

THE TAX BURDEN ON CROSS-BORDER INVESTMENT: COMPANY STRATEGIES AND COUNTRY RESPONSES

HARRY GRUBERT

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Abstract

We look at the tax burden on direct investment from three perspectives. The first section illustrates how the recognition of company tax planning and of the importance of intellectual property affects measures of effective tax rates. It also discusses the methodological issues that arise, such as to which subsidiary the benefits of a multicountry strategy should be attributed. The simulations emphasize the importance of the share of royalties in crossborder income, and of tax planning strategies such as the shifting of debt to high-tax locations. At the same time, evidence on actual company behavior is necessary to limit the range of possible tax avoidance strategies. Otherwise, the effective tax burden on cross-border investment would virtually disappear. Even then, the range of possible estimates is large. The simulations also show how home governments can respond to some types of tax planning by, for example, requiring that parent interest expense be allocated to foreign income. The second section supplements the hypothetical calculations by evaluating the determinants of the actual effective tax rate on overall U.S. manufacturing investment abroad. Among the various components are the location of assets, the location of debt, other forms of income shifting, the share of royalties, and home government repatriation taxes. The results are generally consistent with the simulations in the first section. Somewhat surprisingly, real assets seem more mobile than tax bases, confirming the constraints on tax avoidance. The first two sections demonstrate that it is not the more 'obvious' features of a tax system, such as whether foreign dividends are taxed or exempt, that are important, but provisions that govern the taxation of royalties, the use of tax haven finance subsidiaries, and the allocation of parent interest expenses to foreign income. The third section introduces host government behavior to see how they tax different types of companies. As expected, they seem to favor more mobile companies and those that offer benefits to local factors such as labor. Companies that sell a large share of their output offshore receive concessions while those that import a great deal of their components are penalized, presumably because of the positive and negative impacts on country terms of trade. Subsidiaries of R&D intensive companies pay higher effective tax rates, suggesting rent extraction by the host government.

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Harry Grubert
U.S. Treasury Department
1500 Pennsylvania Avenue, NW
Washington, DC 20220
U.S.A.
harry.grubert@do.treas.gov

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The Tax Burden on Direct Cross-Border Investment: Company Strategies and Government Responses

Globalization has increased the importance of cross-border direct investment. For example, foreign affiliates of U.S. manufacturing companies accounted for about 25 percent of the parents' worldwide capital expenditures in 1999. Foreign affiliate operations are also a very important means by which multinational companies exploit the 'know how' created by their R&D and other investments in 'intangible' assets. An illustration of the importance of these cross-border investments of intangible assets is that, in 1999, license fees and royalties from abroad were equal to about 40 percent of total R&D spending in the United States.¹ Because of the importance of cross-border investment, both home and host countries are interested in their 'competitive' position. It is however necessary to determine the way in which the international dimension of corporate investment alters conventional domestic measures of effective tax rates.

The relevance of evaluating the tax burdens on these cross-border investments has been recognized in earlier studies, but past attempts to estimate the marginal (and average) effective tax rates on cross-border direct investment have tended to overlook important aspects of both corporate and government behavior. (The 1991 OECD report on taxing profits in the global economy is one example.) First, they do not take into consideration straightforward strategies that companies can use to reduce tax burdens. Putting debt on the books of highly taxed subsidiaries is one simple example. Earlier estimates have also tended to overlook the critical importance of intellectual property, or intangible assets more broadly, in direct investment. Because of the special tax rules that apply to royalties both in the home and host country, a comparison of tax burdens can be reversed when the importance of intangible income is recognized.

Earlier attempts to measure effective tax rates have also tended to overlook critical features of home and host country systems for taxing cross-border income. For example, in some home country tax systems it is possible to use a finance affiliate in a tax haven into which equity is injected and then loaned to a high-tax subsidiary. The income is therefore taxed neither in the host country nor the home country.

In addition, previous analyses of host country provisions have failed to recognize that the host country might vary the burdens they impose on different types of foreign investors depending on their contribution to national welfare. In order to obtain a more complete picture of cross-border tax burdens, it is, therefore, necessary to distinguish between different types of operations, depending for example on whether the prospective output is sold in the local market or on world markets.

While it is important to introduce various tax planning strategies into estimates of tax burdens, it is also necessary to recognize that companies face constraints and costs in engaging in them. If not, they could virtually eliminate their worldwide tax liabilities on cross-border investments using techniques described in the paper. Evidence on how companies actually behave therefore has to be introduced to make more reliable hypothetical estimates of cross-border tax burdens. For example, the evidence in Altshuler and Grubert (2003) shows that

affiliate debt is highly sensitive to the local tax rate, but nevertheless substantial debt remains on the books of low-tax affiliates. This in turn raises a further methodological issue, ‘implicit’ taxes that reflect the costs of tax avoidance strategies.

Many of the elements that have been overlooked also create new methodological issues, particularly in calculating average effective tax rates relevant for the decision on whether to choose a particular location.² One major reason is that many of the company strategies are fundamentally multilateral in nature, involving two or more entities, which complicates the calculation of effective tax rates for each entity separately. For example, if debt can be shifted from a low-tax subsidiary to a high-tax subsidiary, to which one should the tax benefit be attributed in estimating average effective tax rates. The first section of this paper will therefore begin with a discussion of the methodological issues in estimating cross-border effective tax rates, particularly those presented by the multilateral nature of investment, the role of intangible assets, and companies’ tax minimizing behavior.

The first section then goes on to make highly simplified simulations of the effective tax rate on cross-border investment to illustrate the impact of a more complete consideration of both multinational corporation (MNC) strategies and the specific features of systems for taxing cross-border income.³ We consider two hypothetical operations, one in a high-tax location and the other in a low-tax location. The emphasis is on the tax provisions that apply specifically to cross-border income, i.e., home country taxes on foreign income and host country taxes on foreign companies. Purely domestic provisions such as accelerated depreciation are not emphasized because they apply to all taxpayers, foreign and domestic. In other words, we are mainly interested in the costs and benefits of being a multinational company.

The next two sections introduce new evidence on actual tax burdens and how they depend on the nature of the investments made, the strategies companies use and on government policy choices. The second section calculates the actual overall effective tax rate on U.S. manufacturing investment abroad, and then resolves it into its positive and negative components. Rather than relying on hypothetical estimates of the effective tax rate on foreign income, this section attempts to determine how U.S. companies’ actual average effective tax rate on all foreign investment gets to be what it is. The various possible contributors to lower or higher overall tax burdens on cross-border income include locating a greater share of the investment in low-tax countries, placing more debt on the books of high-tax affiliates, shifting income from high-tax to low-tax locations, and the residual U.S. tax on repatriated income.

The third section of the paper brings in host governments more explicitly to see how they tax different types of companies. This is difficult to learn simply from tax statutes and regulations, even if we had a fully comprehensive description of the rules in the 60 locations used in this study. Apart from publicly available, transparent rules, such as depreciation schedules for different types of capital, host governments can negotiate special regimes for companies they wish to attract. Relying only on published schedules may give a misleading picture of tax burdens. The section, therefore, uses data on effective tax rates at the subsidiary level, derived from company reports to the U.S. Treasury, to discover the kinds of companies that pay above average or below average tax rates in a location. (These data are used in more aggregate form in section 2.) The intent of this section is to identify the kinds of investments that host governments

value and compete for. In addition to supplementing available information on cross-border tax burdens, it reveals the extent to which tax competition is evident at the subsidiary level.

In competing for foreign companies, the rational host government will distinguish between them depending on how much they contribute to local welfare and how much the country contributes to the companies' profitability. For example, they may attempt to extract rents that companies can earn in their country. Similarly, they may grant tax concessions to operations that export most of their local production to world markets and, therefore, promise gains in national terms of trade and higher real income for local inputs. The question in the third section is whether the tax benefits that host governments grant are consistent with their competing for the operations that contribute the most to national welfare.

1. How Do the Nature of the Investment and Company Planning Alter Estimates of Effective Tax Rates?

Methodological Issues

(a) What Capital Is Relevant and How Should It Be Modeled?

A cross-border investment is typically made up of various types of capital, all of which should be accounted for in measures of the tax burden on cross-border investment. These include not only tangible assets like plant, equipment and inventories, but also the return to intangible assets such as patents, trademarks and other technological or marketing 'know how'. For investments in the financial sector like banking, tax measures should include the tax on the financial assets that the company has to hold as 'capital'. Intellectual property, in particular, is a special feature of direct investment because other modes of foreign investment can be used to finance capital in the form of widely available 'standard' plant and equipment or inventories.⁴ If a multinational corporation finds that home country taxes on foreign income are burdensome, they could simply lease the plant and equipment from local investors and avoid part of the burden. Indeed, if 'standard' tangible capital that is freely available in world markets is particularly productive in a jurisdiction, purely portfolio inflows could equilibrate worldwide rates of return. (Foreign portfolio investors could be the ones financing the lease above.) In contrast, it is much more difficult to detach intangible assets from the company that developed them, except perhaps through a merger. As an illustration, only about 30 percent of the royalties received by U.S. companies from abroad are from unrelated parties. If home country rules are restrictive, companies could even expatriate to a tax haven, which is generally much less costly if there are no significant company intangibles being transferred to a foreign tax base. (For example, under the U.S. rules companies would have to pay a 'toll charge' that in part depends on the value of intangible assets being expatriated.)

In deciding which types of capital are relevant, it may be helpful to ask why countries want to attract direct investment. Presumably, it is because the foreign operation will increase real national income through enhancements in the productivity of local factors, etc. But the company can offer these benefits for reasons apart from any tangible capital such as plant and equipment it may invest. Why do Frankfurt and London compete for banks, brokers, and insurance companies even though their investment in purely tangible capital is insignificant? Because their capabilities

can attract worldwide customers, which increases the demand for local inputs and, furthermore, raises national income through potential improvements in the terms of trade. The effective tax rate relevant for the financial company's location decision is the tax on the return from these enterprise capabilities and from the purely financial assets it uses as capital. (These can of course be located anywhere, which is the source of most of the problems in taxing cross-border financial services.)

Recognizing the contribution of intangible assets is important because the income they produce may be taxed much differently from the return to plant and equipment. If the intangible, such as a patent has been developed at home, the parent should, under normal arms' length principles, receive royalties for its contribution. These are generally a deductible expense in the host country and subject to tax by the home country. But, as we will see, the actual tax burden on the royalties in the home country can vary.⁵

(b) Tax Planning Responses and the Multi-Country Nature of Cross-Border Investment

Effective tax rates cannot be estimated under the assumption that MNCs will stand still and fail to take advantage of tax planning opportunities. The tax planning techniques and behavioral responses we will consider include: (a) the locating of debt in high-tax jurisdictions, (b) the shifting of income to low-tax countries through transfer prices for commodities and intangibles, (c) the use of tax haven finance subsidiaries into which equity is injected and then loaned to high-tax affiliates, and (d) the avoidance of home country repatriation taxes. There are also more 'exotic' but increasingly important techniques such as the use of hybrid securities and hybrid entities which we explain below.

This tax planning behavior creates several methodological issues. One relates to 'implicit' taxes. For example, when MNCs avoid home country repatriation taxes using various planning techniques, they have to bear costs such as accounting, legal, and investment banking fees. Therefore, it would be incorrect simply to take actual tax payments on dividends as the only burden of repatriation taxes. Grubert and Mutti (2001) and Altshuler and Grubert (2001) address this issue by adding the 'dead weight' loss attributable to restricted dividends that is derived from an estimated repatriation equation. (This is of course only relevant for a low-tax affiliate where there would be a positive home country tax on dividends.) The costs of tax planning are also included in the optimal investment decisions of multinational companies in the Sorensen (2002) simulation model.

Many of the behavioral responses we will consider, e.g., the shifting of income or debt, generally require the existence of subsidiaries in two or more countries. The large MNCs that account for most of cross-border direct investment have subsidiaries in many locations. But the multi-country nature of tax strategies raises the issue as to which subsidiary the tax saving in a multilateral strategy should be attributed, particularly if we are interested in the average effective tax rate for purposes of a location decision. This is an issue to which we now turn.

(c) Average versus Marginal Effective Tax Rates and Multi-Country Strategies

The discrete all-or-nothing location decision, which motivates the interest in average effective tax rates, is of major interest in addition to the marginal investment decision. Focusing on the

average effective tax rate is attractive because it clarifies the importance of intangibles and ‘infra-marginal’ returns. But consider the case in which income is shifted from a high-tax country (e.g., Germany) to a low-tax country (e.g., Ireland.). Even for marginal investment decisions in each country after both subsidiaries have been established, it is necessary to know, in addition to the standard cost of capital information, the extent to which an extra dollar of investment in each location adds to total shifted income. This depends in part on the relative size of the two locations because the marginal shifting benefit of additional capital in any location will be greater if it is initially small compared to the other location. (See the simple model in Grubert (2003) as an illustration.) In general, the introduction of income shifting would lower the marginal cost of capital in both locations.

But calculating average effective tax rates can become difficult, or impossible, when the multi-country nature of business strategies is recognized. It becomes more sensitive to what is assumed about the initial starting point. For example, if we assume that neither of the two operations has been established and investing in one is considered, any income shifting benefits are impossible. If one has already been established, all of the shifting benefits will be attributed to the second. But what if neither operation is profitable without income shifting, or both are? In these cases, it is not apparent how the average effective tax rate relevant for location decisions is defined for each country separately.

That is not to say that we cannot find what the MNC’s optimal decisions are if we had all the profit functions and tax provisions in front of us. It is just that average effective tax rates may not be a useful (or feasible) way of summarizing investment options because they can only be calculated after a series of optimizing decisions, including the choice of location, have been made.

But rather than being deflected by this methodological conundrum, we will make several highly artificial assumptions that permit us to approximate the logic of the marginal calculation. The main goal is finding the potential quantitative significance of various multilateral strategies. As described below, the MNC is considering whether to establish new production lines, with their associated intangible and tangible assets, in two locations. The prospective investments are independent of each other in terms of production costs and markets, and they are of equal size. The company already has large existing operations in each country involving other production lines. These could be used as part of a multi-country strategy by a new operation in one country even if a new operation is not established in the other.

(d) Mobile versus Locational Rents-What is the Relevant Effective Tax Measure?

Governments are presumably interested in improving their ‘competitive position’ in attracting companies. But what it means to be ‘competitive’ will vary. Consider the comparison of ‘mobile’ and ‘locational’ rents. In the former, a valuable product has a worldwide market and low transportation costs, and can therefore be produced in many alternative locations. In the latter, the rents can only be earned if production is in that location. An example would be a branded consumer product that is expensive to transport from one prospective location to another.

In the case of mobile rents, a government is interested in how its effective tax rate, including the taxation of intangible income, compares with other locations. In the case of locational rents, the tax rate on intangible income is relevant only to the extent that any after-tax rents can help finance the tangible investment. The company will enter as long as it can meet its cost of capital on its tangible assets.

It, therefore, appears that the effective tax rate measure relevant for the discrete location decision differs in the two cases. In the mobile rent case, the choice depends on the net return in this location versus others. In other words, the relevant measure is the effective tax rate on the entire return including the mobile rent. In the case of locational rents, the answer depends on whether the net return from the investment after paying all taxes is enough to earn the required after-tax return on the tangible assets. The company may choose to invest in a very high tax country if the pre-tax locational rents are large enough. (To construct an effective tax rate comparable to an all-tangible investment in terms of location decisions, the cost of capital, i.e., the required pre-tax return, is the required return on the tangible assets less any after-tax return obtained on the rents.) In the case of mobile rents, the company may not choose to invest in a very low tax country if there is an alternative location that is even lower.

(e) Interest Rates, the Return to Equity, and Constraints on Debt Financing

The benefits of debt shifting strategies depend in part on the interest rate relative to the required return on equity and on the limits to debt financing by the firm. One assumption in the literature is corporate level arbitrage, as in Sinn (1993) and Weichenrieder (1996). Companies equate the cost of finance, so that $i(1-t)=r$, where t is the statutory tax rate, r is the required after-corporate-tax return on equity, and i is the interest rate. (We ignore inflation.) Presumably, t is the home country tax rate, but that ambiguity is the problem. The Weichenrieder-Sinn arbitrage condition is difficult to apply consistently in a multi-country framework. It would imply different country interest rates even under a common currency. Why would a Dutch pension fund accept a lower interest rate on Irish bonds than on German bonds? Because of the international mobility of portfolio debt, the assumption of shareholder level arbitrage, i.e., equal worldwide real interest rates, would seem to be more appropriate. Extending shareholder arbitrage to the choice between debt and equity might tend to equalize interest rates and the return to equity, i.e., $i=r$.

The ideal solution is of course to have a complete capital market model in which the relationship between interest rates and equity returns can vary depending on behavioral responses by investors and companies to changes in tax costs and the risks of bankruptcy. Examples are the comprehensive OECDTAX model used in Sorensen (2002) and the more stripped down computational model in Grubert and Mutti (1994). But this would go beyond the more limited objectives of this paper.

Whatever the reason, companies do seem to believe that debt is a ‘cheap’ source of finance, at least when debt-asset ratio is low. But a company obviously cannot take full advantage of a market equilibrium with $i < r/(1-t)$ and finance all of its capital with debt. Potential bankruptcy costs would intrude and drive up its borrowing costs. In the simulations, we will therefore make the convenient assumption that the company’s worldwide debt cannot exceed a fixed percentage of its worldwide assets. If debt is a ‘cheap’ source of capital but the company is constrained on how much it can borrow in relation to its worldwide assets, the company will have an incentive

to put debt in its high-tax subsidiaries. For ‘outside’ or unrelated party debt, the main question in the simulations is, therefore, how a given amount of worldwide debt is distributed among the MNC’s locations.

The borrowing constraint implicitly assumes that potential bankruptcy costs depend on the company’s worldwide debt-asset position. When potential lenders are evaluating a parent’s creditworthiness, they will take the subsidiary assets into consideration because they can always be claimed if the parent is in financial distress. To be sure, a subsidiary can go bankrupt without threatening the parent’s survival. But if there is a tax advantage to putting a great deal of debt on a highly taxed subsidiary’s books, the parent can always provide explicit or implicit guarantees to reassure lenders and lower overall financing costs. In contrast to the worldwide debt constraint assumption, Sorensen (2002) assumes independent debt-asset decisions by each subsidiary. The practical difference for the effective tax rate estimates is that we attribute some of the benefits of the high-tax entity’s ‘excess’ debt to the low-tax entity because the investment in the latter accommodates greater worldwide borrowing.

Other strategies are available for ‘inside’ or intercompany debt. One simple strategy is to capitalize a high-tax subsidiary with loans from the parent instead of equity. A more aggressive strategy is the use of a tax haven finance affiliate if the home country rules allow it. In order to finance a high-tax foreign subsidiary, the MNC injects equity into the tax haven subsidiary, which then lends to the high-tax affiliate. The potentially highly taxed income can, therefore, be stripped out to the tax haven subsidiary through deductible interest payments, where it is deferred under a worldwide system or repatriated tax-free under an exemption system. Because it is ‘inside’ intercompany debt, it is not subject to outside creditors’ limitations. The return on the company’s investment is, therefore, taxed neither in the home country nor in the host country even though both are nominally high-tax. If the initial equity injection can in part be financed with parent debt, the marginal effective tax rate at the corporate level can easily be negative.

(e) Repatriation Taxes, Trapped Retained Earnings, and Underinvestment--Old View versus New View

If there are home-country taxes on repatriations (or host-country withholding taxes on dividends), the question arises as to the cost of retained earnings and whether a subsidiary will ‘underinvest’ initially, as in Sinn (1993), to obtain the benefits of deferral. But, in fact, this turns out not to be an empirically very important question. As shown in Altshuler and Grubert (2003), MNCs can use a variety of tax planning devices to free ‘trapped’ retained earnings while avoiding repatriation taxes. Furthermore, the evidence in Grubert and Mutti (2001) and Grubert (2001) indicates that the tax burden on repatriations from low-tax countries is very modest even if you add the tax on actual repatriations and the efficiency loss from having to limit dividends.

(f) The Interaction of Tax Shifting Devices

An aggressive tax planning company has a variety of techniques available. It can, for example, shift third-party debt, alter the prices in intercompany transactions, and establish tax haven finance subsidiaries or hybrid entities. There are two issues here. One relates to the constraints imposed by governments. Will the success of a new vehicle depend on whether the company has already used other shifting techniques because governments are more likely to react to a further reduction in taxable income? The other issue relates to the incentives from the

company's point of view. For example, if the company can always use a finance affiliate to strip a given percentage of the subsidiary's income with little risk of penalties, the marginal benefits of other types of income shifting techniques decline; the statutory tax rate relevant for changes in income on the margin has effectively been reduced.

Important Features of Systems for Taxing Cross-Border Income

One objective of this paper is to find whether different rules for taxing cross-border income result in significantly different tax burdens. In addition, to what extent is the comparison altered by the introduction of a wide variety of asset types and of tax planning responses by companies? As we will see, it is not the most obvious features, such as whether dividends are taxed or exempt, that turn out to be most important.

The questions in characterizing home country rules include:

- (a) Are direct dividends taxed (with a credit for foreign taxes) or are they exempt?
- (b) How are royalties taxed and what foreign tax credits can be used to reduce home country tax liability?
- (c) Does any allocation of parent overhead expenses such as interest have to be made to foreign income? This can offset the tax benefits of borrowing at home to finance an injection of equity into a low-tax subsidiary. Under a worldwide system with credits for foreign tax, any allocation reduces net foreign income for purposes of calculating the foreign tax credit limitation. Under an exemption (territorial) system, the allocation reduces deductions against domestic taxable income. The United States seems to be the only country that applies serious interest allocation rules.⁶
- (d) Can a tax haven finance subsidiary that has received an equity injection from the parent be used to lend the funds to a high-tax affiliate, or is any interest it receives subject to current home country tax? Japan, among other countries, apparently allows tax haven finance affiliates. The German rules governing finance subsidiaries were recently tightened.
- (e) Can a foreign subsidiary be capitalized with 'hybrid' securities, i.e., securities that are regarded as debt in the host country and equity at home? Under an exemption system, for example, interest on the hybrid security would be deductible in the host country while it is regarded as an exempt dividend by the home country. (MNCs can get equity treatment at home by taking advantage of the usual restrictions on what can be identified as deductible debt. They can exploit rules intended for a purely domestic context.) The Canadian system, which exempts dividends by treaty, has been vulnerable to this device.
- (f) Can MNCs use a hybrid entity, which is regarded as an offshore, incorporated operation by the host country and as an unincorporated branch, and therefore 'transparent', by the home country? These can be used instead of tax haven finance affiliates if the latter are barred by the home country rules. The finance hybrid, organized in a tax haven, is 'invisible' to the home country because it is regarded as a branch of the high tax subsidiary. But the host country permits a deduction for the interest paid to the hybrid.
- (g) There are other 'anti-abuse' rules that may have an important impact on particular operations. For example, the United States has 'foreign base sales' rules that tax trading income in low-tax countries currently if no manufacturing has taken place.

Host country rules for outgoing payments can of course also be important, although they receive less emphasis in this paper. Withholding taxes on dividends and royalties increase

effective tax rates if they cannot be credited against home country tax liability. In addition, host governments frequently implement ‘thin capitalization’ or ‘earnings stripping’ provisions that attempt to limit the extent to which a subsidiary can rely on debt financing, particularly when some of the debt is extended by the parent or another related party.

Effective Tax Rate Simulations-What is Important?

The purpose of the simulations in this section is to identify the factors that are important in determining the tax burden on cross-border investments. For example, does the composition of assets make a significant difference? Do income shifting and other kinds of tax planning have a notable impact? Are worldwide and territorial systems really very different?

In order to capture the multi-country nature of MNC decision making, we will assume that a parent MNC based in an industrialized high-tax country like the United States is considering locating new production lines of equal size in two locations. One of the locations is low-tax with a statutory tax rate of 10 percent and the other is high-tax with a statutory tax rate of 40 percent. The home country has a 35 percent tax rate. To concentrate on international tax rules, we assume that there are no investment incentives such as accelerated depreciation or investment credits, so that the marginal and average effective tax rates, for purely domestic investors, are equal to the statutory tax rate.

The MNC already has many production lines in each location and the existing operations are of equal size. Accordingly, any benefits that one of the prospective operations could obtain with ‘triangular’ strategies like debt shifting does not depend on the decision to establish the other because the existing operations are already available as vehicles. The new potential production lines are small compared to the existing operations so that ‘marginal’ calculations are a good approximation. The shifting function $s(K_1, K_2)$, which indicates the amount of income that can be shifted from one location to another, is linear homogeneous and symmetric in the K_i s. If both expansions take place, there is a proportionate increase in total shifting. Accordingly, if only one expands, it receives half the total shifting benefit that would accrue if both expanded.

A fixed amount of tangible assets have to be invested in the new production line and, for simplicity, we assume that the scale is not affected by the tax rate. The products in the prospective lines have special features that allow the company to earn above normal profits on the tangible assets it has to invest. (We ignore the R&D process and how the intangible is created.) The return on the intangible assets is paid to the parent in the form of royalties. The intangibles are implicitly assumed to be mobile because the estimated effective tax rate is based on the taxes paid in relation to the entire return including rents.

The tangible assets are financed with a mix of debt and equity. We will assume that the company can only finance a given percentage of its assets with debt. But the debt that finances assets in one country can be put on the books of any one of the two foreign affiliates or on the books of the parent. The interest rate the company pays is the same in real terms wherever it chooses to borrow. Furthermore, we assume for simplicity that the real interest rate is equal to the pre-tax return on equity.

One of the purposes of the simulations is to compare exemption and worldwide systems for taxing cross-border business income, so it is necessary to briefly summarize the basic features of each that are assumed in our base case.⁷ In the worldwide system, only repatriated business income is taxed currently by the home country, i.e., dividends, royalties and interest. A credit is granted for foreign taxes paid including the underlying corporate tax associated with a dividend. But the foreign tax credit is limited to what the home country tax would be on the net foreign income after deductions. Parents with excess foreign tax credits, i.e., with more than they can use, are referred to as being in ‘excess credit’. If they have credits available less than their allowable limit, they are referred to as being in ‘excess limit’. We assume that the foreign tax limitation is on an overall basis, so that all repatriated active income is in the same pool for purposes of the calculation. This means that excess credits originating with dividends or other highly taxed income can shield royalties and other lightly taxed income.

In the exemption system, dividends from an active business are exempt from home country tax. But royalties and interest received by the parent, which are deductible in the host country, are generally taxed at the normal corporate rate by the home country with a credit for foreign withholding taxes. (France, an exemption country, taxes royalties at a rate somewhat lower than the basic corporate rate.)

The question of allocated deductions arises in both systems. For example, in the exemption system, do parent overhead expenses such as interest have to be allocated or attributed to exempt income, which means that they would be lost as deductions against domestic taxable income? If no allocation is required, the parent could borrow, get a deduction for the interest at home, and then inject equity into a low-tax subsidiary that would eventually yield exempt dividends. That is, it could receive an interest deduction without any inclusion of income. The simulations will be performed both ways, with and without required allocations, so that we can evaluate the sensitivity of effective tax rates to this provision.

In the worldwide system, the cost of capital in a location may depend critically on whether the parent company is in an excess credit or an excess limit position. Therefore, there have to be separate calculations for these two cases. (We assume that the parent’s overall position is not affected by the investment decisions being considered.) Accordingly, there are effectively three cases, two for the worldwide system and one for the dividend exemption system. Under U.S. rules, the parent’s excess credit position depends on its repatriated business income from all locations. As stated above, that is assumed here.⁸

The various alternative features of tax systems and possible company responses will be summed up in a series of parameters used in constructing effective tax rates in the alternative scenarios. Appendix 2 presents a complete list of these parameters and the equations used in each scenario. Some of the more important parameters include:

R, the share of pretax income accounted for by royalties.

l, the share of the multinational company’s worldwide tangible assets that can be financed with debt.

d_1 , the share of the low-tax affiliate’s debt shifted to the high-tax affiliate’s books, and d_2 the share carried on the parent’s books. In these shifts of debt,

we assume that the interest costs per dollar of debt are unchanged.

s, the share of the high-tax subsidiary's marginal equity income that is shifted to the low-tax country over and above the shift of debt. Grubert (2003) finds that almost all of the difference in profitability between high-tax and low-tax countries is attributable to the location of debt and to the shifting of intangible income.

H_d , the share of high-tax subsidiary capital that is financed with hybrid securities under a dividend exemption system.

H_f , the share of the tangible capital of each subsidiary that is financed with loans from a tax haven finance affiliate or hybrid entity into which equity had been injected by the parent.

IA, the portion of d_2 , the debt shifted to the parent's books, that has to be allocated to foreign income under the home country rules. The allocation can reduce foreign tax credits under a worldwide system or domestic deductions under an exemption system.

As noted earlier, these calculations make highly simplifying assumptions to make it easier to identify the effect of the strategies and provisions we are interested in. Rather than assuming a required after-tax rate of return to construct a cost of capital, or pre-tax required return, we assume a given pre-tax return on tangible and intangible assets and simply calculate the effective tax rate by accounting for all the tax payments and deductions. (This is what King and Fullerton (1984) call the 'fixed p' case.)⁹ It is only necessary to account for all of the tax payments on the tangible and intangible income to both the host and home governments. The only complication is assigning the benefits of a multi-country strategy. As suggested above, we assume that the benefit of a shift of net tax taxable income from the high-tax to the low-tax subsidiary when one expands is equal to half of the total shifting benefit when both expand. That is, each hypothetical expansion benefits equally from the existing operations in the other location. When taxable income is shifted from the home country to the low-tax location, we attribute the entire benefit to the low-tax subsidiary.

As indicated above, residual U.S. taxes on dividends are very modest. Even 'mature' subsidiaries in low-tax countries have low dividend repatriation rates. Altshuler and Grubert (2003) find no evidence that low-tax subsidiaries 'underinvest' in their early years to increase their benefits from deferral, presumably because they have many ways of avoiding home country taxes. Whether one chooses the 'old view' or the 'new view' on the burden of repatriation taxes would not seem to have an important effect on the estimates of effective tax rates because the tax burden on repatriations is so modest. We choose the 'old view', in part for simplicity because the issue is not the main subject of this paper, but also because the evidence does not seem to be consistent with the 'new view' at least as it is usually characterized. Furthermore, for the de novo investment being assumed, it is appropriate to include potential repatriation costs because they would enter into the parent's decision on whether to choose a particular location. Implicitly, we assume that in each period the low-tax subsidiary repatriates a given (small) percentage of its net income and, if there is a residual home country tax, it bears both the actual tax paid and the implicit tax reflecting the planning costs of avoiding repatriations. The retained earnings are presumably invested in passive assets or other affiliates, as described in Altshuler and Grubert (2003). The implicit tax includes any sacrifice compared to its normal return that the company has to accept on deferred income. Abstracting from any potential 'underinvestment' period makes it unnecessary to use a multi-period model, even though it is admittedly inconsistent with the Sinn (1993) model of a subsidiary which would, in principle, apply even if repatriation taxes are low.

The Table 1 Scenarios

The first scenario in Table 1 is the simplest base case. All the capital is in the form of tangible capital like plant and equipment and equity is the only source of finance. ($R=0$ and $l=0$.) As just noted above, the equity for the investment in this new production line is in the form of an equity injection from the parent. Only a few of the items require comment. We assume a home country tax of 35 percent. The 35 percent high-tax country effective tax rate in the second column, for excess limit parents, reflects the fact that 5 percentage points of the foreign tax can be credited against other foreign income. In the case of the low-tax subsidiary with excess limit parents, the additional 4 percentage points of tax reflects the burden of the home country repatriation tax under our ‘old view’ assumption. It is adapted from Grubert and Mutti (2001) and includes both the tax paid on actual distributions and the ‘implicit’ dead-weight loss attributable to repatriation planning.

In the second row, all entities, including the parent, are financed 50 percent with debt. ($l=.5$) We assume for simplicity that the real interest rate is equal to the pre-tax return on tangible assets. The corporate-level effective tax rates in Table 1 therefore fall by 50 percent.

In the third scenario, 25 percent of affiliate pre-tax income is paid to the parent in the form of royalties in return for the intangible assets it has received. ($R=.25$.) (No attempt is made to shift income at this stage.) That is, tangible assets make up the remaining 75 percent of total assets. (We ignore any return to the intangible assets that is not paid out in royalties.) Debt only finances tangible assets so it now accounts for 37.5 percent of total capital. The royalties are deductible against subsidiary net income abroad. (Host country withholding taxes, which are generally low, are also ignored.) Reading across the third row, we see that the effective tax rate declines for excess credit companies because the excess credits can be used to shield the new royalties and effectively exempt them from tax. The effective tax rates for subsidiaries with excess limit parents go up because the home country rate at which they are taxed, 35 percent, is higher than the comparable effective tax rate in the previous row. The effective tax rate also goes up for subsidiaries in an exemption system because royalties are not exempt but fully taxable. Companies in a worldwide system with excess credits gain while those lacking credits or in an exemption system can lose substantially. Note, for example, the effective tax rate in the low-tax affiliate rises from 5 percent to 12.5 percent in an exemption system, while it falls to 3.75 percent in subsidiaries of parents with excess credits in a worldwide system. This simple example confirms the importance of including the tax on intangible income in assessments of cross-border effective tax rates.

The next three scenarios successively add tax planning in the form of the reallocation of debt in the worldwide enterprise, the reduction of royalty payments where this is advantageous, and other types of income shifting. These responses to tax incentives assumed are approximately in accord with observed behavior.¹⁰ In scenario 4, 25 percent of low-tax debt is shifted to the high-tax subsidiary and a further 25 percent is shifted to the parent. ($d_1=.25$ and $d_2=.25$.) The shift to the high-tax location is roughly equal to the shifting of debt reported by Altshuler and Grubert (2003). The increased debt on the parent’s books is consistent with the higher parent leverage reported in the 1994 Benchmark Survey on U.S. Direct Investment Abroad. (When we refer to a shift of debt, it just means that the initial capitalization is altered.) The tax benefits from the shift

to the high-tax country are attributed equally to each of the subsidiaries and the benefit of the shift of debt to the parent is all attributed to the low-tax affiliate. Comparing this with scenario 3, we see that the reallocation of debt lowers the low-tax subsidiary's effective tax rate by an average of more than 3 percentage points.

In scenario 5, the company lowers royalty payments to the parents by 40 percent if they are fully taxable at home, i.e., in the exemption and excess limit cases, and if they also originate in a low-tax country. (If they originate in a high-tax location, the extra home country tax is less than the loss in host country deductions when the royalties are switched to taxable equity income.) Net equity income, which is exempt from home country tax or can be deferred, increases by an amount corresponding to the fall in royalties. These responses are consistent with the finding in Grubert (2001) that royalties paid are strongly influenced by the excess credit position of the parent and the local tax rate. The fall in royalties lowers the low-tax country's effective tax rate by about another 2 percentage points.

In scenario 6, 25 percent of the remaining net equity income in the high-tax subsidiary, after all of its extra interest deductions in scenario 4, is shifted to the low-tax subsidiary. (s=.25) Companies can exploit the range of uncertainty in transfer prices for commodities. As indicated in Grubert (2003), this ability to shift income is linked to company intangible assets, particularly those derived from R&D. Effective tax rates drop by about an average of one percentage point.

Scenario 7 shows how home governments can respond to the domestic interest deductions for debt that is used to finance foreign investment. The government mandates that some domestic interest expense be allocated to foreign income depending on the share of total assets that are abroad. A straightforward method would be to implement worldwide fungibility, that is, equal debt-asset ratios at home and abroad. Interest is then allocated to foreign income to the extent that foreign subsidiaries are less leveraged than the parent. If we assume equal debt-asset ratios to start with before the shift of debt in scenario 4, this means that the low-tax debt that has been shifted to the parent now has to be allocated to foreign income. In the worldwide systems, this lowers net foreign income and reduces the maximum of foreign taxes that can be credited. In exemption systems, the allocation reduces the interest deductions that can be taken against domestic taxable income. We assume that where required allocations bite, in the excess credit and exemption cases, the debt is moved back to the low-tax country where it can at least get a tax deduction, albeit at a low tax rate.¹¹

This home government allocation rule reverses some of the benefits of debt shifting. But note that the required allocation has no effect in the excess limit case. If the parent MNC in a worldwide system continues to be able to credit all of its foreign taxes, it can borrow and inject equity into a low-tax subsidiary without the tax benefit being eroded by the allocation rules.

Scenarios 8 and 9 introduce the use of aggressive devices, hybrid securities and hybrid entities, which appear to be becoming more widespread. One issue, discussed above, is how the use of these schemes affects the incentive to shift income on the margin considered in the earlier scenarios. That is, do they alter the subsidiary's effective statutory tax rate because their use is expanded or contracted proportionately as the subsidiary earns more or less taxable income? Or it may be that both of these devices involve subsidiary debt, at least from the host country's point

of view, and are therefore limited mainly by the subsidiary's assets irrespective of how much income it earns. On this point, Scenario 8 makes assumptions different from Scenario 9.

In scenario 8, hybrid securities are used to capitalize 50 percent of the high-tax subsidiary's tangible assets when the parent is in a dividend exemption country. ($H_d=.5$.) We assume here that all the other income components shrink proportionately, consistent with a change in effective statutory tax rates that scales down the income shifting in the earlier scenarios. The use of the hybrid security of course has a dramatic effect on the high-tax affiliate's effective tax rate because its payments on the hybrid security are deductible in the host country but are exempt dividends when received by the parent. Note that the low-tax affiliate's effective tax rate rises in this exemption scenario because its value as a destination for shifted income has declined. This illustrates the difficulty in estimating effective tax rates because it is necessary to specify all of the alternative planning vehicles the MNC has available.

In scenario 9, tax haven hybrid entities, or finance subsidiaries if allowed under home country rules, are used to finance 25 percent of each subsidiary's tangible assets and the interest payments to the tax haven entity are completely free from tax. ($H_f=.25$.) Equity is injected into the tax haven finance subsidiary or hybrid entity and then loaned to the operating companies where the interest payments are deductible from local taxable income. (We ignore host country thin capitalization rules mentioned above, which are another complication.) The interest received by the tax haven entity is either retained there under a worldwide system or can be repatriated tax free in an exemption system. This scenario assumes that the incentives to shift income on the margin introduced in Scenarios 4-6 remain unchanged, so that the benefit of the hybrid is additive to the other shifting benefits. As expected, effective tax rates drop substantially, particularly in high-tax subsidiaries where hybrid entities seem to be most frequently used.¹²

Summing up these elementary calculations:

- (a) The composition of assets is clearly important. The increasing importance of royalties can have a substantial effect on cross-border effective tax rates, but in differing directions depending on whether the home country has an exemption or worldwide system, and if worldwide, whether the parent has excess credits.
- (b) Tax planning, such as the shifting of debt, can potentially have a very significant effect. But it is necessary to introduce evidence on actual corporate behavior to avoid overstating its role.
- (c) As shown in Grubert and Mutti (2001) and Altshuler and Grubert (2001), effective tax rates on foreign income can be higher in an exemption system than in a worldwide system. This reflects the importance of royalties and of parent interest deductions that may be disallowed.
- (d) Some newer more exotic techniques, like hybrid entities, which are however becoming more widespread, have the potential for large reductions in tax burdens.
- (e) Governments can respond to offset some of the impact of MNC tax planning. The high-tax host country can impose 'thin capitalization' rules, which we have not explicitly introduced in Table 1, to prevent the disappearance of local taxable income. Home governments can implement expense allocation rules, although this may encourage MNCs to expatriate to a more favorable tax environment.
- (f) The prospect for estimating definitive effective tax rates relevant for a location decision is not encouraging. In the highly simplified calculations in Table 1, there is a wide range in possible outcomes even though they ignore issues such as those raised by implicit taxes, mobile versus

locational intangibles, host country thin capitalization rules, and the availability of more than two potential locations.

2. The Positive and Negative Components of the Actual Tax Burden on Foreign Income.

The objective of this section is to identify the components that are significant in determining the overall tax burden on the foreign manufacturing income earned by U.S. companies. It supplements the hypothetical calculations in the previous section and evaluates the importance of each positive and negative component of the tax burden. Admittedly, looking at foreign manufacturing income in the aggregate abstracts from some of the problems discussed above that arise from the multilateral nature of tax planning.¹³ In addition, there are of course many alternatives in the order in which the decomposition can be presented, and because we are dealing with large discrete changes the amount attributed to any given component may depend on the particular sequence. (Where the order might appear to affect a conclusion, the results of the alternative order will be referred to.) We start with the tax burden on net equity income abroad and then introduce the role of royalties, income shifting and debt. The order is similar but not identical to the illustrative simulations in the previous section.

In determining the actual overall effective tax rate on all the manufacturing income earned abroad by U.S. companies in 1996, we attempt to account for all of the return on the tangible and intangible assets and the corporate level tax paid on this income. This includes the net equity income of the manufacturing affiliates, the royalties paid to the parent, the interest paid on the debt, and the host and home country taxes paid. Some of this information can be taken directly from tax return data, e.g., the net income and taxes paid by foreign subsidiaries. (These data are described in Appendix 1.) Other segments require some assumptions and imputations, e.g., the amount of U.S. parent debt that finances foreign investment. Because interest payments are included in the income base for purposes of calculating an effective tax rate, the final estimate should not be confused with an effective tax rate on equity alone. It is more comparable to effective tax rates in the literature that are a weighted average of the tax on equity and debt.

Accordingly, the steps given in Table 2 are:

- (1) The average overall tax rate on subsidiary income is computed assuming that real assets in each location are proportional to local GDP and that net equity income per dollar of real assets is the same in all foreign locations. That is there is no income shifting from high-tax to low-tax locations. Average effective tax rates in each country are calculated from data for the earnings and foreign taxes paid by manufacturing subsidiaries in each foreign location. (There is information on 60 countries.) Only equity income is considered. This base effective tax rate turns out to be 28.6 percent.
- (2) The tax rate is recomputed keeping the equal profitability and all equity assumptions in (1), but now letting capital be in its actual location, bearing the local average effective tax rate. This lowers the average effective tax rate on equity income to 24.1 percent, or by more than 4 percentage points, which is consistent with the highly sensitive response of investment to local tax rates reported in Altshuler, Grubert and Newlon (2001) and Grubert and Mutti (2001).

- (3) Then we compute the tax rate with actual net equity income per unit of assets in each location. This reshuffling of foreign equity income reflects income shifting in response to tax rate differences, either through the reallocation of debt financing among foreign subsidiaries or by other means. The average effective tax rate falls by almost 2 percentage points to 22.3 percent. Note that the movement of real capital has a much larger impact than the movement of tax bases holding real capital constant. Furthermore, this conclusion that real assets are more mobile than tax bases does not depend on which component is calculated first. If the change in the effective tax rate attributable to profit shifting is calculated first, before the change attributable to the movement of capital, the profit shifting component is still only about two-thirds of the capital location component.¹⁴
- (4) Royalties are now included as an income component. These are deductible against foreign tax and there is only a (generally low) withholding tax abroad. Royalties payments by U.S. subsidiaries are now substantial, about 20 percent of net pretax foreign manufacturing income before deducting royalties. The royalties are subject to U.S. tax but they can be shielded by any excess credits flowing over from highly taxed dividends. Thus, 72 percent of total royalties are effectively exempt from U.S. tax because of available excess foreign tax credits.¹⁵ The remaining royalties are taxed at the U.S. rate of 35 percent. The effective tax rate, therefore, falls by 2.5 percentage points to 19.8 percent.
- (5) The residual U.S. tax on repatriated dividends is added. As indicated in Grubert (2001), this tends to be small, about 1 percent of income, raising the average effective tax rate to 20.8 percent. Dividends bear a residual U.S. tax only if the host country tax rate is less than the U.S. rate and the parent company does not have excess foreign tax credits available. The evidence in Grubert and Mutti (2001) shows that repatriations from low tax countries are very modest.
- (6) At this point, the impact of the average level of foreign affiliate debt financing, and the associated interest deductions, are introduced. (The shifting of equity income in Step 3 in part reflected the reallocation of the average level of foreign debt from low-tax to high-tax subsidiaries but the estimated tax rate only applied to equity income.) That is, we start with debt on the books of foreign subsidiaries, which is on average 50 percent of tangible assets. As in the simulations, we assume for simplicity that the real interest rate is equal to the pre-tax return on equity. This gives us the weights for debt and equity in affiliates' weighted effective tax rate. The combined corporate-level effective tax rate, reflecting both royalties and debt, falls to 11.6 percent.
- (7) Data in the 1994 Benchmark Survey of U.S. Direct Investment Abroad published by the U.S. Commerce Department indicate that non-financial MNCs have a worldwide debt/asset ratio of approximately 60 percent. Parents are, therefore, more heavily leveraged than their subsidiaries with a debt-asset ratio of only 50 percent. In assessing the significance of this 'excess' parent debt, the neutral assumption is 'worldwide fungibility', that is, equal debt-asset ratios in each location in the absence of tax distortions. This is based on the assumption that the amount MNCs can borrow depends on their total worldwide assets independently of where the assets are located.

The implication of worldwide fungibility is that 10 percent of foreign

tangible assets are in effect financed with parent debt, although it is injected as equity. In contrast to normal debt financing, where the interest deduction is matched by the increased income from the debt-financed assets, this deduction of ‘excess’ interest against U.S. taxable income is not matched by any inclusion of income we have not accounted for. That is, the foreign tax on the parents’ equity injection has already been included as well as any residual U.S. tax on dividends attributable to this equity. Further, the tax saving from income shifting in step 3 reflects only the shifting of equity income from low-tax foreign countries to high-tax foreign countries which may in part reflect a reallocation of foreign debt, not increased debt on the parent’s books that finances foreign investment. Step 4 accounts only for the average level of foreign debt in constructing a weighted effective tax rate.

These deductions of interest on ‘excess’ parent debt have a very substantial impact, lowering the effective tax rate to 8.1 percent, or by more than 3 percentage points.

- (8) But this ‘benefit’ of U.S. parent debt is overstated because of required expense allocations under U.S. rules. Parent interest has to be allocated to foreign source income for the purpose of calculating the limitation on foreign tax credits, which is based on net foreign income after deductions. The allocation of interest therefore causes a loss of potential foreign tax credits if the parent is in an excess credit position. The adjustment for the overstatement of the benefits of parent debt, derived from tax return data on how much interest companies actually allocate to foreign income, increases the overall effective tax rate on foreign manufacturing income to 9.3 percent.¹⁶ As emphasized earlier, very few, if any, countries other than the United States have effective interest allocation rules. This provides companies based outside the United States even greater opportunities for putting debt in the most ‘tax efficient’ location.

These calculations show what is important in determining multinational corporations’ worldwide tax on cross-border income. They are generally consistent with the simulations in the previous section. Steps 3 and 4 show that income shifting and the tax treatment of royalties together lower the overall effective tax rate by more than 4 percentage points. The ability to deduct interest at home while injecting equity abroad also has a very significant effect, although the required interest allocations under the U.S. rules are a partial offset to this benefit.¹⁷

The estimates on Table 2 also suggest that there are substantial benefits to being a multinational corporation. The overall average effective tax rate for U.S. manufacturing MNCs can be compared to the tax burden on the average local foreign company that has the same debt-to-asset ratio as the average U.S. company abroad and pays the full local tax rate on any income from intangible assets. These assumptions result in an effective tax burden for the local company of approximately 16 percent, or more than 5 percentage points greater than the burden on U.S. manufacturing income abroad.¹⁸ These benefits derive from the ability of MNCs to choose low-tax locations, rearrange the debt held throughout the worldwide enterprise, shield some of their royalty income with excess credits, and use other strategies to shift income.

After this look at the overall tax rate on cross-border manufacturing income, the next section goes to the other extreme of aggregation and uses subsidiary-level data to determine which type of company pays lower than average tax rates in any location.

3. Which Companies Receive Tax Breaks and Which Receive Penalties?--Tax Competition at the Subsidiary Level.

This section has two related objectives. One is to supplement the information in the first two sections by examining actual tax burdens at the subsidiary level. These data are used to identify how effective tax rates vary in a location depending on the subsidiary's characteristics. As stressed at the beginning, these differences would frequently be difficult to identify, even from detailed, publicly available host country tax rules.

The second purpose of the section is to explain why governments discriminate between different types of companies. Specifically, it attempts to evaluate tax competition at the company level. Past studies of international tax competition have relied on various types of country level data. Some have used hypothetical Hall-Jorgenson-King-Fullerton effective tax rates estimated from the basic few features of a tax system, i.e., the statutory tax rate, depreciation schedules and investment credits. (See, for example, Devereux, Lockwood and Redoano (2002).) Some have been based on data for aggregate corporate revenues in relation to GDP. (Slemrod (2001) is an example). They try to see whether countries have lowered their tax rates in response to increased capital mobility. Some also estimate how a country reacts to tax reductions by its neighbors. Presumably a tax reduction by a competitor increases the elasticity of the supply of foreign capital that a country faces. However, because of the limited number of observations and the severe methodological difficulties, these studies have not tended to be very conclusive.

But, if governments are engaged in tax competition, this should be observable at the subsidiary level as well, because they would compete for mobile companies that are particularly valuable to the local economy. Governments can be expected to distinguish between different types of potential foreign investors when setting tax burdens. They would consider companies' sensitivity to tax rates in choosing locations and the benefits their prospective operations offer to the host country. (As we will see, it is often difficult to distinguish between these two factors.) For example, some companies will earn locational rents that can be extracted by the host jurisdiction while others control mobile intangibles that can be exploited in a large number of alternative locations. Companies also differ in the benefits they provide to local labor and capital. An important consideration is the extent to which the company sells its output offshore and the extent to which it imports components.

In a model of the world economy with homogeneous capital and a single good, as in Gordon (1986) but with a less than perfectly elastic supply of foreign capital, the host government's optimal tax on inbound capital would depend only on the sensitivity of foreign investment to local tax rates. The government would equate the marginal productivity of capital with its marginal cost, and the latter depends on the elasticity of the supply of capital. The optimal tax rate is given by the difference between the marginal and average supply price of capital.

But in a world with differentiated products and intangible capital, the elasticity of investment is an incomplete guide to policy because different types of investments can have different effects on the price of local production in world markets. For example, compare two hypothetical companies whose investments are equally responsive to a cut in local tax rates. One invests in a purely domestic sector and the extra capital has the normal effect of increasing the productivity of local labor. Any increase in exports simply represents the investment return eventually going abroad. The other investor produces a differentiated product that will be sold abroad. The increase in export demand leads to a greater improvement in national real income because it causes a greater expansion in the worldwide demand for local factors such as labor. In other words, increased capital in the exporting company both increases the local productivity of labor and increases the value of this productivity relative to imports.

If a new company offers a worldwide market for its local production, local labor is, in effect, bid away from traditional export industries and its output is sold at higher prices in world markets. Similarly, if the company imports a great deal of its components, the local economy may suffer a terms of trade loss. This conclusion on which type of company should be favored parallels a similar result in trade theory, in which the export facing the highest elasticity of demand should receive a subsidy even in a no-tax world. In the limit, as the elasticity of demand for the export increases, it is like getting a greater demand for your exports and resulting higher terms of trade at no cost.¹⁹

The potential trade benefits of an investment may be closely linked to the mobility of its intangible assets. If a subsidiary sells most of its output offshore, this may indicate that the company could exploit its know-how in another location. Granting concessions to the company may be due to the mobile intangibles, which increase the company's sensitivity to tax rates, and not any prospective terms of trade benefit. In principle, however, it is possible, at least conceptually, to distinguish between the mobility of the intangibles and the terms of trade improvement. The lower tax to the mobile intangible would increase the demand for the country's exports, but the extent of the terms of trade benefit would depend on the nature of the local economy, such as the elasticity of the supply of labor to the new activity and the elasticity of demand for its other exports. Moreover, as noted in the discussion of the results, a subsidiary using mobile intangibles may also import a great deal of its components, which would offset the terms of trade gain. If the host government nevertheless penalizes imports, this would help identify the significance of the terms of trade objective.

The data used in this section, described in more detail in Appendix 1, are derived from the basic corporate tax return, the Form 1120, and the Form 5471 that is filed by U.S. multinational companies for each of their controlled foreign corporations (CFCs). (A CFC is a foreign company more than 50 percent of which is owned by U.S. shareholders.) The Form 1120 is used for information on parent profitability, R&D and advertising, and capital and labor intensity. The Form 5471 provides information on the foreign income taxes paid by the CFC and on its Earnings and Profits, a measure of book net income specified in the tax code. These are used to construct the subsidiary's effective tax rate. The Form 5471 also has data on the CFC's date of incorporation, its industry, and its transactions with related parties. The sample is based on the manufacturing CFCs among the largest 7500 CFCs, for which more complete data is available. The sample is reduced further because, in order to calculate an effective tax rate, the CFC of course has to report positive net profits. Altogether there are 1751 observations in the sample.

The ratio of parent R&D and advertising to sales are used as measures of company industrial and marketing intangible assets. These might be sources of either mobile or locational rents in the host country. The measure of parent profitability, the ratio of domestic profits to sales, is another potential indicator of rents that might be extracted. Parent labor intensity, measured by the ratio of labor costs to sales, and capital intensity, measured by the ratio of plant and equipment to sales, are other company variables that might indicate the mobility of operations. They are also company characteristics that the host government may use as predictors of benefits to the local economy. Finally, we use a measure of parent size, the log of sales, to see if larger parents are able to obtain relatively favorable tax treatment, perhaps because they have many alternative opportunities for expanding investment.

The subsidiary's date of incorporation is used to construct age dummies. We would expect that newer operations have lower effective tax rates because of the greater importance of investment incentives such as accelerated depreciation. The CFC's imports and exports are derived from the data on intercompany sales and purchases of goods, or 'stock in trade' as it is referred in the tax return. These are each expressed in relation to CFC sales. Transactions with other foreign affiliates and transactions with the U.S. parent can be distinguished. The CFC's industry category is used to construct a dummy variable for subsidiaries in electronics and computers, which would be expected to have particularly mobile intangibles.

In the regressions in Table 3, the dependent variable is the controlled foreign corporation's (CFC's) effective tax rate, the ratio of foreign income taxes paid to CFC Earnings and Profits. Because we are interested in how the tax burden on a particular subsidiary compares with other CFCs in the same location, either the country's average effective rate or its statutory tax rate are used as independent variables. (Table 3 indicates that the results are not very sensitive to which is used.)²⁰ The statutory rate is the independent variable in the first 2 regressions. Not surprisingly, the local statutory tax rate has highly significant coefficients. The coefficient of the dummy variable for CFCs incorporated within the last 5 years shows the expected benefits of recent incorporation, presumably reflecting incentives such as accelerated depreciation and tax holidays.

The highly significant positive coefficient for purchases from related parties and the similar (in absolute terms) highly significant negative coefficient for sales confirm the importance of overseas markets and potential terms of trade benefits to host governments. The coefficient for sales indicates that a subsidiary that sells all of its output offshore achieves an effective tax rate 5 percentage points lower than one that serves the local market exclusively. This is a large effect in view of the mean effective tax rate of 23 percent in the sample. The second column distinguishes between transactions with the parent U.S. company and transactions with other foreign affiliates. Sales to the parent and sales to other offshore locations have a comparable effect in gaining a more favorable tax rate. On the purchases side, imports of components from the United States seem to have a particularly unfavorable effect.

These results on the effect of foreign transactions may, as noted, reflect mobile intangibles and higher sensitivity to taxes rather than potential terms of trade effects. This interpretation might well hold for sales, which indicate the company's ability to sell its products in world markets. The host government would give concessions to this operation that is more responsive

to tax rates. But the mobile intangibles interpretation does not explain why greater purchases from related parties result in a tax penalty. A mobile operation might be expected to buy more components from related parties in other countries. Grubert (2003) finds that, if anything, subsidiaries in low effective tax countries, companies that are presumably the ones most responsive to tax rates, import more from related parties abroad, although the effect is statistically significant at only the 10 percent level. The potential terms of trade gain or loss seems to be the most consistent explanation of the transactions results.

Returning to the first regression and the other variables, we can see that parent R&D intensity increases the local tax burden, suggesting rent extraction by the host government. On the average, the rents that companies earn from their R&D investments appear to be locational rather than mobile. There may be several sources of these locational rents. They may derive from the opportunity to produce and sell a company-developed product in the local market. Another possibility is that local skilled labor is necessary for the company to be able to exploit a new technology.

To be sure, some of the R&D linked rents are mobile. The dummy variable for industries with mobile operations, electronics and computers, has a significant negative coefficient. (In regressions not shown, the extraction of rents associated with R&D is evident even when the transactions and other mobility indicators are not used as explanatory variables.) The significance of the electronics and computer dummy variable confirms the expectation that mobility brings more favorable tax treatment. This mobility could reflect either mobile intangible assets or the fact that production is physically easier to move. We also use parent labor and capital intensity to indicate more or less mobile operations and we see that both tend to lower the host government tax rate. This might suggest that host governments expect that real activity using local labor and plant and equipment offer greater potential benefits to local inputs compared to more intangible based production.

Finally, larger parents, as indicated by their U.S. sales, tend to obtain more favorable tax treatment although the coefficient is significant only at the 10 percent level. Larger parents are likely to have operations in a greater number of locations and, therefore, have more options in moving capital from one place to another. (There may, for example, be fixed costs of establishing a subsidiary in a new location,) In other words, the larger MNCs have greater bargaining power. An alternative explanation is that larger companies are also likely to have large subsidiaries, which the host government may find less costly to attract in relation to the benefits they can bring. But other regressions, not displayed on the tables, show that larger subsidiaries in fact pay significantly more, and that the parent size variable becomes more significant when subsidiary size is included. Perhaps, the fact that the subsidiary is large indicates that the company values the location and is committed to it, increasing the government's ability to extract rents.

One possible objection to the Table 3 regressions is that the independent variables are in fact endogenous and may be determined by the tax rate. This is conceivable for R&D, but it is not likely to be an important source of bias. The R&D measure used reflects the parent's U.S. R&D, which is unlikely to be strongly influenced by the tax rate in a single location.

A more serious source of possible endogeneity is that CFC tax rates may influence the volume of transactions with related parties. Indeed, Grubert and Mutti (1991), using data aggregated by country, showed that locations with low average effective tax rates attract production for sale offshore. This effect might also operate at the CFC level, and subsidiaries that happen to have below average tax rates in a location might sell a greater share of their production to related parties abroad. But, again, the positive sign on the purchases coefficient tends to reject this direction of causation. Grubert and Mutti (1991) also found that locations with low effective tax rates attract a great deal of U.S. exports to the local U.S. subsidiaries. The evidence in Grubert (2003) cited above showed that this seemed to be observable at the CFC level as well, with CFCs in low-tax countries importing more components from related parties. If the direction of causation goes from CFC tax rates to the level of offshore transactions, one should, therefore, expect a negative relationship between a CFC's tax rate and its purchases from abroad. In fact, the positive and significant coefficient for purchases in the Table 3 regressions indicates the reverse. Large purchases of goods from related parties are associated with significantly higher than average tax rates. The direction of causation seems to run from the CFC's purchases and sales to the effective tax rate that it is offered, consistent with the terms of trade and national welfare interpretation.

4. Conclusions

The first two sections demonstrate that it is not the most obvious features of a tax system, such as whether foreign dividends are taxed or exempt, that are important in determining the tax burden on cross-border investment. More significant are how royalties are taxed and whether companies can use tax haven finance subsidiaries or other aggressive tax planning schemes. Requiring allocations of parent interest expense to foreign income can also be important. The sections also show that even 'normal' tax planning, such as shifting debt to high-tax foreign locations or the home country, can have a notable effect on tax burdens.

While some general conclusions such as the importance of intangible income can be drawn, the highly simplified simulations in section one reveal that it is very difficult to make definitive statements about average effective tax rates in a particular country. The complexity of multi-country strategies, and the knowledge required about the company's planning opportunities throughout the worldwide corporation, are the sources of much of this problem.

The second section shows that there appear to be substantial benefits to being a multinational company compared to the average local company that cannot shift debt and has to pay the full tax on any income from intangible assets that it owns. Under the assumption that the average local company has the average amount of debt of U.S. subsidiaries, the differential seems to be close to 5 percentage points. The section also indicates, incidentally, that real assets are more responsive to tax differences than are tax bases, that is, than net income in a location per dollar of real assets.

The third section indicates that host governments impose tax burdens on different types of companies depending on their contribution to national welfare. They seem to distinguish between mobile and locational rents. They grant lower tax rates to mobile high-technology companies, such as those in electronics, while extracting rents from the average R&D intensive company.

Improving national terms of trade also seems to be an important policy goal. Governments grant tax concessions to companies that sell a greater share of their output in other markets and they impose higher tax rates on companies that import more of their components.

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Appendix 1-Data Sources

The principal data sources used in sections 2 and 3 are the linked U.S. Treasury files for the Forms 1120, 5471 and 1118. The Form 1120 is the basic corporate tax return, giving the parent company's revenues and deductions. Multinational corporations file a Form 5471 for each of their controlled foreign corporations. It gives the CFC's sales and net income, foreign taxes paid, balance sheet, transactions with related parties and date of incorporation. Net income refers to 'Earnings and Profits', which is defined in the tax code and is intended to approximate book income, not local taxable income. The parent claims foreign tax credits on the Form 1118, which has total repatriated foreign income, including dividends, interest and royalties, as well as deductions against foreign income. (The total allowable credit depends on net income after deductions.)

Information on the parent's R&D is based on the 'qualified research and experimentation' reported on the tax return for purposes of the research credit. Only R&E performed in the United States qualifies. In the minority of cases (less than 20 percent) in which companies do not claim a research credit but is reported as performing R&D in its financial statements as compiled in COMPUSTAT, the latter is used to impute qualified research. Parent advertising is taken directly from the Form 1120.

Country statutory tax rates are obtained from Price Waterhouse (1996). Average effective tax rates by country are computed from the taxes and net profits reported on the Form 5471.

Appendix 2

Technical Description of the Table 1 Scenarios

This appendix gives a more specific description of the Table 1 scenarios in terms of the following parameters:

t_l = the low-tax country tax rate.

t_h = the high-tax country tax rate.

t_u = the home country tax rate.

t_d = the tax and non-tax burden of repatriations from the low-tax country if they are taxable on the margin, i.e., excess credits are not available.

R = the share of pre-tax income accounted for by intangible income paid to the parent as royalties in the absence of income shifting.

d_R = percentage reduction of royalties by low-tax subsidiaries if they are taxable on the margin in the home country.

l = the share of the MNC's worldwide tangible assets that can be financed with debt. In the absence of debt shifting, each of the subsidiaries are assumed to borrow this share of their assets.

d_1 = the share of low-tax debt shifted to the high tax subsidiary. a_1 = the share of the tax saving attributed to investment in the low-tax country. The remainder is attributed to investment in the high-tax country.

d_2 = the share of low-tax debt shifted back to the parent.

$XC = 1$ if parent in a worldwide system has excess foreign tax credits.

$XL = 1$ if parent does not have excess credits.

$DE = 1$ if home country has a dividend exemption system.

s = the share of net equity income remaining in the high-tax subsidiary (after the debt shift) that is shifted to the low-tax subsidiary. a_2 is the share of s that is attributed to investment in the low-tax country.

H_d = the share of high-tax tangible capital that is financed with hybrid securities if the home country has a dividend exemption system.

H_f = the share of the tangible capital of each subsidiary that is financed by loans from tax haven finance affiliates or hybrid entities.

IA = the share of d_2 that has to be allocated to the low-tax subsidiary under the home country rules.

In each scenario, ETL and ETH, the effective tax rate on a new product line in the low and high-tax subsidiary respectively are calculated for the 3 possible cases: excess credit, excess limit, and dividend exemption. They are identified by the three dummy or state variables, XC , XL , and DE , where relevant. Income is normalized so that all components pre-tax add up to one. As stated in the text, the interest rate is assumed to be equal to the pre-tax return to equity. An alternative interpretation of l , the company debt-asset constraint, is that it is the share of gross income accounted for by interest deductions.

Scenario 1

In the first scenario $R=0$ and $l=0$. There is only equity investment and no income derives from intangible assets. As described in the text, in calculating the effective tax rate for a new discrete investment, we implicitly adopt the ‘old view’. In the case when the home country repatriation tax can potentially bite, for low-tax affiliates with a parent with no excess credits, we assume that the low-tax affiliate repatriates a fixed amount of its income each period and it bears both the residual tax actually paid and the ‘implicit’ tax cost of retaining income. Accordingly:

$ETL_1 = t_l + XL * t_d$, where $XL=1$ if the parent is in excess limit.

$ETH_1 = t_h - XL * (t_h - t_u)$

We assume that $t_l < t_u < t_h$. The second term in ETH_1 reflects the fact that the high-tax subsidiary will repatriate all of its income and some of the tax that it has paid can flow over to shield other foreign income if the parent is in excess limit.

Scenario 2

Debt is positive. Each operation has the same debt-asset ratio= 1.

$ETL_2 = (1-l) * ETL_1$

$ETH_2 = (1-l) * ETH_1$

Scenario 3

Royalties paid to the parent are R of total pre-tax income.

$ETL_3 = (1-R) * ETL_2 + R * t_u * (XL+DE)$

$ETH_3 = (1-R) * ETH_2 + R * t_u * (XL+DE)$

Royalties are deductible in the host country but do not incur a home country tax if the parent has excess credits in a worldwide system, i.e., when XL and DE are both zero.

Scenario 4

Debt shifting.

$SD_1 = d_1 * 1 * (1-R)$ of low-tax debt, expressed as a share of total capital, is shifted to the high-tax subsidiary. The total tax reduction per unit of gross pre-tax income is $TD_1 = SD_1 * (ETH_1 - ETL_1)$.

The Scenario 1 all-equity effective tax rates apply instead of the statutory rates because they include any positive and negative repatriation taxes when taxable income is increased. Depending on whether XC , XL , or DE is equal to 1, the appropriate Scenario 1 effective tax rates should be used. a_1 of the tax saving is attributed to the low-tax investment.

$SD_2 = d_2 * 1 * (1-R)$ of low-tax debt is shifted to the parent. The tax saving $= TD_2 = SD_2 * (t_u - ETL_1)$.

This is all attributed to the low-tax investment.

$ETL_4 = ETL_3 - a_1 * TD_1 - TD_2$

$ETH_4 = ETH_3 - (1-a_1) * TD_1$

Scenario 5

Royalties decline by d_R if they are paid by a low-tax subsidiary and they are taxable in the home country. The tax saving is $d_R * R * (t_u - ETL_1)$.

$ETL_5 = ETL_4 - d_R * R * (t_u - ETL_1) * (XL+DE)$

$ETH_5 = ETH_4$

Scenario 6

A portion, s , of the net equity income remaining in the high-tax subsidiary, after the debt shifts in Scenario 4, is shifted to the low-tax subsidiary.

The remaining high-tax net equity income, as a share of total pre-tax income before deductions for interest or royalties, is equal to $(1-R)*(1-l)-SD_1$, where SD_1 was defined in Scenario 4. a_2 of the tax saving is attributed to the low-tax affiliate.

$$ETL_6 = ETL_5 - a_2 * s * ((1-R)*(1-l)-SD_1) * (ETH_1 - ETL_1)$$

$$ETH_6 = ETL_5 - (1-a_2) * s * ((1-R)*(1-l)-SD_1) * (ETH_1 - ETL_1)$$

Scenario 7

A portion, IA , of the debt that was shifted from the low-tax subsidiary to the parent now has to be allocated abroad under the home country rules. We assume that this applies in the dividend exemption regime. In the worldwide system, it only affects companies in excess credit because the allocation only enters into the calculation of maximum allowable credits. We assume that if the allocation reduces home country interest deductions, the debt is shifted back to the low-tax subsidiary where it will be deductible.

$$ETL_7 = ETL_6 + IA * TD_2 * (XC + DE), \text{ where } TD_2 \text{ was defined in Scenario 4.}$$

$$ETH_7 = ETH_6$$

Scenario 8

H_d of the tangible capital of the high-tax subsidiary under a dividend exemption system is financed with a hybrid security that is classified as debt in the host country and equity in the home country. We assume that the remaining income components are distributed in the same way as in Scenario 7. In particular, the income shifting in the earlier scenarios shrink proportionately. Note that the effective tax rate in the low-tax country in the dividend exemption case goes up because it has less value as a shifting vehicle. It receives less income shifted from the high tax country.

$$ETL_8 = ETL_7 + H_d * a_1 * TD_1 + H_d * (ETL_6 - ETL_5). \text{ } TD_1 \text{ was defined in Scenario 4 and the last term reflects the partial loss of the attributed shifting benefit in Scenario 6.}$$

$$ETH_8 = (1 - H_d) * (ETL_7 - R * t_u) + R * t_u$$

These only apply to the dividend exemption case. The other effective tax rates are the same as in Scenario 7

Scenario 9

The tax planning in Scenario 9 is an alternative to Scenario 8. Companies use tax haven finance subsidiaries or hybrid entities to finance H_f of the tangible capital in each subsidiary. This (inside) debt is in addition to the third party debt already on the subsidiary's books. We assume that in this scenario, in contrast to Scenario 8, the incentives to shift income on the margin reflected in the earlier scenarios remain as before.

$$ETL_9 = ETL_7 - H_f * (1-R) * ETL_1$$

$$ETH_9 = ETL_7 - H_f * (1-R) * ETH_1$$

Table 1
Effective Tax Rates for New Production Lines in High-Tax and Low-Tax Locations
(Corporate Level Tax)

High-tax country t=.40			Low-tax country t=.1			Scenario
Excess Credit	Excess Limit	Dividend Exemption	Excess Credit	Excess Limit	Dividend Exemption	
.40	.35	.40	.1	.14	.1	1. Tangible capital only-All equity- No Income Shifting
.20	.175	.20	.05	.07	.05	2. Tangible assets financed with 50% debt-no debt shift
.15	.21875	.2375	.0375	.14	.125	3. Royalties =25 percent of income
.1359	.2089	.2234	0	.1105	.0875	4. 25% of low-tax debt shifted to high-tax and 25% to home country
.1359	.2089	.2234	0	.0895	.0625	5. Royalties responded reduced by 40 % if fully taxed at home and from LT sub
.1254	.2015	.2129	-.0105	.0821	.0520	6. 25 % of high tax equity income shifted to low-tax subsidiary Benefit split between them.
.1254	.2015	.2129	.0129	.0821	.0754	7. Home country requires that debt shifted to parent be allocated to foreign income
.1254	.2015	.1502	.0129	.0821	.0947	8. Hybrid securities are 50% of high-tax sub tangible capital under exemption
.0504	.1359	.1379	-.0059	.0559	.0565	9. Finance affiliates or hybrid entities are used to finance 25% of tangible capital

Table 2**Decomposing the Overall Effective Tax Rate on U.S. Manufacturing Income Abroad (1996)****Corporate Level**

Steps	Effective Tax Rate
1. Base case. Real capital in each location is proportionate to local GDP. Net income per unit of real assets is same in all locations. No debt financing. No income from intangibles.	28.6
2. Capital is in its actual location. The shift reflects the response of investment to effective tax rates. All other assumptions in step 1 are retained.	24.1
3. Actual net income in each location. This change in the effective tax rate reflects the benefits of income shifting.	22.3
4. Royalties paid to the parent are now included in the total Investment return. The royalties are deducted abroad and included in U.S. taxable income. But the may be shielded by available excess credits.	19.8
5. Residual U.S. tax on repatriated dividends is added. Dividends are taxed but receive a credit for foreign tax including underlying corporate tax.	20.8
6. Debt on the books of foreign subsidiaries is now included As a source of finance for tangible assets. We assume that the interest rate equals the pre-tax return to equity.	11.6
7. A portion of parent's debt is attributed to foreign Subsidiaries to reflect greater parent leverage. Interest is deducted at U.S. tax rate.	8.1
8. Mandated allocation of parent interest to foreign income for the purpose of calculating the limitation on foreign tax credits. Companies in excess credit can take fewer credits.	9.3

Notes. See text for more details. The estimates are based on tax return and survey data described in Appendix 1, and on author's calculations.

Table 3
Which Companies Get Concessions and Which Companies are Penalized?
 Dependent Variable is Subsidiary Effective Tax Rate *
 Manufacturing subsidiaries in 1996

Independent Variable	(1)	(2)	(3)	(4)
Country Statutory rate	.471 (12.42)	.474 (12.44)		
Country Effective rate			.731 (16.46)	.732 (16.44)
Age < 5 years	-.057 (3.95)	-.056 (3.93)	-.055 (3.95)	-.056 (3.96)
Age 5-15	-.008 (.83)	-.008 (.79)	-.107 (1.12)	-.107 (1.13)
Parent R&D/Sales	1.022 (3.34)	1.03 (3.36)	.997 (3.35)	.982 (3.30)
Parent Advertising/Sales	-.131 (.97)	-.118 (.86)	-.102 (.77)	-.113 (.86)
Sales to all Affiliates/Total Sales	-.052 (3.71)		-.034 (2.48)	
Purchases from all Affiliates/Total Sales	.060 (3.00)		.071 (2.62)	
Electronics & computers	-.028 (2.44)	-.029 (2.54)	-.025 (2.26)	-.025 (2.21)
Parent size-log of total sales	-.0053 (1.70)	-.0052 (1.69)	-.0047 (1.58)	-.0046 (1.54)
Parent domestic profits	.035 (.52)	.026 (.39)	.028 (.43)	.0244 (.37)
Parent labor intensity	-.083 (2.08)	-.082 (2.05)	-.087 (2.24)	-.086 (2.20)
Parent capital intensity	-.037 (1.51)	-.039 (1.58)	-.044 (1.84)	-.045 (1.87)
Sales to Foreign affiliates		-.049 (2.97)		-.025 (1.55)
Sales to U.S. affiliates		-.058 (2.32)		-.053 (2.21)
Purchases from Foreign Affiliates		.029 (1.06)		.039 (1.49)
Purchases from U.S. Affiliates		.094 (3.30)		.077 (2.77)

*Notes: t values are in parenthesis.
 N=1751

Endnotes

¹ These data appear in the October 2002 Survey of Current Business, which provide details on both U.S. international transaction and preliminary results from the 1999 benchmark survey of U.S. direct investment abroad. More than two-thirds of the license fees and royalties referred to come from affiliates.

² The importance of average effective tax rates for discrete location decisions is emphasized by Devereux and Griffith (1999).

³ This extends recent papers by Grubert and Mutti (2001) and Altshuler and Grubert (2001) that have started to address some of these issues. They show, for example, that tax burdens on cross-border income can be higher under a territorial (dividend exemption) system than under the alternative worldwide system with deferral and foreign tax credits

⁴ Looking at cross-border income flows, one sees that in 1996 royalties accounted for 26.6 percent of the net foreign income received by U.S. manufacturing companies.

⁵ In addition, the subsidiary may keep a significant portion of the return, perhaps as an incentive for exploiting the technology efficiently. The evidence in Grubert (1998) suggested that, whatever the reason, the return to R&D is split about equally between parent and affiliate.

⁶ Many countries use a ‘tracing’ system in which an allocation has to be made only if a foreign investment can be traced directly to contemporaneous borrowing. This is of course easy to manipulate. Allocations under the U.S. rules are based on the ratio of foreign assets to worldwide assets.

⁷ The comparison of worldwide and exemption systems extends the simulations in Grubert and Mutti (2001) and Altshuler and Grubert (2001).

⁸ Some home countries have a nominal ‘per-country’ system for credit limitations, but frequently MNCs can get around this by using a ‘mixer’ holding company in a country, such as the Netherlands, with favorable treatment of holding companies.

⁹ The fixed p assumption makes it more convenient to specify the importance of income from an existing intangible. Otherwise, the return attributable to an intangible asset would vary depending on the grossed-up payments that have to be made to the tangible capital.

¹⁰ In contrast to the implicit cost of avoiding repatriation taxes, planning costs are not included in these scenarios. If we make the frequently used assumption that planning or avoidance costs are a quadratic function of the discrepancy between actual income in a location and ‘true’ income undistorted by tax considerations, then the benefits of planning are just reduced in half.

¹¹ It is possible that more debt could be stuffed in the high-tax foreign country. The estimate assumes that this is infeasible because of host country thin capitalization rules.

¹² We assume that the effective tax rate on this investment can be negative because of positive taxable income from other investments.

¹³ It also ignores implicit planning costs that were included in some of the simulations.

¹⁴ One qualification however is that all of the income may not have been accounted for. Some may have been shifted to non-manufacturing subsidiaries. This possibility becomes more real as hybrid entities become more prevalent.

¹⁵ Expenses that have to be allocated to foreign income also contribute to excess credits that can be absorbed by royalties. This is taken into account when the effect of the allocations is estimated.

¹⁶ The costs imputed here to the interest allocation rules are greater than would conventionally be estimated as a stand-alone provision. First royalties are taken out of foreign source income, increasing the likelihood that a company has excess credits, and then the effect of the allocations on available tax credits is computed. The reason is that some of the benefit of excess credits attributed to royalties in Step 4 may have resulted from interest allocations but, nevertheless, the parent ended up in excess limit because of the large volume of royalties. In a stand-alone estimate, the benefit to royalties would not be offset by the required allocations, because, with the parent in excess limit, the allocations would appear not to impose a cost.

¹⁷ The required allocations appear more significant here than in the simulations in Table 1 , which assumed ‘worldwide fungibility’ as the standard. Current U.S. law mandates allocations to foreign income significantly larger than under the equal worldwide debt-asset ratio standard.

¹⁸ The assumption of equal leverage in all foreign countries may be too extreme. Leverage would be expected to be higher in high-tax countries. In addition, it is possible that governments grant favors to locally owned companies that they don’t extend to foreign owned companies, although that is not what the tax competition literature would suggest.

¹⁹ This result is apparently due originally to de V. Graff (1949-50) who presents a general tariff structure framework and notes that in some cases subsidies will be called for.

²⁰ The statutory tax rate is probably more valid because, unlike the average effective rate, it is not influenced by the particular mix of companies in a location.

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