumed that τ is low enough that ΔR is positive. For a small capital tax increase, the burden imposed on the private sector is the loss of after-tax income by workers and resource owners which can be approximated as $(1 - \tau)(\mathbf{fghb}) + (1 - \tau)(\mathbf{ghe})$. Therefore the marginal cost of public funds from taxing capital is approximately equal to:

$$MCF_{t_k} = \frac{(1 - \tau)[\mathbf{efgh}] + (1 - \tau)[\mathbf{ghe}]}{(1 - \tau)[\mathbf{efgh}] - \tau[\mathbf{ghe}]}$$

When the tax rate on capital is close to zero, area \mathbf{ghe} would be very small and the MCF_{t_k} will be close to one. On the other hand, given an upward supply curve for labour, the marginal cost of funds from taxing labour income, MCF_{t_L} , will be greater than one. Therefore, if the tax rate on capital is zero, $MCF_{t_k} = 1 < MCF_{t_L}$ and the optimal tax system would involve a positive tax rate on capital. The optimal tax rate on capital is found by equating MCF_{t_k} and MCF_{t_L} . Dahlby (2008, Chapter 7) derives formulas for the MCFs for capital and labour taxes and an expression for the optimal tax rate on capital.

because the owners of firms would pay themselves very high wages and salaries that would be taxed at the lower rates. Thus, information limitations generally prevent governments from imposing 100 percent tax rates on pure profits.

Proposition 2: *If the government of a small open economy cannot impose a 100 percent tax on pure profits, then it should impose a positive source-based tax on capital.⁶*

The textbox above describes the intuition behind Proposition 2. While Proposition 2 indicates that a small open economy should impose a source-based tax on the return to capital, it does not indicate whether limitations on the taxation of pure profits justify high source-based capital taxes in small open economies. Formulas for the optimal tax rate on capital derived in Dahlby (2008, Chapter 7) can provide some insights into the size of the optimal tax rate on capital. Here we will simply focus on the special case where the economy has a Cobb-Douglas aggregate production function, and the government is only concerned about the burden of the tax on workers (perhaps because the economic rents accrue to foreigners or to rich domestic landowners). In this case, the optimal tax rate on capital is equal to the after-tax share of profits in total income, i.e., $\tau_K = (1 - \tau_\pi) \alpha_\pi$ where τ_π is the tax rate on profits and α_π is the share of economic profit in total output. Consequently, if pure profits represent 10 percent of total income and the tax rate on pure profit income was 50 percent, then the optimal tax rate on capital income would be five percent. The optimal tax rate on capital would be even lower if the government were equally concerned about the burden of taxation on labour income and

6 See, for example, Huizinga and Nielsen (1996), and Keen and Marchand (1997).

pure profits. By way of comparison, the average marginal effective tax rates in Canada and the OECD are in the 20 to 30 percent range.⁷ The optimal tax rates on capital, based on this very simple model, are much lower than the rates of taxation on capital that are currently imposed in Canada and other countries.

However, this model does not reflect some important aspects of the taxation of capital in small open economies. First, the corporate income tax is the main component of the taxation of capital in most countries, and the CIT taxes both economic profits and the return on equity-financed capital. An increase in the corporate income tax rate increases both the rate of taxation of economic profit and the marginal effective tax rate on capital in the economy. The model described above did not link the rate of taxation on profits to the rate of taxation on capital, and this linkage may be important in explaining the current rate of taxation of capital. Second, the model does not incorporate the foreign tax credit systems that the United States, the United Kingdom, Japan, and other countries use to reduce the “double taxation” of dividend income from foreign investments. It is often argued that the foreign tax credit system means that if the host country’s CIT is fully credited by a foreign government, an increase in the CIT rate is effectively borne by the treasury of the foreign government. This means that a significant share of the CIT burden may be exported to foreigners, which greatly enhances its attractiveness. In the following section, we describe how the optimal CIT rate varies with the tax treatment of foreign source income by foreign governments.⁸

2.1 The tax treatment of foreign source income

Countries have generally adopted some form of tax relief for the foreign source income of their residents in order to offset, at least partially, double taxation by the host and home countries. The adoption of such systems is often justified by the desire to promote “capital export neutrality”, “capital import neutrality”, or “national efficiency”. A detailed discussion of these concepts is beyond the scope of this paper because we are concerned with the tax treatment of inbound investment. However, we need to consider the tax treatment of foreign source income by the home country because it can affect the optimal tax policies of the host country. In this section, we will discuss the effects of a tax rate increase for a small capital importing country when the home country adopts (a) an exemption system, (b) a deduction system, and (c) a foreign tax credit system.

If the home country adopts the exemption system (also known as the territorial system), it does not impose any tax on (active business) income from foreign investments. Therefore, capital will flow between two countries until the after-host-country-tax rate of return is equal to the after-home-country-tax rate of return. Under the exemption system, an increase in the host country’s CIT rate always increases the user cost of capital. Under the deduction system, domestic taxpayers can deduct foreign income taxes paid on active business income in computing their home-country tax liability. For a foreign investment to be viable under the deduction system, it must earn an after-host-country-tax rate of return at least equal to the pre-tax rate of return on investments in the home country.

7 See Department of Finance (2008, Chapter 3, Chart 3.8).

8 See also Wilson (2007) for other reasons why the optimal tax rate on capital might be substantially higher than that generated by the simple model that serves as the basis for Propositions 1 and 2.

Under a foreign tax credit system, the home country imposes a tax on the gross return received by its residents on their investment in the host country, and it provides a tax credit for the foreign taxes paid up to the maximum tax that would apply in the home country. If the host-country tax rate is less than the home-country tax rate, $u_B \leq u_A$, the firm is said to be in a “deficit credit” position, and the home country’s effective tax rate on the foreign source income is the difference between the two countries’ tax rates, $u_A - u_B$. In this case, income earned in the host country or at home is taxed at the same total rate, u_A . Capital market equilibrium implies that the pre-tax rate of return in the host country has to equal the pre-tax rate of return in the home country because domestic and foreign investments are effectively taxed at the same rate. Assuming that the foreign income is taxed on an accrual basis, an increase in the host country’s tax rate, as long as it remains below the home-country rate, will not raise the effective tax rate on investment in the host country because it is offset by an increase in the foreign income tax credit provided by the home country. Under these conditions, an increase in the host-country tax rate will not reduce the incentive to investment in the host country.

In the “excess credit” case, where $u_B > u_A$, the foreign tax credit is limited to the tax that the home country would have levied on the foreign source income. The home country does not provide a credit to offset the host country’s taxes, but no further tax is imposed by the home country. In the excess credit case, the effective tax rate on the foreign direct investment is determined by the host country’s tax rate and the after-tax rate of return on host country investment has to equal the after-tax rate of return on equity in the home country, which implies that the pre-tax rate of return on the host-country investment will exceed the pre-tax rate of return on investment in the home country. Further increases in the host-country tax rate will drive up the pre-tax rate of return that investments in the host country have to earn and therefore it will discourage investment in the host country.

The relationship between the host country’s CIT rate and the user cost of capital is illustrated in Figure 1 if the host country’s capital cost allowance equals the true economic rate of depreciation (see figures beginning on p. 46). In the deficit credit situation, where u_B is less than u_A , the user cost of capital is not affected by increases in the host-country rate. There is a “kink” in the cost of capital schedule at u_A when the maximum foreign tax credit is reached. When u_B exceeds u_A and the MNE is in an excess credit position, increases in u_B will increase the cost of capital in the host country, reducing the incentive to invest in the host country.

The foreign tax credit model outlined above assumed that foreign earnings were taxed on an accrual basis. However, under the foreign tax credit systems used by Japan, the United States, and the United Kingdom, the active business income of a foreign subsidiary is only taxed when a dividend payment is made to the parent corporation in the home country. Consequently, a multinational can defer or postpone the residual home-country tax liability that arises when the host country’s tax rate is less than the home-country rate by retaining the profits in the foreign subsidiary. Hartman (1985) has shown that the deferral system implies that the residual home-country tax is an “unavoidable fixed cost” for a firm with a mature subsidiary that can finance its investments out of retained earnings. Consequently, the home-country tax rate should not affect the investment decisions made by mature subsidiaries, and the capital market equilibrium condition under the deferral system is the same as under the exemption system.⁹

9 See Altshuler and Grubert (2002, pp. 79–80) for a formal derivation of this result.

Therefore, deferral can effectively convert the foreign tax credit system into an exemption system. With deferral, the subsidiary's cost of capital will be an increasing function of the host country's tax rate under the foreign tax credit system, even if its tax rate is less than the home-country rate. A higher host-country CIT rate will therefore tend to discourage investment.

For an "immature" foreign subsidiary, which requires equity investments from the parent, the home-country tax rate will affect the required return on the investment and the capital market equilibrium condition is given by $(1 - u_A)\rho_A = (1 - Iu_A - (1 - I)u_B)\rho_B$ where ρ_A and ρ_B are the pre-tax rates of return in the home and host countries and I is the projected dividend payout rate for the subsidiary. Therefore, in general the immature foreign subsidiary's cost of capital, and its level of investment, will be affected by both the host and the home-country tax rates.

Another aspect of international taxation that is neglected in this model is the provision for worldwide averaging of foreign taxes under U.S. tax law. In calculating its foreign tax credits, a U.S. multinational is able to use the low tax burdens in some countries to offset its excess tax credits on investments in other high tax countries (with some restrictions on averaging across different types of income). By averaging taxes from high and low tax sources, a multinational can avoid being in an excess tax credit position, such that its foreign tax credits exceed its overall U.S. tax liability.¹⁰ Therefore it is possible that an increase in the CIT rate in a low tax country may push up the MNE's overall tax rate, and therefore may not be fully credited at the margin. In that case, an increase in the host country's CIT rate increases its user cost of capital even though its rate is below the U.S. rate.

The extent to which deferral and worldwide averaging have effectively converted the U.S. credit system into the equivalent of an exemption system is basically an empirical question. Slemrod (1990) analyzed FDI in the United States from countries using the exemption system and the foreign tax credit system over the period 1962 to 1987, and concluded that FDI from exemption countries was not more sensitive to U.S. tax rate changes than FDI from the countries providing foreign tax credits. Auerbach and Hassett (1993) also found no difference in the tax responsiveness of FDI in the United States from countries using the exemption or the foreign tax credit systems. However, Hines (1996) found that FDI from countries with exemption systems was much more sensitive to the state CIT rates than FDI from countries with foreign tax credit systems. He found that a one-percent increase in a state's tax rate reduced the share of manufacturing capital by exemption countries from nine to 11 percent compared to foreign tax credit countries and that foreign investors from exemption countries were much more likely to invest in states with zero CIT rates than were the investors from the foreign tax credit countries. Shah and Slemrod (1991) examined the FDI flows into Mexico over the period 1965-87 and tested whether a measure of U.S. multinationals' foreign tax credit status affected FDI from the United States to Mexico. They found that in the deficit tax credit case the U.S. tax rate, not the Mexican tax rate, affected FDI to Mexico. However, in general both the U.S. and the Mexican tax rates affected FDI to Mexico. Finally, Desai, Foley, and Hines (2001) found that the dividend payout rate of the foreign subsidiaries of U.S. corporations is inversely related to the residual U.S. tax on dividends, with an estimated elasticity of -1.0 . Their results seem to be inconsistent with Hartman's prediction that a mature subsidiary's dividends should be independent of the home-country tax rate.

10 Excess foreign tax credits can be carried forward to offset taxes in future years, but future tax credits are obviously worth less than an immediate tax credit.

Overall, the empirical results indicate that neither view of the foreign tax system — as a de facto exemption system because of deferral and worldwide averaging or as a pure foreign tax credit system — provides an adequate description of the impact of a host country's CIT tax rates on foreign direct investment, and therefore the cost of capital will generally be affected by both the host and home-country tax rates.

2.2 The optimal corporate income tax rate

The simple model described at the beginning of this section indicated that the optimal tax rate on capital should be positive, if economic profits cannot be fully taxed, but that the optimal tax rate is likely to be low. In this section, we see how the optimal tax rate on capital for a small open economy could be affected by the international tax system and also by distributional preferences. In this model, which is presented in more detail in Dahlby (2008, Chapter 7), the optimal tax rate on labour and capital is determined by the equality of the marginal cost of public funds (MCF) from taxing labour and capital. The optimal CIT and the implied METR on capital depends on the share of pure profits in total output and whether the government ignores the impact of taxes on the level of pure profits ($\beta = 0$) or puts equal weight on reductions in profits and labour incomes ($\beta = 1$). In the case where $\beta = 0$, the government is only concerned about the welfare of workers and in the $\beta = 1$ case, wages and profit have equal “social significance” as far as the determination of tax policy is concerned.

The main purpose of these calculations is to illustrate how the international taxation regime adopted by the capital exporting country affects the optimal tax rate for the host country. In each case, the home-country CIT rate is assumed to be 40 percent. The computations in Table 1 (see tables beginning p. 39) show that if the home country adopts the foreign tax credit system (based on accrual taxation) the host country should match the home country's tax rate if it puts equal weight on labour income and economic profits in determining its optimal tax policy. Recall that when the host country levies the same rate as the home country, its tax is fully credited and the host country's tax revenue is a transfer from the treasury of the home country. The computations also show that if the government is only concerned about workers' welfare, the optimal tax rates can be higher than the home-country tax rates and increasing in the share of profits in total output.

If the home country adopted the exemption system and if the host country's government applied equal distributional weights to labour income and economic profits, then the optimal CIT rates are much lower than under the foreign tax credit system. For example, in Case 1, the optimal CIT rate would decline from 40 percent to five percent and the optimal effective tax rate on capital would decline from 19 percent to 1.8 percent if the home country switched from a foreign tax credit system to an exemption system. Thus the international taxation regime of the home country can have a dramatic effect on the optimal CIT rate of a small open economy. However, the model also indicates that if no distributional weight is attached to profit income and if the share of profits in total income is sufficiently high (as in Cases 1 and 3), then the optimal CIT rate for a small open economy can exceed the home country's CIT rate even if the home country adopts the exemption system. (Recall that if $u_B > u_A$, tax increases by the host country have the same effect on the user cost of capital under the exemption and foreign tax credit systems. That is why the optimal tax rates are the same under the foreign tax credit and exemption systems when $\beta = 0$.)

If the home country adopted the deduction system, the optimal CIT rates would be lower than under the exemption and foreign tax credit systems. In Case 1, the optimal CIT rate is only 3.5 percent and the optimal effective tax rate on capital is only 1.6 percent if $\beta = 1$. However, the computations also suggest that a CIT rate of over 50 percent is optimal, given u_A is 40 percent, even under the deduction system, if economic profits are sufficiently high and no social value is attached to profit income.

These computations are based on a very simple model, but they illustrate the potential importance for the optimal source-based tax on the return to capital of the size of the economic rents in the economy, the distributional weights or preferences that the governments' adopt in setting tax policies, and the foreign taxation regime adopted by the capital exporting countries. The model suggests that host country's CIT rate can be relatively high if the capital exporting country adopts a foreign tax credit regime and the host country attaches little or no weight to the burden of the tax that falls on economic profits. However, if the capital exporting countries adopt the exemption system or if the foreign tax credit regime is effectively an exemption system because of deferral, then a much lower tax rate is optimal if a government places equal weight on the tax burden that falls on labour and profit income.

While this model provides some insights into the issue of the optimal taxation of FDI, it has some very significant limitations. First, it does not distinguish between foreign investment and domestic investment. Essentially, it is assumed that all domestic investment is as potentially mobile as foreign investment. However, domestic investors may be less mobile than foreigners, and it may be advantageous to differentiate taxation based on the differences in the supply elasticities of domestic and foreign investments.¹¹ Second, the model does not consider how non-tax distortions such as externalities from R&D, agglomeration effects, or imperfect competition in the domestic market might affect the optimal tax treatment of FDI. Third, the model does not consider how alternative methods of financing FDI or transfer pricing arrangements might affect the ability of the government to capture some of the economic rents generated by FDI. These issues, especially those connected with debt placement and thin capitalization, will be discussed in greater detail in the remainder of the report.

11 There is a large and growing literature on whether differential rates of capital taxation are welfare improving. This literature is too large and complex to review here, but see Janeba and Peters (1999), Haufler and Schjelderup (2000), Keen (2001), Janeba and Smart (2003), Fuest and Hemmelgarn (2005), Haupt and Peters (2005), Slemrod and Wilson (2006), Hong and Smart (2007), and Bucovetsky and Haufler (2008).

3. Capital structure and taxation

Before discussing the effects of alternative financing arrangements on the taxation of FDI and the potential impact of thin capitalization rules, we will briefly review the literature on the determinants of a firm's capital structure and the tax incentive to use debt to finance investments. There is a huge literature on capital structure, but the main models that have been developed and tested to explain the use of debt and equity financing are the trade-off model, the pecking-order model, and the agency model. Fortunately, there are some excellent survey papers for this literature. Harris and Raviv (1991) survey the literature on the pecking-order model and the agency model up to 1990. Graham (2001) surveys the literature on the capital structure of firms with a focus on the effects of taxes on debt financing. Frank and Goyal (2007) provide an up-to-date survey of the theoretical and empirical literature on the trade-off model and the pecking-order model.

We begin by describing the trade-off model because taxation plays a central role in that model. Then we briefly describe the pecking-order model and the agency model to contrast them with the trade-off theory. Finally, we summarize some of the empirical literature on determinants of capital structure and the effects of taxation on debt financing.

Modigliani and Miller (1958) launched the modern literature on the theory of the capital structure of the firm by arguing that under certain conditions a firm's leverage or debt-equity ratio would not affect the value of the firm in a perfect capital market. In particular, the debt-equity ratio would not affect shareholders' wealth if there were no costs to financial distress and bankruptcy, if the tax system was neutral with respect to the taxation of interest payments on debt and the return on equity (dividends and capital gains), and if potential equity investors and bondholders had the same information about a firm's earning prospects as current shareholders. Their essential insight was that current shareholders sell debt and equity to outside investors, and they maximize their wealth by maximizing the market value of the firm's equity and debt. If the outside investors get the same tax treatment from holding debt and equity, have the same information about the firm's prospects as current shareholders, and are risk neutral (because they hold a diversified portfolio of assets), then changing the mix of debt and equity in a firm's capital structure will not change the total market value of the firm's debt and equity.

The trade-off model, which emerged in the wake of the Modigliani and Miller debt irrelevance proposition, indicates how taxation and bankruptcy costs can determine an optimal debt level for a firm. This model, as developed by Bradley et al. (1984), Leland (1994), and Goldstein et al. (2001), focuses on the trade-off between the benefits of debt financing that arise because the interest payments on the firm's debt are deductible under the corporate income tax, while dividends and capital gains are paid out of the corporation's after-tax income and these forms of income are often taxed at different rates than interest income. However, the potential tax advantage from higher debt financing may be offset by the increases in the probability that the firm will encounter financial distress and that it may be placed into bankruptcy. This will impose

costs that are assumed to be proportional to the size of the firm's debt. In the absence of non-debt tax shields, such as accumulated losses or unclaimed capital cost allowances, the firm's optimal debt level will be proportional to the B^* which satisfies the following equation:¹²

$$(1) \quad [(1 - t_p) - (1 - t_c)(1 - t_e)](1 - F(B^*)) = (1 - t_p)\theta B^* F(B^*)$$

where B is the coupon on a perpetual bond or consol, t_p is the personal income tax rate on interest income, t_c is the corporate income tax rate, t_e is the tax rate on equity income (capital gains and dividends), θ is the bankruptcy cost per dollar of debt that would be incurred in the event of bankruptcy, and $F(B^*)$ is the probability of bankruptcy with the optimal debt level. Since $(1 - F(B^*))$ is the probability that the firm will not be bankrupt, the left-hand side of (1) indicates the expected net gain if the firm issues another dollar of debt. The net increase in the investor's after-income is $(1 - t_p)$ times the interest income from an additional dollar of debt less the reduction in the after-tax equity income of a shareholder $(1 - t_c)(1 - t_e)$ that arises because the additional dollar of debt displaces a dollar of equity. At the optimal debt level, the expected net tax advantage from issuing an additional dollar of debt should be just equal to the expected increase in bankruptcy costs, which is given by the right-hand side of the equation, where it is assumed that bondholders are able to deduct the bankruptcy costs from their personal income tax liability. The model indicates that a firm will find it advantageous to have a positive amount of debt if the total tax rate on equity income, $t_c + t_e(1 - t_c)$ exceeds the personal tax rate on interest income, t_p . (Note that if corporate and personal income taxes were fully integrated such that the tax rate on equity income was $t_e = (t_p - t_c)/(1 - t_c)$, then there would be no tax advantage in debt financing.) The trade-off model predicts that the firm's optimal debt level will increase with an increase in t_e , and decrease when t_p or θ are higher.¹³ An increase in non-debt tax shields will also reduce the optimal debt level because they reduce the expected present value of interest deductions of the firm. Bradley et al. (1984) also showed that for reasonable parameter values an increase in risk will reduce the optimal debt level of the firm. The model suggests that there could be substantial variations in firms' optimal debt levels if they face different risk profiles (i.e., their $F(\cdot)$ functions differ) or if there are variations in the costs of bankruptcy across firms. Since it is likely that firms within a given industry face somewhat similar risks and bankruptcy costs, intra-industry variations in debt-equity ratios should be smaller than economy-wide variations in the ratios.

Given that bankruptcy costs are generally believed to be relatively low, computations of the optimal debt level using the trade-off model, based on U.S. tax rates in the 1980s, suggested that U.S. firms should have been more highly levered than they actually were. Partly for this reason, the search for an explanation for firms' capital structures shifted to the information assumptions embedded in the Modigliani and Miller proposition. In particular, Myers and Majluf (1984) adopted an asymmetric information framework to explain firms' capital financing decisions. In their model, which has become known as the pecking-order theory, the owners of the firm have better information about the quality of the firm's assets than outside potential investors. Firms with high-quality assets are reluctant to share the value of their assets with outside investors. Therefore, if possible, they will finance any investments from retained earnings. If the firm does not generate enough earnings to finance its investments from

12 See Bradley, Jarrell, and Kim (1984, p. 862) or Frank and Goyal (2007, p. 10).

13 Frank and Goyal (2007, p. 10).

retained earnings, then it will issue debt rather than equity. Issuing equity is interpreted by the market as indicating that the firm has only low quality assets (the “lemons” in Akerlof’s adverse selection model), and this will result in a reduction in the value of the firm’s shares. In the pecking-order model, firms only issue new equity if they have “exhausted” their ability to issue debt.

The agency model developed by Jensen and Meckling (1976) was also based on the assumption that asymmetric information drives a firm’s capital financing decisions, but it made different predictions about the use of debt.¹⁴ Jensen and Meckling assumed that the interests of managers and shareholders diverge, at least to some extent, in making investment decisions because some investment projects provide “perks” to managers. Shareholders have only a limited ability to monitor managers’ investment decisions. The efficiency loss from managers pursuing their own interests at the expense of shareholders increases with the “free cash” flow that managers have access to. Increasing the amount of debt reduces the firm’s free cash flow and the ability of managers to pursue projects that benefit them. Therefore, the agency model predicts that firms will use debt to reduce the freedom of action of managers, especially in situations where their actions cannot be readily monitored by shareholders.

All three models of capital structure may be capturing different aspects of the forces that determine a firm’s capital structure and for any particular firm the strengths of these different forces may vary leading to different capital structure and different responses to changes in the economic and fiscal environment.

In a comprehensive survey of the empirical literature on the capital structure of U.S. firms, Frank and Goyal (2007) have compared the explanatory powers of the trade-off model and pecking-order model and concluded that while some of the stylized facts about capital structure contradict the predictions of both theories, the contradictions for the pecking-order model are more serious. In their view, the trade-off model provides a better foundation for developing a comprehensive model of the capital structure.

The models of a firm’s capital structure that were described in the previous section were not developed with a multinational enterprise’s financing of FDI in mind. In discussing the optimal financing of FDI, the literature has focused on the gains from the deductibility of interest payments on debt because the potential gains from manipulating the location of its debt are potentially large for a multinational firm that operates in jurisdictions with widely differing tax rates. Furthermore, the pecking-order model and the agency model seem less relevant than a modified version of the trade-off model in dealing with the financing of FDI by multinational corporations. For example, in most cases foreign investment occurs through a wholly-owned subsidiary.¹⁵ Consequently, the use of equity or debt to finance investment does not reveal information about quality of the subsidiary’s prospects as predicted by the pecking-order model where it is assumed that the value of the firm’s shares are determined by the valuations of potential outside investors. Likewise, the agency model may be less relevant in the context of a multinational firm which operates through

14 A related capital structure model where debt is used to control the actions of managers in the event of a liquidity shock is described in Hart (2001).

15 Weichenrieder (forthcoming) reports that 70 percent of the foreign-owned subsidiaries in Germany are wholly-owned by a foreign parent.

wholly-owned foreign subsidiaries. The managers in the headquarters of the MNE likely have more information about the performance and decisions made by the local managers of its foreign subsidiaries than the shareholders of a widely-held firm in the Jensen and Meckling model. Furthermore, the local managers may be promoted to other positions within the MNE on the basis of good performance. Therefore, the MNE may be able to use other incentives to induce appropriate decisions by the managers of the foreign subsidiaries, and they do not have to rely on debt to avoid the free cash flow problems. While the problems of asymmetric information which are at the heart of the pecking-order model and the agency model are not completely irrelevant in the context of the internal decision making and performance of MNEs, they would seem to be less important in determining the financing of a foreign subsidiary. Hence the literature has tended to focus on the tax incentives that might motivate the debt versus equity financing decisions of FDI by a multinational enterprise.

In the simplest terms, the MNE has an incentive to finance its FDI with debt if the host country's CIT rate is higher than the home country's CIT rate because it will be able to deduct its interest payments at a higher rate if the foreign subsidiary borrows instead of the parent. However, the incentives to use debt financing also depend on the withholding tax rates imposed by the host country, on whether the home country uses a foreign tax credit regime or the exemption system, and whether it is feasible to use more complex financing instruments and structures that permit more than 100 percent of the firm's interest payments to be deducted against its taxable income at home and abroad.¹⁶ The following section illustrates how alternative financing arrangements affect the average and marginal effective tax rates on FDI.

16 See Graham (2001, Table 3) and Newberry and Dhaliwahi (2001, Appendix A) on the incentives to a U.S. MNE to use debt to finance foreign investment under the U.S. foreign tax credit regime and interest allocation rules. See also Altschuler and Mintz (1995).

4. The taxation of FDI under alternative financing arrangements

The OECD (2007) report used a methodology for calculating the effective tax rates on FDI under alternative methods of financing these investments to illustrate the issues that governments face in adopting policies with regard to inbound and outbound FDI.¹⁷ The OECD report calculated the average effective tax rate (AETR) on FDI projects under six alternative scenarios concerning the method used to finance the FDI. A key assumption in the OECD's computations is that the after-tax profit rate is the same for each method of financing the FDI. However, the AETR and the METR on the FDI projects investment vary as the financing system changes, and therefore the amount of capital invested in each project would vary. A lower METR means that more capital will be used in the project, implying a reduction in the after-tax profit rate. Consequently, the computations in the OECD report do not indicate how a given project would be affected by alternative financing arrangements because they assume that the after-tax rate of profit remains constant. The OECD's calculations should be interpreted as indicating how different projects, earning the same after-tax profit rate, would be affected by the method of financing adopted by the multinational enterprise.

We have modified the OECD's methodology to allow the after-tax rate of profit to vary with the METR and the scale of the investment. This allows us to compare the level of investment, the average effective tax rate, the marginal effective tax rate and other characteristics of a given FDI project under alternative financing assumptions. We have restricted our attention to the case where the home country has adopted the exemption system because many countries have adopted this system, and because it is often argued that the foreign tax credit systems, with deferral of home-country taxation until the foreign source income is repatriated, operate effectively as exemption systems.¹⁸

Figure 2 compares the AETRs under the OECD's assumption of a constant after-tax profit rate and our methodology where the same project is compared under each financing arrangement and the after-tax rate of profit varies. The parameters in our model were chosen so that they would generate the same AETR as in the OECD's Low Tax Host Country scenario.¹⁹ Figure 2 shows that our methodology produces results that are similar, but not identical, to the OECD's calculations. (Our AETRs are as much as three percentage points higher than the OECD's in some of the High Tax Host Country scenario calculations.) The general pattern of the AETRs is the same in both sets of calculations.

The primary purpose of these calculations is to illustrate how alternative financing arrangements can affect the average and marginal tax rates on an FDI project and therefore how financing arrangements could affect the location and the scale of the project.²⁰ For the remainder of

17 See also Clark (2007).

18 Furthermore, it is possible that the largest countries that utilize the foreign tax credit systems, Japan, the United States and the United Kingdom, may adopt the exemption systems in the future.

19 Matching the OECD's AETR resulted in a parameter value of 0.719 for α in the production function $x = AK^\alpha$ which implies that the elasticity of the demand for capital is -3.6, a relatively high value.

20 The AETR is generally thought to be one of the factors that affects the location of an FDI project and the METR affects the scale of the project given the location of the project.

this section, we will focus on our results which are described in greater detail in Table 2. A description of the alternative financing arrangements in the various cases is contained in Table 3, and the key parameter values used in the calculations are given in Table 4.

In Case H1, where the parent corporation uses retained earnings to finance the FDI in the foreign subsidiary through the injection of new equity, the AETR of 42.6 percent arises from the 40-percent CIT rate and the 5-percent dividend withholding tax rate imposed by the host country. (The AETR is less than 45 percent because the withholding tax on dividends is levied on the after-tax profit of the foreign subsidiary when the dividends are remitted to the parent.) The home country is assumed to levy a 30-percent corporate income tax, but as noted earlier, has adopted an exemption system for foreign source dividend income, and therefore it does not impose any tax on the dividend income generated by this project. Thus the average effective tax rate imposed by the host country's taxes, labeled "AETR_B," is the same as the overall average effective tax rate, "AETR". Case H1 will be treated as a "base case", and the other cases illustrate how alternative financing assumptions affect the AETR, the METR, and other fiscal characteristics of the project. Each of these alternatives is now briefly discussed, focusing first on the High Tax Host Country (HTHC) scenario.

In Case H2, the parent corporation again uses retained earnings to finance the investment in its foreign subsidiary. We have adopted that OECD's assumption that 35 percent of the investment is financed in the form of debt to the parent corporation and 65 percent is an injection of new equity. This gives rise to interest deductions under the host country's 40-percent corporate income tax. The interest payments on the debt are taxed by the home country, at a 30-percent rate, with a credit for the withholding tax on interest imposed by the host country. Table 2 shows that financing the foreign subsidiary through the related-party debt reduces the overall average effective tax rate on the project from 42.6 percent to 41.1 percent because the interest payments are deductible at the 40-percent host-country rate and only taxed at the lower 30-percent home-country rate. The METR on the investment also drops, from 42.2 percent to 39.4 percent, and the scale of the investment project increases by 8.0 percent compared to Case H1. The net present value of the project would increase by 4.7 percent of the Case H1 investment level, indicating that as long as the present value of the additional tax planning costs are less than 4.7 percent of the initial investment, the MNE would prefer to use related-party debt to finance its investment in the foreign subsidiary. Increasing the debt-equity ratio above the assumed $0.35/0.65 = 0.53$ rate would further increase the net present value of the project. The final column shows that the average excess burden per dollar of tax revenue, a measure of the efficiency cost of the tax systems, declines because of the decline in the marginal effective tax rate. (Note that this measure of the efficiency cost of raising tax revenues does not include the tax planning costs of the MNE or the tax administration costs of the two governments.)

In Case H3, the parent corporation borrows to finance the investment in the foreign subsidiary, which is funded through the purchase of new equity. The parent corporation's interest payments are deductible against other taxable income in the home country at the 30-percent CIT rate. Even though the foreign subsidiary's profits are fully taxed at the higher 40-percent rate in the host country and dividend payments are subject to withholding tax at a five-percent rate, the average effective tax rate of the project declines to 30.4 percent, compared to 42.6 percent in Case H1 where the parent used retained earnings instead of debt to finance the equity investment in its

foreign subsidiary. Furthermore, the METR declines by an even greater amount, from 42.2 percent to 17.3 percent, leading to a 71-percent increase in the scale of the project and an increase in the net present value of the project equal to 39 percent of the investment in Case H1. Host country tax revenues increase by 32 percent because of the increase in the scale of the investment, and the average excess burden declines to 3.6 cents per dollar of tax revenue because of the decline in the METR and the increase in the scale of the project which generates additional tax revenues. Note however that the higher tax revenue of the host country arises because of a tax subsidy by the home country. This is reflected in the fact that the $AETR_B$ is greater than the total average effective tax rate.

Case H4 combines features of Case H3, where the investment in the foreign subsidiary is financed through borrowing by the parent corporation, and Case H2, where the foreign subsidiary is funded through debt owed to the parent and a new equity injection, with a debt-equity ratio of 0.53. As a result of this financing and funding arrangement, the MNE is able to deduct 135 percent of the interest payments on the debt that is used to finance the project at a weighted average tax rate of $(100 \div 135) \times 30\% + (0.35 \div 1.35) \times 40\% = 32.6$ percent. As a result, the AETR drops to 27.9 percent compared to 30.4 percent when the foreign subsidiary was financed solely by equity in Case H3. The METR drops by an even greater percentage and the scale of the project increases by over 15 percent because of the reduced cost of capital. The lower METR is reflected in an increase in the host-country tax revenues and a lower overall average excess burden per dollar of tax revenue. Again, although the total tax revenues are raised at a relatively low cost per dollar of total tax revenue, the system is efficient only because the home country is effectively subsidizing the investment by the MNE.

In Case H5, the foreign subsidiary is financed with a hybrid security, one that is treated as an equity investment by the home country and as a debt instrument by the host country.²¹ Therefore, the foreign subsidiary's payments are deductible from corporate income tax in the host country, although subject to an interest withholding tax (at 5 percent in these calculations), but they are exempt from taxation by the home country because they are treated as dividend payments from the foreign subsidiary. As in the previous case, the parent corporation borrows to finance the investment in the foreign subsidiary. The tax burden imposed by the home country is substantially reduced compared to Case H4 because the "interest" component is only subject to the host country's withholding tax on interest, and it is not subject to the 30 percent home-country corporate income tax that would otherwise be imposed on interest payments received by the parent. As a result of this recharacterization of the financial payments, the average effective tax rate drops to 22.3 percent compared to 27.9 percent with an ordinary debt instrument. METR is now -0.024, indicating that the marginal investment is subsidized by the tax systems of the two countries.

Case H6 illustrates the effects of a classic double dip financing structure.²² The parent corporation borrows the funds in the home country and injects equity into a financing corporation which it has set up in a tax haven or a country that imposes a very low rate of tax

21 See Auerbach (2006), Lanthier and Mintz (2007), OECD (2007), and Klostermann (2007) on the use of hybrid securities for financing FDI.

22 For more detailed descriptions of how the double dip financing arrangement works, see Mintz (2004), Lanthier and Mintz (2007), and Slaats (2007).

on interest income. The financing corporation makes the investment in the foreign subsidiary in the host country. In these calculations (which mirror the OECD's calculations) 50 percent of the investment is in the form of debt to the financial corporation in the tax haven and 50 percent is equity. Therefore the MNE is able to deduct 150 percent of the interest payments on the debt that the MNE incurred to finance the project (100 percent in the home country and 50 percent in the host country). The dividend and interest payments from the foreign subsidiary to the financing corporation in the tax haven are subject to the five-percent dividend withholding taxes imposed by the host country. The income received by the financing corporation is either treated by the home country as a dividend payment, and therefore it is exempt from home-country taxation, or the income is retained in the financing corporation in the tax haven and used to finance other investment projects, effectively reducing the present value of any taxes imposed by the home country. As a result of this double dip financing arrangement, the AETR is 18 percent, less than half the average effective rate in Case H1, and the METR is -14.1 percent, indicating a substantial tax subsidy for the marginal investment in the project.²³ As a result of this marginal subsidy, the scale of the project would be over two and a half times as large as the base case investment and the net present value of the project would increase by 78.6 percent of the base investment. For large projects, it would be worthwhile incurring substantial tax planning costs (such as setting up and running a subsidiary in a tax haven) in order to achieve these tax advantages. Note that the average excess burden is low compared to the base case scenario, but this low efficiency cost is achieved because of the tax subsidy provided by the home country. From the perspective of the home country, it is an inefficient tax unless offset by some other advantages.

The Low Tax Host Country (LTHC) scenario shows how the level of taxation and the incentives to engage in alternative financing arrangements change when the host country's corporate income tax rate is 15 percent rather than 40 percent. In Case L1, retained earnings by the parent are used to finance an equity injection in the foreign subsidiary. The AETR is 19 percent, rather than 42.3 percent, because of the reduction in the host-country CIT rate from 40 to 15 percent. In Cases L2 and L4, the MNE does not have an incentive to use related-party debt to finance the foreign subsidiary, as it did in the HTHC scenario, because the corporate tax rate in the host country is now lower than the corporate tax rate in the home country, i.e., $(u_A - u_B) > (1 - u_B)(w_d - w_i)$ where w_d is the withholding tax rate on dividends and w_i is the withholding tax rate on interest payments. Therefore the average and marginal effective tax rates are identical in Cases L1 and L2 and in Cases L3 and L4 in the LTHC scenario because there is no incentive to put debt in the foreign subsidiary when the interest income is taxed at the home country's higher tax rate. The large reductions in the AETR in Cases L3 and L4, from 19 percent to 3.9 percent arise because of the interest deduction in the home country for the funds that are used to finance the investment. However, even though the host country levies a lower tax rate than the home country in the LTHC scenario, there is still an advantage in using a hybrid security (Case L5) or routing the investment through a financing corporation in a tax haven (Case L6). In the latter case, the AETR is negative, indicating a small net subsidy for the project and while the last dollar invested in the project receives a 29.2-percent subsidy. The

23 The difference between the average effective tax rates in H5 and H6 is due to different assumptions about the amount of debt used to finance the subsidiary. In keeping with the OECD Report's assumption, 35 percent of investment in the subsidiary is in the form of debt when it is financed by a hybrid security and 50 percent in the double dip structure. If the same amount of debt were used in the hybrid security and double dip scenarios, the AETRs and METRs would be identical.

increase in the net present value of the project with the double dip financing suggests that there could be substantial incentives to engage in this type of financial arrangement even when the host country imposes a low corporate income tax. In other words, the incentive to engage in double dip and other complex financial structures is reduced but not eliminated when the host country imposes a corporate income tax that is below international norms.

One implication of the above calculations is that the foreign subsidiary of an MNE may have a lower cost of capital than a domestic firm because of its financing arrangements. This may confer a competitive advantage to foreign-owned firms and capital import neutrality may be violated. The playing field in the host country's market may not be level, and foreign subsidiaries of MNEs may be able reap greater profits at the expense of domestic firms, and perhaps displace them altogether. However, in many cases there would be gains to domestic consumers from an increase in competition from foreign producers with lower costs due to a tax subsidy from the home country. In Section 6.2, we provide a cursory analysis of the welfare gains and losses from foreign governments' subsidies for their MNEs.

5. Empirical studies of the determinants of the financing structures of MNEs

The computational models used in the previous section are based on the neo-classical model of investment, and they abstract from a number of important considerations that may affect the incentives to use the capital structure or transfer pricing to maximize the MNE's after-tax profit. In this section, we review the empirical literature that has developed over the last 20 years on the determinant of the financial policies of MNEs, with particular attention on debt placement and profit-shifting.²⁴

A substantial body of empirical studies has shown that MNEs can shift taxable income through transfer pricing and debt placement strategies to take advantage of statutory tax rate differentials among countries and reduce their global tax liabilities. Table 5 contains a summary of the main results from some of the key studies in this area. Most of this literature deals with the behaviour of U.S.-based MNEs, but more recent studies have been based on data for German and European MNEs. The main conclusions from this body of research can be summarized as follows:

- Higher host country taxes lead to lower taxable incomes in the MNEs' foreign subsidiaries.²⁵
- Higher host country taxes lead to higher debt levels in the MNEs' foreign subsidiaries.²⁶
- Both internal (related-party) debt and external (third-party) debt of the foreign subsidiaries are responsive to tax differentials.²⁷
- The responsiveness of foreign subsidiary debt and profit to tax incentives is lower in partially-owned subsidiaries than in wholly-owned subsidiaries.²⁸ Higher host-country taxes discourage MNEs from forming joint ventures and encourage the establishment of majority-owned or wholly-owned subsidiaries.²⁹

24 For other surveys of the effects of taxation on FDI, see Hines (1999, 2007), de Mooij and Ederveen (2003), and OECD (2007, Chapter 2).

25 See Huizinga and Laeven (2008), Mills and Newberry (2004), and Weichenrieder (forthcoming).

26 See Altshuler and Grubert (2002), Altshuler and Mintz (1995), Buettner et al. (2006b), Buettner and Walmser (2007), Desai et al. (2004b), Jog and Tang (2001), Mills and Newberry (2004), Mintz and Weichenrieder (2005), Newberry (1998), Newberry and Dhaliwahi (2001), and Ramb and Weichenrieder (2005).

27 Desai et al. (2004b) find that external debt is more tax sensitive than internal debt for subsidiaries of U.S. MNEs, while Buettner et al. (2006b) find that they are equally responsive for subsidiaries of German MNEs. Mintz and Weichenrieder (2005) find that the subsidiaries of German MNEs adjust to higher host-country rates through inter-affiliate loans rather than third-party debt.

28 See Desai et al. (2004a), Buettner and Walmser (2007), Mintz and Weichenrieder (2005), and Weichenrieder (forthcoming).

29 See Desai and Hines (1999) and Desai et al. (2004a). These authors argue that joint ventures make it more difficult to transfer profits within the MNE in response to tax incentives because of potential conflicts with outside shareholders. This view is consistent with the evidence that wholly-owned foreign subsidiaries' debts and profits are more responsive to international tax differentials than partially-owned subsidiaries. When host-country tax rates are higher, the gains from using transfer pricing and debt placement to shift profits abroad are higher, and it becomes more advantageous to use wholly-owned foreign subsidiaries.

While there is now a substantial body of evidence that host-country taxes affect the tax bases of foreign subsidiaries of MNEs, the economic significance of these effects has yet to be fully appreciated. Here we will focus on the results of two of the studies that provide some insight in terms of the consequences of debt placement and transfer pricing by MNEs.

Jog and Tang (2001) examined the effects of tax changes in both the United States and Canada in the mid-1980s that increased the incentive for U.S. parents to increase debt to finance their Canadian subsidiaries. They found that the debt-to-asset ratios of U.S. controlled corporations operating in Canada increased substantially over the period and their tax-to-asset ratios declined.³⁰ Their econometric evidence indicated that these trends were consistent with the changes in the relative CIT rates that occurred in the 1980s when Canada went from being a relatively low tax country to a high tax country vis-à-vis the United States. They found that a one percentage point increase in the Canadian CIT rate increased the debt of the U.S. foreign-controlled corporations by 1.06 percent. The increase in the debt-to-asset ratio of the U.S. subsidiaries between 1984 and 1994 was estimated to have reduced the taxes paid by all U.S. subsidiaries by at least \$1.3 billion. Jog and Tang also found that debt levels of Canadian-controlled corporations increased with the Canadian tax rate. A one percentage point increase in the Canadian tax rate increased the debt of Canadian-controlled corporations by 1.55 percent.³¹

How important is the shrinkage of the Canadian corporate income tax base when the Canadian tax rate increases because Canadian and foreign-controlled corporations increase their debt levels in response to the tax incentive offered by the higher deduction rate for interest expenses? One way of calculating the importance of this effect is to calculate the marginal cost of public funds for the corporate income tax when higher taxes induce firms to take on higher debt levels. A detailed description of the calculation of this MCF is contained in Appendix A to this paper. If all of the CIT burden is borne by Canadians and the increase in debt is the only effect of a CIT rate increase on the Canadian tax base, then the MCF for the CIT was 1.006 based on the 1994 tax rate and other parameter values in the Jog and Tang study. Since the MCF is equal to one if the tax base does not change when the tax rate increases, we can infer that the debt distortion contributes only a small amount to the overall distortion caused by an increase in the CIT rate. In other words, the distortion in the average debt levels of corporations caused by an increase in the CIT does not impose a substantial cost on the economy.

It should be stressed that this measure of the MCF for the CIT does not include any reduction in the profit-maximizing capital stock because of an increase in cost of capital, the adjustment that was the focus of the analysis in Section 2. If the level of investment also declines when the CIT rate increases, then the MCF for the CIT would be much higher. Note, however, that the increase in the debt-to-asset ratios would tend to moderate the increase in the cost of capital that would otherwise occur. In this way, the debt adjustment makes the level of real investment less sensitive to the statutory tax rate, a point made by Hong and Smart (2007). Further analysis should be undertaken to confirm these results, but they suggest that the responsiveness of debt to corporate tax rate increases by Canadian and foreign firms does not significantly raise the cost of raising revenue through a corporate income tax.

30 See Figure 3. Note, however, that at the end of the study period in 1994, the debt-to-asset ratios of the Canadian-controlled corporations were still higher than those of the U.S.-controlled foreign subsidiaries and the tax-to-asset ratios were about the same.

31 Calculation based on the Jog and Tang (2001) regression results (iii) in Table 5, page 18 and the data on debt-to-asset ratios in Table 4a, page 13.

A recent study by Huizinga and Laeven (2008) has examined the degree of corporate tax base shifting in Europe in response to tax rate differentials among the countries. Their theoretical model predicts that the amount of taxable income shifted into country j is proportional to the “true” level of profits earned in country j (because it is less costly to conceal additional profits in a highly profitable subsidiary), decreasing in the statutory tax rate of country j , decreasing in the marginal cost of shifting profits through transfer pricing and debt placement, and directly related to a weighted average of the differentials between the other countries’ statutory tax rates and country j ’s statutory tax rate. The weights on the tax rate differentials are increasing in the other countries’ true taxable incomes. Thus the sensitivity of a country’s corporate tax base depends on its tax rates relative to the tax rates in all other European countries in which its MNEs operate, and it also depends on the level of capital and investment in that country compared to other countries. Overall, they found that a one percentage point increase in a country’s top statutory CIT rate reduced the reported taxable income of its MNE-linked firms by an average of 1.3 percent. However, there were substantial variations in the tax sensitivity of the tax bases, with the semi-elasticity of the tax base with respect to the country’s CIT rate ranging from 0.28 for Germany to 2.92 for the Netherlands. The cost of profit-shifting was estimated to be 0.6 percent of the tax base.

Huizinga and Laeven’s analysis indicated in 1999 there was substantial profit shifting in Europe at Germany’s expense because it had the highest tax rate, at 53.76 percent, compared to the European average of 34.44. Approximately 13.6 percent of its “true” taxable income was shifted from Germany. Italy, Portugal, and the Slovak Republic also suffered outward profit shifting. Hungary and the Czech Republic had profits shifted to them equal to 22.4 and 26.3 percent of their true profits respectively (see Figure 4). While Hungary, with a tax rate of 18 percent in 1999, was an obvious target for tax base shifting, the high degree of shifting to the Czech Republic indicates that a country can benefit from tax shifting even if its tax rates are close to the average if the firms operating in its territories are linked with firms in higher taxed countries (such as Germany), and if large “real” profits are generated from extensive business linkages with the high tax countries.

The computations from the Huizinga and Laeven model also indicate that the tax rates in three countries — the Netherlands, Belgium, and Portugal — are “too high” in the sense that a lower tax rate would have increased the amount of tax revenue that they collected from the MNEs operating in their territories. Of course, lowering their tax rates might also involve a loss of tax revenues from purely domestic firms and the goal of tax policy should not be the maximization of corporate tax revenues. Still, it is interesting to note that the three countries that were on the “wrong” side of the MNE Laffer curve had tax rates that were close to the European average in 1999. Germany, with the highest tax rate, was still on the upward sloping part of its Laffer curve for MNE revenue. The important point is that countries can be on the wrong side of the Laffer curve at average tax rates. It is the responsiveness of its base to a tax rate increase that determines the “optimal tax rate” for a country and the responsiveness of the CIT base due to transfer pricing and debt placement can vary substantially across countries. This means, for example, that the appropriate CIT rate for Canada may be quite different from that for other countries, given the “thick” linkages that our firms have with U.S. MNEs.

6. Thin capitalization regulations

The potentially large losses of tax revenue from foreign-owned firms through high levels of related-party or inter-affiliate debt have induced many countries to adopt thin capitalization rules “in order to protect the domestic tax base.” This policy measure has a long history in Canada. The issue of thin capitalization was raised by the 1966 Canadian Royal Commission on Taxation (the Carter Report) and in the 1969 white paper “Proposal for Tax Reform” which noted that, “it is a natural thing for corporations to borrow, and not unnatural for them to borrow from their shareholders, but the difference in tax rates has tempted some to create corporations with very nominal share capital (say \$3) and to make virtually all of their investment as an interest-bearing loan.”³² In 1972, Canada became one of the first countries to implement a thin capitalization rule. The regulations disallowed the deductibility of interest on the debt of a corporation to “specified non-resident shareholders” if their debt-equity ratio exceeded 3 to 1. A specified non-resident shareholder is a non-resident person or corporation that owns at least 25 percent of the voting shares in the corporation. If the debt to the specified non-resident shareholder exceeds his equity by the threshold ratio, the interest payments on the excess debt are not deductible under the income tax. The Report of the Technical Committee on Business Taxation (the Mintz Committee Report) recommended in 1998 that the threshold debt-equity ratio be reduced to 2 to 1 because this threshold would better approximate arm’s-length financing. The threshold debt-equity ratio of 2 to 1 was adopted by the Canadian government in 2000. For further discussion of the legal and accounting issues raised by the Canadian thin capitalization regulations, see Edgar (1992, 2008), Williamson and Garland (1996), Richardson (2000), and Nitikman (2000).

About three-quarters of the OECD countries have now adopted some form of thin capitalization regulation.³³ Dourada and de la Feria (2008) provide a detailed description of the thin capitalization regulations of the EU members, and their summary of thin capitalization regulations in Europe is contained in Table 6. There has been a recent flurry of changes to the thin capitalization regulations in Europe because the European Court of Justice ruled in 2002 in *Lankhorst-Hohorst* that thin capitalization rules that were applied to inbound investment from other EU countries contravened the freedom of establishment provisions in the EC Treaty. To meet the court ruling, some member countries have extended thin capitalization regulations to residents (e.g., Germany, Denmark, and Italy³⁴), while some have excluded EU residents from their provisions (e.g., Spain and Portugal).³⁵

In spite of its lengthy history and the recent interest generated by the EU court’s decision, there has been very little theoretical, empirical, or policy analysis by economists of the effect of thin capitalization regulations. In the following sections, we review the existing literature and provide some analysis of the potential effects of thin capitalization regulations.

32 Quoted in Edgar (1992, p. 11).

33 See Buettner et al (2006a). See Richardson et al. (1998) for a description of the approaches to thin capitalization adopted by Australia, Canada, New Zealand, and the United States.

34 In Italy the thin capitalization regulation applies to resident or non-resident shareholders who own at least 25 percent of the share capital of the borrowing firm. Interest on loans obtained or guaranteed by these shareholders is not deductible when the ratio of debt to equity exceeds 4 to 1. See Polacca (2004).

35 Dourada and de la Feria (2008, pp. 6-7).

6.1 Empirical studies of thin capitalization regulations

We begin by looking at two empirical studies. Buettner et al. (2006a) analyzed the effects of thin capitalization regulations on the capital structures of the subsidiaries of German MNEs in 26 countries. They modeled the effect of the thin capitalization regulation as a dummy variable in regressions on the debt and capital of the German affiliates. They found that a thin capitalization regulation reduced the affiliate's debt-to-asset ratio by about five percentage points. The negative effect of a thin capitalization regulation was larger the higher the host country's tax rate, and investment in foreign subsidiaries was more tax sensitive if debt financing is restricted by thin capitalization regulations.

Farrar and Mawani (2008) examined the effects of the 2001 change in the thin capitalization regulation based on data on the leverage of large Canadian corporations over the period 1996-2005. Using a narrow definition of leverage, they found that the average debt-equity ratio for all industries was 1.059 and that only the real estate industry had an average debt-equity ratio in excess of the 2 to 1 threshold. They found that after 2000 the debt-equity ratios were reduced in seven of nine industries, the exceptions being the insurance industry and the real estate industry where the average debt-equity ratio increased from 2.278 to 1 to 3.384 to 1. Farrar and Mawani (2008, p. 25) concluded that "firms did alter their leverage ratios in response to changes in thin capitalization legislation." However, it is very difficult to interpret the Farrar and Mawani results as indicating the effects of the lower threshold on leverage because these regulations only applied to firms with specified non-resident investors and only to the debt held by such investors. Their model did not identify firms that would potentially be affected by the change in the threshold because of their ownership structure, and therefore it is unclear what inferences about the effects of the reduction in the thin capitalization threshold can be drawn from their study.

6.2 The welfare effects of thin capitalization regulations in oligopolistic markets

The calculations in Table 2 imply that a foreign subsidiary of an MNE may have a lower cost capital than a domestically-owned firm in the host country's market. As a result of this cost advantage, foreign-owned firms may be able to earn higher profits at the expense of domestic firms. Under certain conditions, the gain from this "profit-shifting" may exceed the tax subsidy provided by an MNE's home government, and this may explain why the home government provides tax subsidies for its MNEs' outbound FDI. See Brander and Spencer (1985), Eaton and Grossman (1986), and Janeba (1996) on a country's potential welfare gains from subsidizing its MNEs' exports, allowing them to increase their market shares and profits in oligopolistic markets.

Thin capitalization regulation is often justified as a way of "protecting the host country's tax base" and "leveling the playing field" between domestic and foreign-owned firms. The question that we now address is whether it would be in a host country's interest to reduce the cost advantage of a foreign-owned subsidiary, which competes with domestic firms in the host country's market, by imposing a thin capitalization regulation. There has been, to our knowledge,

no comprehensive analysis of the welfare effects of thin capitalization regulations.³⁶ Here we will only provide some preliminary discussion of the implications of thin capitalization regulation when it affects the costs of foreign-owned firms in an oligopolistic domestic market. Our simple model indicates that “protecting the revenue base” and “leveling the playing field” through a thin capitalization regulation may come at high social cost because it will reduce competition and lead to higher prices for the host country’s consumers. Numerical simulations using a simple Cournot duopoly model suggest that the marginal cost of public funds obtained from thin capitalization regulation may be very high when a foreign-owned firm competes with a domestically-owned firm in the host country’s market.

We use a simple Cournot duopoly model to illustrate the potential adverse effects of thin capitalization regulations. A foreign-owned firm and a domestically-owned firm produce an identical product which is purchased by domestic consumers. The host country levies a corporate income tax on both the domestic and foreign-owned firms at the same statutory rate and allows full deductibility of interest payments on debt. The foreign-owned firm has a lower cost of capital than the domestic firm, perhaps because it can utilize a double dip financing structure, and it has a higher debt-equity ratio.

If the firms are otherwise identical, the foreign-owned firm will have a lower marginal cost of production, will produce a higher level of output, and earn larger profits than the domestic firm. This is illustrated in Figure 5 where Q_d^0 and Q_f^0 are the reaction functions for the domestic and foreign-owned firms in the absence of a thin capitalization regulation. As a result of its cost advantage, the output of the foreign-owned firm, x_f^0 , exceeds the output of the domestically-owned firm, x_d^0 . If the host country adopts a binding thin capitalization regulation, the foreign-owned firm’s debt-equity ratio will decline, and its cost of capital will increase. This will shift the reaction function of the foreign-owned firm down to Q_f^1 , and in the new equilibrium, x_f will decline while x_d will increase. Total output will decline because the reduction in x_f will exceed the increase in x_d .³⁷ The decline in total output implies that the price of the product will increase. The thin capitalization regulation will therefore have the following impacts on the host country’s residents:

- domestic consumers will be worse off because the price of the product will increase;
- the owners of the domestic firm will be better off because the after-tax profits of the domestic firm will increase as a result of the increase in price and its increased output;

36 One recent contribution to the theoretical literature on thin capitalization is Haufler and Runkel (2008) who examine the role of thin capitalization regulations in a model in which countries compete for mobile capital by setting their statutory tax rate and a thin capitalization rule. Competition leads to low tax rates and lax thin capitalization rules, while a coordinated tightening of a thin capitalization rule benefits some countries while harming others. Their model does not incorporate the distortion caused by imperfect competition in the host country’s market that is central to simple model presented in this section. See also the literature on differential tax rates on mobile and immobile capital referenced in footnote 11.

37 This follows from the stability condition that the Q_d curve has to be steeper than the Q_f curve and the increase in the foreign-owned firm’s costs means that it will produce less output for any given output by the domestic firm, i.e., Q_f will shift down.

- the taxpayers of the host country may be better off or worse off. On the one hand, the tax revenues of the host country will increase because the foreign-owned firm's interest deductions will decline, and the taxable profits of the domestic firm will increase. Offsetting this is the decline in tax revenues from the foreign-owned firm as a result of the reduction in its profit. In general, tightening a thin capitalization regulation has an ambiguous effect on the total tax revenues of the host country.

Evaluation of the welfare consequences of the thin capitalization regulation will then depend on the distributional weights that are applied to the gains by the owners of the domestic firms and the losses sustained by domestic consumers, and on the marginal cost of public funds of the host country's government.

If domestic consumers and the owners of domestic firms have the same distributional weight in the evaluation of the policy and if the host government's MCF is equal to one, then a thin capitalization regulation would tend to reduce total social welfare because the loss sustained by domestic consumers will exceed the gains by the owners of the domestic firms and any increase in tax revenues. In an oligopolistic market, price exceeds the marginal cost of production, and too little output is produced. If the host government's MCF is one, the optimal tax policy would be to subsidize the production of the product. The thin capitalization regulation would reduce the subsidy pushing the equilibrium further from the optimal allocation of resources where price equals marginal cost.

Using a thin capitalization regulation to "protect the host country's revenue base" only makes sense if the host country's marginal cost of public funds is greater than one, which is almost always the case because of their reliance on distortionary taxation. The social gain to the host country from the additional tax revenues must be sufficiently large to justify the net harm inflicted on domestic residents by the price increase.

With this perspective in mind, one approach to evaluating a thin capitalization regulation is to consider the marginal cost of public funds obtained from a marginal increase in a thin capitalization regulation, i.e., what is the additional social harm caused by a tightening of the thin capitalization regulation which generates an additional dollar of revenue. The MCF for the thin capitalization regulation is defined in the following equation:

$$(2) \quad \text{MCF}_{\text{TC}} = - \frac{\Delta\Pi_d + \Delta\text{CS}_d}{\Delta R_d}$$

where $\Delta\Pi_d$ is the change in profits earned by the domestic firm which is positive, ΔCS_d is the change in domestic consumers' surplus which is negative, and ΔR_d is the increase in the host country's tax revenues when it tightens its thin capitalization regulation. This formulation of the MCF assumes that the increase in the profits and the decline in consumers' surplus have the same distributional weight in evaluating the social cost of a thin capitalization increase. If MCF_{TC} is higher than the MCF for the host government's other sources of tax revenue, then the thin capitalization regulation should be relaxed. If MCF_{TC} is lower than the MCF for the host government's other tax sources, then the thin capitalization regulation should be tightened.

We do not know of any attempt to measure MCF_{TC} but some insights may be gleaned from computations based on a simple Cournot duopoly model. Both firms are assumed to use a Cobb-Douglas production function and capital costs are one-third of total costs. The domestic firm's debt-to-capital ratio is assumed to be 0.50, and its cost of capital is 0.193. The foreign-owned firm's debt-to-asset ratio is constrained by a thin capitalization regulation and equal to 0.667 in the initial situation. Its cost of capital is assumed to be 0.122, reflecting a double dip financing arrangement. The host country's corporate income tax rate is 30 percent. The market demand curve is assumed to be linear and the demand parameter is varied so that a particular elasticity of demand is reflected in the initial situation. After calculating the initial equilibrium based on these parameter values, the thin capitalization regulation was tightened by one percentage point, reducing the foreign-owned firm's debt-to-asset ratio to 0.657 and raising its cost of capital to 0.124. The resulting changes in the profits of the domestic firm, consumers' surplus, and the host country's tax revenues were calculated and used to generate values for the MCF for the thin capitalization regulation shown in Figure 6. This simple model indicates that when the elasticity of demand is -0.75, MCF_{TC} is 1.362 and if the market demand is elastic, MCF_{TC} exceeds 1.60. If the demand for the product is highly elastic, tightening the thin capitalization regulation would reduce the host government's total revenues because the decline in tax revenues from the foreign-owned firm would more than offset the increase in tax revenues from the domestically-owned firm, and MCF_{TC} would be infinite. In our numerical example, this occurs when the elasticity of demand is just over -4.75. Although one should not read too much into the precise values in these calculations, they suggest that a thin capitalization regulation may be a relatively high cost source of tax revenues if the domestic demand for products in oligopolistic markets is price elastic.

6.3 Thin capitalization policy proposals

With regard to thin capitalization policy in Canada, Williamson and Garland (1996, p. 2), in a background study prepared for the Mintz Committee, recommended that "...thin capitalization provisions be amended so that the test of whether a corporation is thinly capitalized is based on the debt-to-equity level of the debtor company as a whole, rather than including only the debt and equity of specified non-resident investors." Although it is not made explicit in this quotation from their paper, it seems clear that Williamson and Garland were advocating a general thin capitalization regulation for firms with significant foreign ownership, and not for all Canadian corporations. Their reasoning for extending the thin capitalization threshold to all debt held by foreign-owned, but not domestically-owned firms, is contained in the following passage:

Financing a company through debt would not be a concern if the ultimate financing was provided by a taxable person resident in the same jurisdiction as the borrower. While the borrower is allowed a deduction for interest expense, the ultimate lender is taxed on interest income. Therefore, if the interest is ultimately subject to income tax in the same jurisdiction as the borrower, the government would generally be indifferent as to the level of interest expense sustained by the borrower. While in this situation the borrower's taxable income is reduced, the government still manages to collect tax by taxing the lender. This balance, however, breaks down when the lender is in a foreign jurisdiction (or is a tax-exempt entity).³⁸

³⁸ Williams and Garland (1996, p. 15).

There are two problems with Williamson and Garland's reasoning in this passage. First, even in a completely closed economy (with no foreign borrowing or investment), additional borrowing by a corporation would affect the government's tax revenues to the extent that the tax rate on interest income is less from the tax rate on equity income. In other words, as noted in Section 3, the firm will have an incentive to borrow and the government revenues will decline with the amount of debt issued if $t_p < t_c + (1 - t_c)t_e$.

However, a second and more serious problem with Williamson and Garland's proposition occurs in the context of a small open economy, which is probably the appropriate framework for Canada. Residents will hold debt and equity in domestic and foreign firms, earning the rates of returns on these assets as determined in world capital markets. If a domestic firm borrows additional funds from residents, it will displace domestic borrowing by some other firms, and the additional funds will be supplied by foreign lenders. The interest deduction by the domestic borrower will go up but the additional tax on the interest income will be the withholding tax on the additional interest that is paid to the foreign lenders, which is generally levied at a low rate. Thus additional domestic borrowing will reduce the governments' tax revenue, contrary to the assertion made by Williams and Garland.

Another proposal to extend the thin capitalization provisions has recently been made by Lanthier and Mintz (2007, p. 652) who recommended the adoption of:

a comprehensive domestic thin capitalization rule, which would apply to all indebtedness of a Canadian corporate group, both arm's-length and non-arm's-length, and would deny interest expense (and other financial costs) to the extent that total indebtedness of the group exceeds a specified threshold — for example, 75 percent of the amount or value of the group's investment in net Canadian domestic assets, computed before net debt or equity of the group.

Instead of a thin capitalization regulation restricted to related-party debt, Lanthier and Mintz have proposed a general thin capitalization rule that would apply to all debt and equity in all Canadian corporations. Their objective in proposing a general thin capitalization regulation is to address the problem of debt financing of outbound investment by Canadian corporations. Such a proposal, with perhaps an exemption for firms with assets below some level, would affect Canadian firms without foreign affiliates. Farrar and Mawani's analysis suggests that most firms would not be constrained by the 3 to 1 debt-equity ratio proposed by Lanthier and Mintz, except perhaps those in the real estate and financial industries. However, even in industries where the average debt-equity ratio is below this threshold there would still be some firms that would be affected by this extension of the thin capitalization regulation.

Furthermore, an analysis of leverage of Canadian firms by Baggs and Brander (2006), which used a different data set (T2-Leap) for a different period (1984-1997) than Farrar and Mawani, found substantially higher debt-equity ratios. In the Baggs and Brander (2006, Table 1, p. 200) study, the median debt-to-asset ratio was 0.65, which implies a debt-equity ratio of close to two. Therefore, 50 percent of the firms would have debt-equity ratios in excess of a 2 to 1 thin capitalization ratio in the Baggs and Brander study and 25 percent of the firms in their study had debt-equity ratios in excess of 7.3. The differences in the measured debt-equity ratios in

the Farrar and Marawani and the Baggs and Brander studies are very large and the differences may be due to the use of different data sets (Compustat versus T2-Leap) or different definitions of debt and equity used in the two studies. Obviously more research is required before the full consequences of extending the thin capitalization regulations to all debt by all domestic corporations can be assessed.

To gain some better understanding of the effects of thin capitalization regulations applied to related-party and third-party debt, we have used the methodology developed in Section 4 to calculate the effects of thin capitalization regulations on the AETR and METR of an MNE. We have used the same framework for computing AETRs and METRs as in Table 2, but now we focus on a situation where the host country imposes a 30-percent corporate income tax. In the first scenario shown in Table 7, the home country imposes a high CIT rate of 40 percent. We assume that the foreign subsidiary is financed through a double dip arrangement because of the demonstrated tax advantages of this type of arrangement and because Slaats (2007, p. 691) contends that “many, if not most, foreign-based multinationals use double-dip structures to invest in Canada and other countries.” We also assume that the MNE would use a related-party debt, with a 4 to 1 debt-equity ratio, to finance its subsidiary in the host country in the absence of a thin capitalization rule. Case I indicates that the AETR on the investment would be negative, i.e., the project would reduce the total taxes paid by the multinational, although the host country would collect positive tax revenue with an average effective tax rate of 18.3 percent. Case II shows the implications of a thin capitalization rule, with a 2 to 1 related-party debt-equity ratio, imposed by the host country. Under these conditions, the MNE would reduce the related-party debt to the binding constraint imposed by the thin capitalization rule, and it would replace related-party debt with equity financing. As a result of these changes, the average effective tax rate imposed by the host country would increase from 18.3 percent to 21.4 percent, because of the reduction in interest deductions. The METR would increase, but it would still represent a substantial subsidy for the marginal investment in the project. The scale of the investment would decline by about 7.6 percent and the net present value of the project would decline by about 3.65 percent of the initial investment level. In other words, if the host country imposed the thin capitalization regulation, it would reduce its attractiveness as a location for the investment, but by only a relatively modest amount compared to the scale of the investment. Its average effective tax rate would increase, although the scale of the investment would decline.

It should be noted that in Case II, the thin capitalization regulation, restricting related-party debt, would not create an incentive to replace the related-party debt with third-party debt because the home-country tax rate, at 40 percent, is higher than the host-country tax rate, 30 percent. This type of substitution can occur if the home country is a low tax country, and this is demonstrated in Cases III and IV. Now the home country is assumed to levy a 10-percent corporate income tax, while the host country continues to levy a 30-percent corporate income tax rate. In the absence of a thin capitalization regulation, the MNE is assumed to use a double dip financial structure with a 4 to 1 related-party debt flowing through a tax haven. The AETR is now 17.9 percent because of the reduction in the effective home-country subsidy through the deductibility of the interest used to finance the project from the home country's tax base. The METR would be close to zero and the AETR for the host country would be higher, because of the reduction in the scale of the project.

Case IV shows the effect of a binding 2 to 1 related-party debt-equity thin capitalization rule. Related-party debt would be reduced but instead of replacing it with equity as in Case II, the MNE would replace it with third-party debt. In other words, the total debt-equity ratio would be unchanged by the thin capitalization rule on related-party debt. The total average effective tax rate would increase but the host country's average tax rate would be virtually unchanged. The METR for the project would increase, the scale of the project would decline and the net present value of the project would decline. In other words, the thin capitalization regulation on related-party debt would have very little effect on the revenues received by the host country if the MNE's home country is a low tax country because the regulation would not change the incentive to finance the project with debt placed in the foreign subsidiary. The thin capitalization regulations would however reduce the scale of the investment project and make the host country a slightly less attractive location for FDI.

Now we will examine how a general thin capitalization regulation would affect inbound FDI. Case V shows that under a general thin capitalization regulation, with a binding 2 to 1 debt-equity ratio, the MNE would use related-party debt to finance the project up to the binding constraint and would not use third-party debt. Average effective tax rates would be higher than in Case IV, while the scale of the project and its net payoff would be only slightly lower. These calculations illustrate the difference between thin capitalization regulations that only apply to related-party debt, such as those imposed by Canada, and those general thin capitalization rules that apply to the overall debt-equity ratio. These calculations suggest that in dealing with FDI from a low tax home country, the general thin capitalization rule may be a more effective way to "protect" the tax base.

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Appendix A — The MCF arising from the debt distortion

This simple model uses the marginal cost of public funds (MCF) concept to gauge the importance of the distortion in the debt-to-asset ratio caused by a CIT rate increase. See Dahlby (2008) on the theory and measurement of the MCF. These calculations are not meant to indicate the “true” MCF for the CIT, which is likely to be much higher, but to illustrate the economic importance of the distortion in the debt-to-asset ratios based on Jog and Tang’s (2001) results concerning the responsiveness of debt to tax rates in Canada.

The basic idea behind the MCF calculation is that if there is only one tax base, B , and it is taxed at the rate t , then the MCF from taxing this base is:

$$\text{MCF} = \frac{B}{B + t \frac{dB}{dt}} = \frac{1}{1 + t \frac{d \ln B}{dt}}$$

where the semi-elasticity, $d \ln B / dt < 0$, indicates the tax sensitivity of the tax base. In the case we are considering, let $B = R - iD$, where R are the earnings of the corporate sector before interest and taxes and i is the interest rate on corporate debt, D . Assuming no change in R as t increases, $d \ln B / dt = -(iD/B) d \ln D / dt$. Therefore the MCF can be written as:

$$\text{MCF} = \frac{1}{1 - t \frac{iD}{B} \frac{d \ln D}{dt}}$$

Jog and Tang’s results indicate that the debt responsiveness of Canadian and U.S. firms is significantly different, and therefore it is advisable to disaggregate the denominator. Thus the MCF formula has the following form:

$$\text{MCF} = \frac{1}{1 - t \frac{iD_{US}}{B} \frac{d \ln D_{US}}{dt} - t \frac{iD_{Cdn}}{B} \frac{d \ln D_{Cdn}}{dt}}$$

where t is the Canadian CIT rate, i is the interest rate on corporate debt, D_j is the debt of firms owned by the residents of country j , where $j = \text{US or Cdn}$. The semi-logs of the debt levels were calculated as follows from the coefficient estimates in equation (iii) in Table 5 of Jog and Tang (2001) and their calculation of $d \ln(D_{US}/A_{US})/dt$ on page 19:

$$\frac{d \ln D_{US}}{dt} = \frac{0.002689 \cdot A_{US}}{D_{US}} = 0.0106$$

$$\frac{d \ln D_{Cdn}}{dt} = \frac{0.005237 \cdot A_{Cdn}}{D_{Cdn}} = 0.0155$$

where $A_{US} = 55.83$ is the level of assets of U.S. firms and $A_{Cdn} = 120.53$ is the assets of Canadian firms in 1994. See Jog and Tang (2001, Tables 4a and 4b). The other parameter values also taken from these tables are: $D_{US} = 14.14$, $D_{Cdn} = 40.66$, and $B = 6.87$.

The tax rate was set at $t = 0.42$, the rate that Jog and Tang used in their study for 1994. The interest rate on debt, i , was set equal to 0.10, the value that Jog and Tang used for their calculations.

On the basis of these parameters, the MCF is 1.006. Since the MCF is equal to one if the tax base does not change when the tax rate increases, the model suggests that the tax induced debt increase contributes only a small amount to the overall distortion caused by an increase in the CIT rate.

Table 1
Optimal Host-Country CIT Rates under Alternative International Taxation Regimes

		Case 1		Case 2		Case 3	
		The share of pure profit in total output					
		0.025		0.015		0.050	
		Distributional weights applied to economic profits					
		$\beta = 0$	$\beta = 1$	$\beta = 0$	$\beta = 1$	$\beta = 0$	$\beta = 1$
Foreign Tax Credit System	Optimal Statutory Tax Rate	0.436	0.400	0.400	0.400	0.593	0.400
	METR	0.215	0.190	0.190	0.190	0.340	0.190
Exemption System	Optimal Statutory Tax Rate	0.436	0.050	0.336	0.029	0.593	0.111
	METR	0.215	0.018	0.151	0.010	0.340	0.042
Deduction System	Optimal Statutory Tax Rate	0.377	0.035	0.277	0.020	0.545	0.080
	METR	0.211	0.016	0.144	0.009	0.346	0.037

Note: The home country tax rate is 0.40. The labour supply elasticity is assumed to be 0.10. Labour's share of total output is 0.85.

Source: Adapted from Dahlby (2008, Table 7.4, p. 198).

Table 2
Implications of Alternative Financing Structures of FDI

Case	Average effective tax rate	Average effective tax rate by host country	Marginal effective tax rate	Relative levels of total investment	Change in the net present value of the project	Relative host country tax revenues	Average excess burden per dollar of total tax revenue
	AETR	AETR _B	METR	$\frac{K_i}{K_1}$	$\frac{NPV_i - NPV_1}{K_1}$	$\frac{R_i}{R_1}$	AEB
High tax host country scenario, $u_B = 0.40$							
H1: Equity Financing	0.426	0.426	0.422	1.00	0.000	1.00	0.264
H2: Debt and Equity Financing	0.411	0.377	0.394	1.08	0.047	0.92	0.223
H3: Parent Debt Financing	0.304	0.426	0.173	1.71	0.390	1.32	0.036
H4: Double Debt Financing	0.279	0.362	0.115	1.87	0.472	1.17	0.016
H5: Hybrid Security	0.223	0.363	-0.024	2.23	0.650	1.28	0.001
H6: Double Dip	0.180	0.330	-0.141	2.52	0.786	1.23	0.025
Low tax host country scenario, $u_B = 0.15$							
L1: Equity Financing	0.190	0.190	0.188	1.00	0.000	1.00	0.070
L2: Debt and Equity Financing	0.190	0.190	0.188	1.00	0.000	1.00	0.070
L3: Parent Debt Financing	0.039	0.191	-0.160	1.54	0.372	1.22	0.142
L4: Double Debt Financing	0.039	0.191	-0.160	1.54	0.372	1.22	0.142
L5: Hybrid Security	0.006	0.164	-0.250	1.67	0.452	1.09	2.08
L6: Double Dip	-0.009	0.152	-0.292	1.72	0.489	1.02	n.a.

Note: The home country uses the exemption system for foreign source dividend income and imposes a corporate income tax rate of $u_A = 0.30$.

Table 3
Description of Alternative Financing Structures of a Foreign Subsidiary

Case Number	Title	Description
1	Equity Financing	Retained earnings (RE) used by the parent corporation to purchase new equity (NE) in the foreign subsidiary (FS)
2	HTHC Debt Financing	RE used to purchase NE and debt securities (DS) of the FS in the high tax host country (HTHC) scenario; NE only in the low tax host country (LTHC) scenario
3	Parent Debt Financing	Third-party debt of the parent used to purchase NE of the FS
4	HTHC Double Debt Financing	Third-party debt of the parent used to purchase NE and DS of the FS in the HTHC scenario; NE only in the LTHC scenario
5	Debt Financing with Hybrid Security	Third-party debt of the parent used to purchase NE and hybrid security of the FS
6	Double Dip	Third-party debt of the parent used to purchase NE in FS in a "tax haven", which purchases DS and NE in FS in host country

Table 4
Key Parameter Values

Parameter	Symbol	Values
Host-country tax rate	u_B	0.40 in the HTHC scenario; 0.15 in the LTHC scenario.
Home-country tax rate	u_A	0.30
Required after-tax rate of return on investment	ρ	0.10
Economic rate of depreciation	δ	0.20
Interest rate on debt	r	0.10
Rate of depreciation for tax purposes (CCA)	a	0.20
Host-country withholding tax rate on dividends	w_d	0.05
Host-country withholding tax rate on interest	w_i	0.05
Return to capital as proportion of total output	α	0.719

Table 5
Key Results from Empirical Studies of the Determinants of the Financing Structures of MNEs

Study	Characteristics of data set	Key results
Altshuler and Grubert (2002)	Data on 5,981 subsidiaries of non-financial U.S. MNEs in 1996	Subsidiaries in high tax rate host countries have higher overall debt levels and higher related-party debts. Those that face higher taxes on repatriation of dividends to the U.S. parent invest more in related affiliates, accumulate more retained earnings, and pay off local debt. The latter is equivalent to investing in passive assets.
Altshuler and Mintz (1995)	96 observations on 17 large U.S. corporations (13 non-financial) with subsidiaries in Canada, Japan and the United Kingdom for the years 1986, 1988, 1990, and 1991	Worldwide debt-to-asset ratios increased from 23 percent in 1986 to 36 percent in 1991. U.S. debt-to-asset ratios increased from 18 percent in 1988 to 36 percent in 1991. U.S. interest expense doubled over the period while worldwide interest expense tripled. U.S. debt accounted for almost three-quarters of the U.S. MNEs' worldwide debt. An additional dollar of interest on U.S. debt for parents in an excess foreign tax credit position only generated a deduction of about 62 cents, creating an incentive for these firms to borrow abroad through their foreign subsidiaries. For excess credit firms, the average debt-to-asset ratio increased from 0.19 to 0.44 in Canada and from 0.26 to 0.37 in the United States between 1986 and 1991. An increase in a host country's tax rate increases its share of the worldwide debt of a U.S. MNE in an excess credit position. The U.S. interest allocation rules increased the METR for investment in Canada by about eight percentage points.
Buettner et al. (2006a)	Data on subsidiaries of German firms in 26 countries, 1996-2004. 43,626 firm-year observations on 4,256 firms	Host country tax rates affect the financial structure of the foreign affiliates of German firms, but the impacts are moderated by thin capitalization rules to some extent. The existence of a thin capitalization regulation reduces the affiliate's debt-to-asset ratio by about five percentage points. The negative effect of a thin capitalization regulation was larger the higher the host country's tax rate. Investment in foreign subsidiaries is more tax sensitive if debt financing is restricted by thin capitalization regulations.
Buettner et al. (2006b)	Data on majority-owned subsidiaries of German parents in 26 countries, 1996-2003. 40,300 firm-year observations	The mean debt-to-asset ratio was 0.612 with an external debt-to-asset ratio of 0.364 and internal debt-to-asset ratio of 0.248. There were 679 firm-year observations for Canada. For Canadian subsidiaries of German firms, the mean debt-to-asset ratio was 0.541 with an external debt-to-asset ratio of 0.316 and an internal debt-to-asset ratio of 0.225. A 10 percentage point increase in the host country's statutory CIT tax rate increases the external debt-to-asset ratio by 1.9 percentage point and the internal debt-to-asset ratio by 1.5 percent. The elasticity of external-debt to the host-country tax rate was 0.18 while the elasticity of internal debt was 0.21. The latter figure is lower than the internal debt elasticity for foreign subsidiaries of U.S. MNEs in Desai et al. (2004b).
Buettner and Walmser (2007)	Data on subsidiaries of German MNEs in 79 countries, 1996-2004. 109,300 observations	The average debt-to-asset ratio was 0.588, with an inter-company loan-to-asset ratio of 0.242. Excluding loans from the German parent, the average inter-affiliate leverage ratio was 0.106. For the affiliates that were located in the lowest tax rate country in the group, the average inter-affiliate loan ratio was 0.077. Inter-affiliate loans were higher in groups with an affiliate in a low tax rate country and increasing in the magnitude of the maximum tax rate. A 10 percentage point increase in the maximum tax rate differential in the group led to a 0.68 percentage point increase in the inter-affiliate debt ratio, which they regard as a relatively small impact. Wholly-owned subsidiaries have a five percentage point higher, and majority-owned affiliates have two percentage point higher, inter-affiliate loan ratios than minority-owned affiliates. Inter-affiliate loans are more tax sensitive for wholly-owned affiliates than for minority-owned affiliates.
Desai and Hines (1999)	Survey data of the foreign operations of American MNEs in 1982 and 1989. 44 observations of changes in equity, royalty payments and debt in jointly owned foreign affiliates	The U.S. Tax Reform Act of 1986 restricted the foreign tax credits of minority-owned foreign subsidiaries to a "separate basket", increasing the taxes paid on dividends from minority owned subsidiaries in low tax countries. Joint venture activity is concentrated in rapidly growing and technologically advanced countries. Between 1982 and 1989, the number of minority-owned joint ventures fell by 12.3 percent while the number of majority-owned joint ventures rose by 7.3 percent. A one percentage point lower foreign tax rate resulted in a 7.1-percent slower growth of joint ventures between 1982 and 1989. The implied elasticity of joint venture growth with respect to the tax rate was -1.39. A one percentage point lower foreign tax rate resulted in a 0.046 percentage point increase in royalty payments and a 0.81 percentage point increase in the debt-to-asset ratio of a minority-owned joint venture to the U.S. parent compared to a majority-owned affiliate.

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Table 5 (cont'd)**Key Results from Empirical Studies of the Determinants of the Financing Structures of MNEs**

Study	Characteristics of data set	Key results
Desai, Foley, and Hines (2004b)	Approximately 3,700 U.S. multinational firms operating in more than 150 countries through approximately 30,000 foreign affiliates in 1982, 1989, and 1994	<p>A 10-percent increase in the host-country tax rate increases the foreign subsidiary's debt-to-asset ratio by 2.8 percent. Internal borrowing is particularly sensitive to host-country tax rates.</p> <p>The estimated elasticity of external borrowing with respect to the host-country tax rate is 0.19, while the estimated elasticity of borrowing from a parent company is 0.35.</p> <p>Related-party borrowing offsets approximately three-quarters of external borrowing "... external borrowing is more costly in environments in which creditor rights are weak and capital markets are shallow and ... affiliates substitute parent for external borrowing in response to these costs" (p. 2453).</p> <p>The median affiliate leverage ratio was 0.5364. The median affiliate external borrowing-to-asset ratio was 0.4074.</p> <p>There is greater reliance on debt in politically risky countries.</p>
Desai et al. (2004a)	Data on foreign affiliates of approximately 2,500 U.S. MNEs, 1982, 1989, 1994, 1997. 121,212 firm-year observations	<p>In 1982, 48 percent of U.S. parents had 80 percent or more of their affiliates wholly-owned. By 1997, this figure had risen to 65 percent.</p> <p>"... levels of parent ownership are lower for affiliates with higher fractions of their total sales in host countries, for those that purchase small fractions of their inputs from the United States, and for those that have fewer transactions with other members of their controlled groups" (p. 337).</p> <p>A 10-percent higher host-country tax rate reduces the affiliates' reported profits by 7.8 percent. The sensitivity to tax rates disappears when affiliates are partially-owned, indicating that partial ownership constrains the ability of the MNE to shift profits through transfer pricing and debt placement.</p> <p>Majority and wholly-owned subsidiaries make larger royalty payments to the parent for intangible property than do minority-owned affiliates.</p> <p>A larger tax rate differential between the host country and the United States increases the likelihood that the foreign affiliates in the host country are wholly-owned.</p> <p>Firms in research intensive industry are more likely to establish wholly-owned subsidiaries to reduce risks of leaking technological advantages.</p> <p>MNEs tend to form joint ventures with firms that "can provide valuable information and guidance about distributing output and sourcing inputs in host country markets" (p. 349).</p> <p>"In 1982, U.S. parents relied on their foreign affiliates as a destination for 30.6 percent of their exports, and that figure rose to 45.8 percent by 1997" (p. 351).</p>
Huizinga and Laeven (2008)	Data on 15,955 parent companies and subsidiaries of European MNEs in 32 countries in 1999. Only majority owned and wholly-owned subsidiaries included in the data set	<p>A one percentage point increase in a country's top statutory CIT rate reduced reported taxable income by an average of 1.3 percent.</p> <p>Profit shifting in Europe has been at Germany's expense because it had the highest tax rate. Approximately 13.6 percent of the "true" taxable income was shifted from Germany. Italy, Portugal, and the Slovak Republic also suffered outward profit shifting. Hungary, with the lowest tax rate, had profits shifted to it equal to 22.4 percent of its true profits.</p> <p>The costs of profit-shifting were estimated to be 0.6 percent of the tax base.</p>
Jog and Tang (2001)	Data on 388 large non-financial Canadian-based corporations between 1986 and 1994. 120 were subsidiaries of U.S. companies. Non-U.S. FCCs were excluded from the sample	<p>Tax changes in the mid-1980s in both the United States and Canada increased the incentive for U.S. parents to increase debt to finance their Canadian subsidiaries.</p> <p>The increase in the debt-to-asset ratio of the U.S. subsidiaries between 1984 and 1994 was estimated to have reduced the taxes paid by all U.S. foreign-controlled corporations (FCCs) by at least \$1.3 billion.</p> <p>A one percentage point reduction in the Canadian corporate tax rate reduced the debt-to-asset ratios of the U.S. FCCs by 0.2689 percentage points.</p>

Cont./

Table 5 (cont'd)

Key Results from Empirical Studies of the Determinants of the Financing Structures of MNEs

Study	Characteristics of data set	Key results
Mills and Newberry (2004)	Data on foreign controlled corporations (FCCs) operating in the United States 1987-1996 with assets in excess of \$500 million. 566 firm-year observations on 125 FCCs (Canadian-owned firms represented four percent of the sample observations)	<p>Median debt-to-asset ratios of 43.3 percent with the 25th percentile of 28.8 percent and the 75th percentile of 59.9 percent.</p> <p>Subsidiaries of foreign MNEs operating in the United States with relatively low average foreign tax rates report lower taxable incomes and higher debt levels.</p> <p>A 10 percentage point increase in the U.S. CIT rate compared to the parent's average tax rate leads to a 0.36 percentage point reduction in the FCC's ratio of taxable income to assets and an overall 1.2 percentage point increase in FCCs debt-to-asset ratio.</p> <p>"... the taxable income levels of FCCs vary significantly with the worldwide tax incentives of their foreign parent companies and with economic determinants. These findings suggest that FCCs are not a homogeneous group for which a 'one size fits all' tax policy is likely to be effective" (p. 104).</p>
Mintz and Weichenrieder (2005)	54,022 firm-year observations on outbound FDI by 13,758 German-owned subsidiaries, operating in 68 countries, 1996-2002	<p>A one percentage point increase in the host country's tax rate increases the debt-to-asset ratio of a wholly-owned foreign subsidiary by some 0.30 to 0.57 percentage points, but has no effect on the partially-owned foreign companies.</p> <p>In contrast to the studies of U.S. MNEs, the adjustment to higher host country rates by German MNEs occurs through higher inter-affiliate loans rather than third-party borrowing.</p>
Newberry (1998)	339 observations on offerings of debt, common stock and preferred shares by U.S. firms 1988-91.	U.S. multinationals in an excess credit position, with a lower expected marginal tax rate on domestic income, or higher loss carryforwards are more likely to issue equity than debt.
Newberry and Dhaliwahi (2001)	Data on international bond offerings U.S. parents and their foreign subsidiaries in Australia, Canada, France, Germany, Italy, Japan, and the United Kingdom over the period 1987-1997. 220 firm-year observations with 103 foreign subsidiary and 117 U.S. parent bond offerings	<p>Canada accounted for 55 of the 103 bond offerings by U.S. foreign subsidiaries and 13 of the 117 parent bond offerings. The value of the foreign subsidiary bond offerings in Canada was 55 percent of the total value of the bond offerings by the foreign subsidiaries but only 5.6 percent of the total value of the U.S. parent's foreign borrowing.</p> <p>There was a 94-percent probability of a foreign subsidiary making a bond placement if the U.S. parent had a tax-loss carryforward compared to a 47-percent probability if the parent had no loss carryforward.</p> <p>There was a 55-percent probability of the foreign subsidiary making a bond offering if it is located in a high tax rate country (such as Canada over this period) compared to a 17-percent probability if the foreign subsidiary was located in an "moderate" tax rate country (France after 1991 and the United Kingdom).</p> <p>U.S. MNEs with excess foreign tax credits shift borrowing to foreign subsidiaries.</p>
Ramb and Weichenrieder (2005)	Data from 1996 to 2002 on 3,314 indirectly held and 4,985 directly-held foreign affiliates operating in Germany	<p>The corporate tax rate of the foreign parent does not have a significant effect on the financial structure of a German subsidiary.</p> <p>Profitable directly-held foreign subsidiaries show stronger reactions to changes in the German corporate tax than less profitable firms.</p> <p>High German taxes may have led to high levels of intra-company loans. About 60 percent of the cross-border intra-company loans turn out to be held by firms that are running losses.</p> <p>Debt-to-asset ratios were about 53 percent for direct and indirectly held subsidiaries. Debt to affiliated companies represented 26 percent of assets for directly held firms and 32 percent for indirectly held foreign subsidiaries.</p>
Weichenrieder (forthcoming)	Data from 1996 to 2003 on inbound and outbound investment in Germany. For inbound investment, 55,230 firm-year observations and with 5,791 firms in 1996 and 6,988 in 2003. For outbound investment, 117,254 firm-year observations with 10,855 firms in 1996 and 16,745 in 2003	<p>With regard to inbound FDI in Germany, a 10 percentage point increase in the parent's home-country tax rate leads to a 0.5 percentage point increase in the profitability of the German subsidiary.</p> <p>In 2003, 36 percent of directly held foreign affiliates in Germany had a return on assets in the +/- 2.5 percent range while 72 percent of the indirectly held foreign affiliates were within this range. The average return on assets for the entire period was 5.6 percent for all foreign affiliates.</p> <p>With regard to outbound FDI by German parents, wholly-owned foreign subsidiaries show more sensitivity to the host-country tax rate than jointly owned subsidiaries. About 70 percent of foreign subsidiaries of German firms were wholly-owned. There is some evidence that a lower foreign tax rate reduces the leverage of the foreign affiliates of German parents.</p>

Table 6
Thin Capitalization Regulations in the EU

	Thin capitalization rule	Method used		Scope		Effect	
		Arm's length principle	Fixed ratio	Debt/equity ratio	Participation rule	Excess debt non-deductible	Interest recharacterized as dividend
Austria	Yes ¹					*	*
Belgium	Yes		*	1:1 / 7:1		*	*
Bulgaria	Yes		*	3:1		*	
Cyprus	No						
Czech Republic	Yes		*	4:1 / 6:1		*	
Denmark	Yes		*	4:1	50%	*	
Estonia	No						
Finland	No						
France	Yes		*	1.5:1	50%	*	
Germany	No ²					*	
Greece	No						
Hungary	Yes		*	3:1		*	
Ireland	Yes ³				75%		*
Italy	Yes		*	4:1	25%	*	*
Latvia	Yes		*	4:1		*	
Lithuania	Yes		*	4:1	50%	*	
Luxembourg	Yes ⁴		*	85:15			
Malta	No						
Netherlands	Yes		*	3:1	33%	*	
Poland	Yes		*	3:1	25%	*	
Portugal	Yes		*	2:1	10% / 90% / Other	*	
Romania	Yes		*	3:1		*	
Slovakia	No						
Slovenia	Yes		*	6:1	25%	*	
Spain	Yes		*	3:1		*	*
Sweden	No						
United Kingdom	Yes	*					

- Notes:**
1. No specific thin capitalization rule, but guidelines set out by the Austrian Administrative Court.
 2. Thin capitalization rules have been substituted by a new "earnings stripping rule", with effect from 1 January 2008.
 3. No specific thin capitalization rule, but rules emerge from general tax provisions.
 4. No specific thin capitalization rule, but rules emerge from administrative practice.

Source: Dourada and de la Feria (2008, Table 1, p. 16)

Table 7
Implications of Thin Capitalization Rules

Case	Average effective tax rate	Average effective tax rate by host country	Marginal effective tax rate	Relative levels of total investment	Change in the net present value of the project
	AETR	AETR _b	METR	$\frac{K_i}{K_1}$	$\frac{NPV_i - NPV_1}{K_1}$
High Home Country Tax Scenario, $u_A = 0.40$					
I: Double Dip $\beta_i = 0.80, \beta_o = 0.00$	-0.0759	0.183	-0.822	1.00	0.000
II: Double Dip with a Binding Thin Capitalization Rule on Related-party Debt $\beta_i = 0.667, \beta_o = 0.00$	-0.0324	0.214	-0.650	0.924	-0.0365
Low Home Country Tax Scenario, $u_A = 0.10$					
III: Double Dip $\beta_i = 0.80, \beta_o = 0.00$	0.179	0.226	-0.00349	1.00	0.000
IV: Double Dip with a Binding Thin Capitalization Rule on Related-party Debt $\beta_i = 0.667, \beta_o = 0.133$	0.189	0.228	0.0420	0.946	-0.0306
V: Double Dip with a Binding General Thin Capitalization Rule $\beta_i = 0.667, \beta_o = 0$	0.202	0.246	0.0509	0.935	-0.0368

Note: The host country tax rate, u_h , is 0.30. The other parameter values are the same as in Table 2.

Figure 1
The Cost of Capital for a Host Country under a Foreign Tax Credit Regime

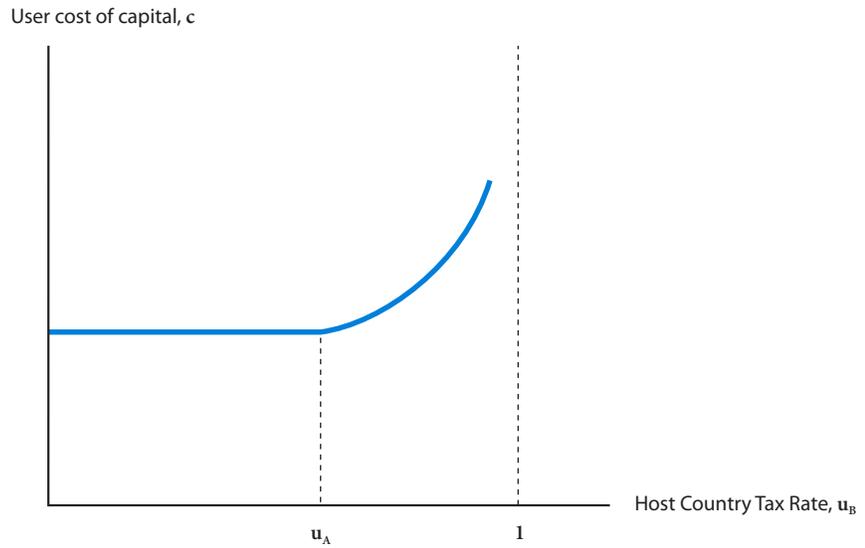
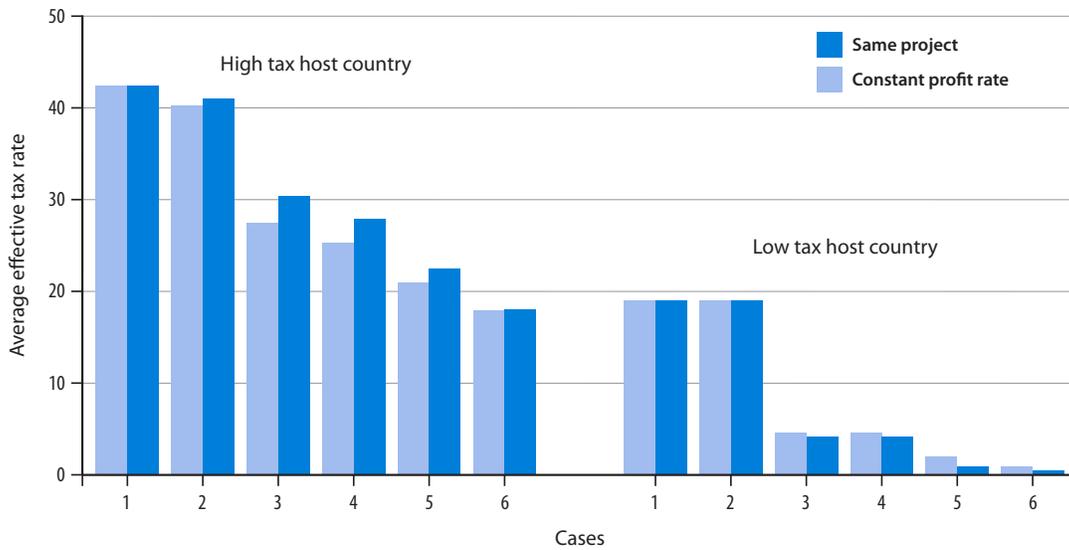
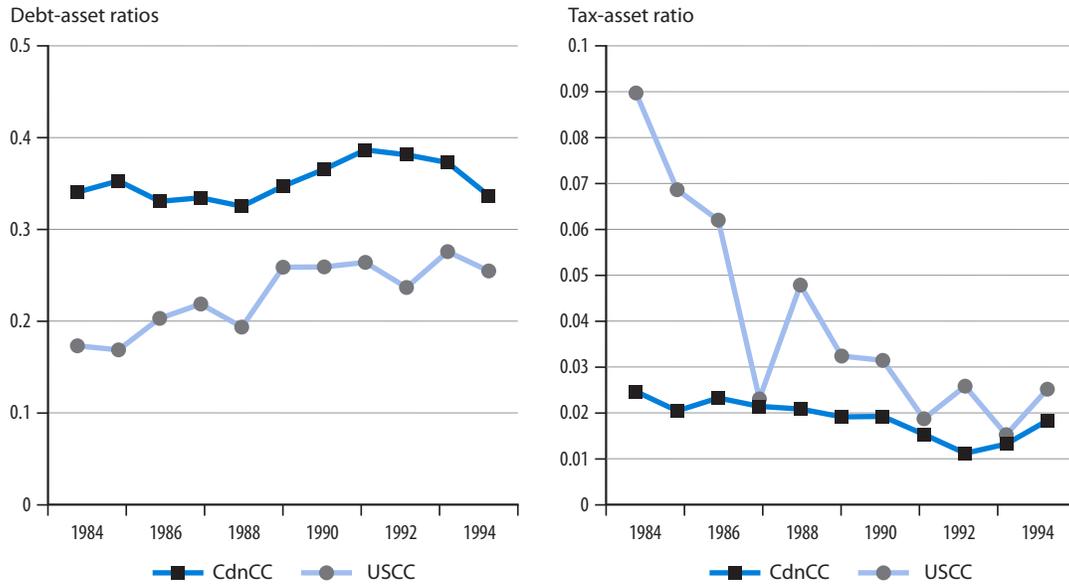


Figure 2
Average Effective Tax Rates on FDI under an Exemption System with Alternative Financing Arrangements



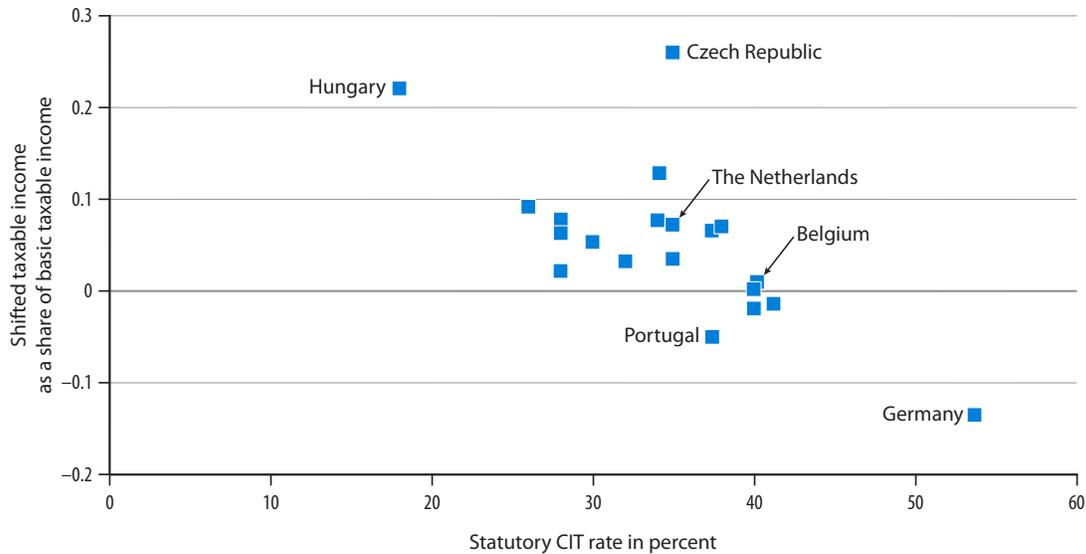
Note: The constant profit rate calculations are based on OECD (2007, pp. 139-140). The same project calculations are by the author. See text for details. The cases and parameter values used in both sets of calculations are described in Tables 3 and 4.

Figure 3
Trends in Financing and Taxation of Canadian-Controlled and U.S.-Controlled Canadian Corporations



Source: Jog and Tag (2001, Tables 4a and 4b, p. 13)

Figure 4
Profit Shifting by MNEs in Europe



Source: Huizinga and Laeven (2008, Tables 1 and 8)

Figure 5
The Effect of a Thin Capitalization Regulation in a Cournot Duopoly

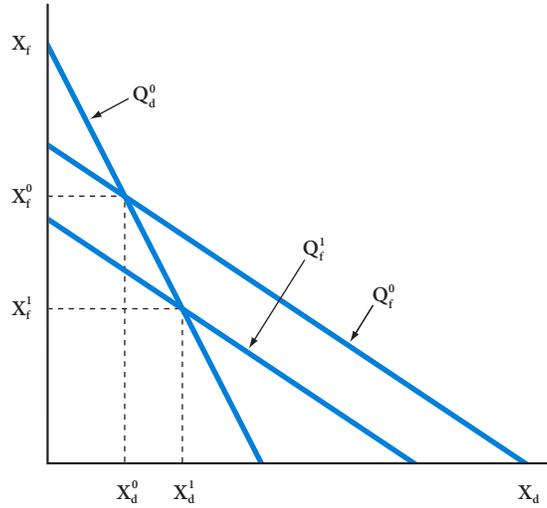


Figure 6
The Marginal Cost of Public Funds from Tightening a Thin Capitalization Regulation

