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Abstract

Financial and real investment flexibility, tax competition, and superior economic information by transnationals both creates a rationale for corporate income taxation and limits the effectiveness of such taxation. While these factors have led to a variety of transnational tax policies, such as deferral, double taxation, apportionment, and trade rules, very few of these institutional features have been integrated into tax competition and agency models. In this paper, I show how the integration of investment flexibility, tax competition, and agency issues is crucial to our understanding of corporate tax policies.

Godel and Miller's Tax Proposition: No finite and feasible system of business taxation can collect positive revenues. (Stephen Ross, *Journal of Economic Perspectives* 1988)

1. *Introduction*

Transnational corporations thrive for many reasons. Oft-stated reasons include proximity to customers and resources through vertical integration and operational economies of scale (e.g. in administration, R&D, and/or production activities).[2] The economic advantage often conferred by these attributes is also attractive to many national and state governments. Transnational or foreign direct investment (FDI) not only creates direct economic benefits such as jobs and taxable income but significant indirect benefits such as knowledge spillovers. However, the ability of individual governments to reap the benefits of transnational investment is compromised by a third characteristic of transnationals: the flexibility to shift production and resources across national boundaries. This flexibility not only helps transnationals minimize the cost of taxes and regulations imposed by individual governments it can also aid them in pitting one government against another. Ultimately, the beneficiaries of such strategies are likely to be the transnationals and not the local jurisdictions. How these institutional and strategic factors limit the benefits governments earn from attracting FDI is the theme of this paper.

The focus of this survey is on the role of corporate income tax laws and investment policies in influencing the nature and composition of FDI and on their strategic role as tax competition instruments. I take as given the existence of transnational companies and focus only on corporate income tax competition, as opposed to commodity tax competition. This focus away from the issues of transnational formation and commodity tax competition should not be construed to imply that they are less important. Instead, I prefer to see this paper as complementing existing surveys of these literatures.[3]

One benefit of focusing on corporate income tax policy is that it helps identify three dimensions of transnational investment and taxation that challenge the ability of governments to raise tax revenues and extract rents: financial and real investment flexibility, tax competition, and informational advantage. The first exists because of characteristics common to many commercial tax codes that encourage

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[2]See G. Peter Wilson (1993) for examples from field studies.

[3]James Markusen (1995) discusses the various economic environments in which transnational investment can arise. The impact of endogenous transnational formation on strategic trade theory is also developed in Markusen and Anthony Venables (1998). For a broader review of tax competition issues, including commodity tax competition, see the recent survey by John Wilson (1999).

transnationals to manipulate production and financial flows to reduce tax liabilities. Tax competition pressures not only help explain why such characteristics persist, they also introduce additional strategic effects that influence the level of investment and the ability of governments to collect transnational tax revenues. A natural response to these first two sources of transnational power would be to consider cooperative agreements between countries. I will argue that informational asymmetries between governments and transnationals and across governments add a third layer of strategic effects that further impedes efforts by governments to benefit from transnational activity. In the extreme, the combined impact of these three dimensions suggests what one might consider a corollary to Godel and Miller's Tax Proposition: Governments cannot accurately measure transnational profits they plan on taxing.

In practice, many countries seem to have responded to these economic pressures by formulating very complex tax codes. In Section 2, I offer a taxonomy that reduces some of this complexity by organizing observed commercial tax and investment policies associated with FDI, both within and across countries, into four basic categories: deferral rules, double taxation rules, apportionment rules, and trade policies. This taxonomy is applied in Section 3 to show how the corporate tax codes themselves often endow transnationals with the ability to structure investment flows in ways that not only reduce taxes but increase a government's informational disadvantage. It is here that I also summarize some of the empirical research on the impact of various policies on FDI.[4]

One seemingly simple response that circumvents the three dimensions of transnational advantage is to have no corporate income taxes. In Section 4, I show that one rationale for corporate income taxes arises when there exists asymmetric information, either between foreign and domestic investors or between transnationals and their governments. This suggests that corporate taxes are an imperfect solution to the information problem. I return to a more detailed discussion of the impact of asymmetric information in Section 7. The introduction itself of corporate income taxes in an open economy also raises new economic tradeoffs and these economic tradeoffs ultimately impact the design of tax policies. These tradeoffs are introduced and discussed in Section 5.

The issue of tax competition is taken up in Section 6. One thing Section 6 will try to make

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[4]Most of the empirical studies I will summarize utilize data on U.S. based transnationals. Rather than reflecting a national bias, it instead reflects a bias in the availability of individual tax data for research studies. James Hines, Jr. (1999), which provides a more comprehensive survey of transnational responses to international tax provisions, offers a similar caveat. The Hines survey however does not address tax competition or informational concerns.

evident is the significant difference between the complexity of commercial policies reflected in Sections 2 and 3 and those that are incorporated in tax competition models. Filling this gap I argue is an important research direction that in some cases will require new theoretical tools. Section 7 outlines some of the outstanding theoretical issues involved in understanding the role of asymmetric information in open economy models with transnational investment. Consistent with the need to include tax competition effects as expressed in Section 6, particular attention is paid to the development of common agency (multiple principal) models. Section 8 offers some brief, forward looking comments.

2. *Common features of corporate tax and investment policies*

In practice, countries vary considerably in how they interact with transnational enterprises. Since a transnational will look at the aggregate effect of a country's policies on its investment, seemingly innocuous details can often affect how well a country competes for and benefits from FDI. However, with regard to trade and tax policies intended to stimulate or moderate aggregate levels of inbound and outbound FDI and/or to generate revenues from these flows, there appears to be a fair amount of policy convergence. Some of this convergence is due to cooperative efforts such as OECD conventions or the GATT, some has been a response to financial structuring strategies adopted by transnationals, and some has been the result of changes in U.S. policy that other countries have felt compelled to mimic. It is upon these most prevalent components of tax and commercial policies that I focus.

One can think of the major components of national corporate income tax/commercial policies in terms of four important categories: deferral of taxes on foreign-source income, double taxation rules, expense apportionment rules, and trade policies. All four categories influence the financial and economic structure of FDI as well as the ongoing decisions of established transnationals. At the simplest level, transnational investment creates two sources of income: domestic-source income or income attributed to investments made in the home country of the transnational's parent corporation and foreign-source income or income attributed to investments made outside the parent's home country. The first two categories determine when and how a transnational's home country taxes the transnational's foreign-source income. The last two categories relate to the definition of domestic-source and foreign-source income for the purpose of calculating home tax liabilities. Together these four categories span the critical dimensions along which transnationals can structure transactions to enhance the marginal benefit of advantageous regulations (e.g. deferral, revenue sourcing rules) and to mitigate the impact of costly regulations (e.g. taxes, environmental restrictions). Table 1 summarizes how some of these policies vary across several developed countries. The terms used in the table will be explained as each category is discussed.

[Table 1 here]

2.1 *Deferral*[5]

Many countries tax their residents, including resident corporations, based on worldwide income. For residents with foreign-source income, the calculation of foreign-source income depends on the specific corporate structure of the foreign sources. While branch income is generally taxed when earned by the branch, deferral allows income from subsidiaries classified as controlled foreign corporations (CFCs) to be taxed only when it is remitted to the resident corporation.[6] One rationale for home countries to allow deferral is the idea of capital import neutrality. Without deferral a country's foreign investments would be placed at a competitive disadvantage to host investors who face only one set of tax rates. Minimum equity rules are used to distinguish active foreign investment from portfolio investment. For instance, for tax purposes the United States considers a foreign corporation to be controlled by U.S. citizens if U.S. citizens individually controlling at least 10% of the foreign firm together own at least 50%.

The main advantage of deferral to transnationals is the ability to avoid paying home taxes on foreign earnings that are reinvested in the foreign operations. This same feature is often criticized because it creates an incentive for transnationals to park foreign earnings abroad. Hines and R. Glenn Hubbard (1990) lend credibility to this concern with their study of income repatriation patterns based on 1984 returns which found that 84% of all U.S. controlled foreign corporations paid no dividends to their U.S. parents. This figure corresponds to 62% of all parent corporations in their sample.

2.2 *Double Taxation Rules*

Dividend payments from a CFC represent repatriated earnings on which the CFC has already paid taxes to its host country. In countries that allow deferral, it is at this point that a home tax liability is created. Double taxation rules specify the extent to which the home country provides some relief from

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[5]I treat the issue of deferral/accrual as distinct, although obviously not independent, from the issue of double taxation. Until recently the economic and strategic impact of deferral has received relatively less attention than double tax rules. Presumably this is due to the fact that one can study double taxation issues in static models while deferral policies require dynamic analysis. Two recent efforts to focus on the dynamic aspects of deferral include Rosanne Altshuler and Harry Grubert (1996) and Alfons Weichenrieder (1996a).

[6]A number of countries have exceptions to this repatriation rule for earnings from passive investments, e.g. U.S. Subpart F regulations.

double taxation; the most common methods either exempt foreign-source income from home taxation or provide a tax credit for the host taxes.[7] All of the countries represented in Table 1 use one of these two rules.[8] In fact, current OECD and UN treaty conventions, rather than advocating a specific method only proscribe the use of deductions. A possible rationale for such conventions will be discussed in Section 6. For now, the important feature of credit and exemption rules to note is that their proper application requires the parent to divide its income foreign-source and domestic-source as only the former is eligible for double tax relief.

2.3 *Expense Apportionment Rules*

During the oil crisis of the late 1970s and early 1980s, U.S. airlines adopted the strategy of topping off a plane's fuel tank in cities with low fuel prices and unloading this same excess fuel in cities with high fuel costs. Because of substantial variations in fuel prices across the U.S., this strategy provided some relief from historically high fuel costs. In an analogous fashion, double taxation rules can create an incentive for one subsidiary to bear expenses on behalf of another subsidiary or its parent because doing so converts domestic-source income into foreign-source or vice versa.

For countries that exempt foreign income, like Australia, each dollar of cost borne by the parent reduces its global tax liability by its marginal home tax rate. For tax credit countries like Japan, the savings depends on whether the home tax rate is larger or smaller than the host rate. In the first instance, such cost shifting has no effect on home tax liabilities. In the second instance, the parent has excess credits because it can generally claim a tax credit only up to the value of (pre-credit) home taxes due on its foreign income.[9] With excess credits, the effective marginal home tax rate on foreign income is zero

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[7]In practice, the actual calculation of home taxes due on foreign source income is complicated by variations in how CFC earnings are taxed by host countries. These include the use of split-rate systems that tax distributed and undistributed earnings at different rates or imputation systems that provide relief to domestic investors from paying both corporate and individual income taxes on the same dividend. Altshuler and T. Scott Newlon (1993) derive marginal tax prices for dividends that include these variations.

[8]China, Columbia, the Czech Republic, Egypt, Lebanon, and Peru are among the few countries that use deductions as their main method of double tax relief. Angola, Bolivia, Congo, Libya, Mynamar, Nigeria, Uruguay, and Venezuela offer no relief from double taxation.

[9]Some countries have provisions for applying any excess tax credits on earlier or future tax returns.

making the tax savings the same as under an exemption system. Two approaches for distributing parent expenses to calculate domestic source and foreign source income are "tracing" and "allocation." The first attempts to trace the actual source of the costs so that only those costs that are directly linked to foreign operations are labeled foreign-source. The second gets around the cumbersome and complicated tracking of expenses by employing a formula based on various financial ratios. The way tracing and allocation methods work will be made clearer in the next section. Column three of Table 1 reports the preferred method for general costs. In addition, these rules may be supplemented with special provisions for costs associated with parent debt and R&D expenses. The range of special rules is reported in columns four and five and will also be discussed in the next section.

2.4 *Trade Policies*

In addition to opportunities to classify costs for tax purposes, special rules that create export zones or foreign sales corporations provide transnationals with some flexibility in how they structure or classify their revenues. In general, a parent corporation's domestic income from foreign operations can take the form of either exports or royalties.[10] To the extent that countries offer rules that give firms discretion in classifying income sources, they involve allowing firms to classify some domestic-source income as foreign-source. For firms with excess credits, shifting domestic-source income to foreign-source income allows them to use their excess credits and lower their net tax payments.

3. *Financial and Real Investment Flexibility in an Open Economy*

Deferral and the distinction between domestic-source and foreign-source income necessitated by the use of exemption or credit methods create opportunities for both income-shifting and production-shifting. Some details of the common rules used to combat such tax induced behavior and related empirical evidence is presented in this section.

3.1.a *Interest Allocation Rules*

One type of expense allocation rule specifies how a parent must allocate domestic interest expenses to calculate its domestic and foreign income. Suppose a transnational headquartered in an exemption country decides to borrow funds to finance a foreign subsidiary. If the subsidiary borrows on its own behalf, its interest expenses reduce its host profits and hence also the parent's eventual foreign income. Since foreign income is not taxed by its home country, this borrowing has no effect on the transnational's home taxes. However, if the parent borrows the funds, the interest expense reduces the

[10] A third source, service income, does usually not qualify for special treatment under standard sourcing rules.

parent's net domestic income and its home taxes. In effect, the lower home taxes indirectly subsidizes the transnational's foreign investment. To prevent this type of subsidization, some exemption countries - Australia, Luxembourg, and the Netherlands - deny all parent interest deductions for which one can trace or find a paper trail to foreign investments. Other exemption countries allow such interest deductions if the funds are used for purchasing shares in the subsidiary. Examples of such countries are denoted by the term "share" in column four of Table 1. A similar situation exists when the parent is located in a credit country and its has excess credits. Among credit countries, Japan denies a deduction for debt traced to foreign investments. Norway and the United States require parent corporations to allocate domestic interest expenses between domestic source and foreign source income based on asset and sales ratios. For example, if 25% of a Norwegian transnational's assets are titled in Norway, then only 25% of interest expenses incurred by the parent can be expensed against the parent's domestic income. The other 75% must be expensed against the parent's foreign-source income.

Since subsidiaries are typically financed with a combination of debt and equity (as well as retained earnings for mature subsidiaries), changes in either deductibility policies or allocation rules can influence both the composition of subsidiary financing as well as the marginal cost of FDI. Empirical evidence of these effects related to changes in the allocation rules in the TRA has been found by Julie Collins and Douglas Shackelford (1992), Altshuler and Jack Mintz (1995) and Kenneth Froot and Hines (1995).

In his seminal work on the composition of subsidiary financing, Thomas Horst (1977) reported that by 1974 U.S. manufacturing firms had made roughly $21 billion in foreign investments of which only $2.7 billion involved new equity and U.S. debt. The remaining $18.3 billion consisted of foreign debt (debt acquired by the subsidiary in its host country) and retained earnings. More recently Martin Feldstein (1995) reports that, according to the 1989 Benchmark Survey of U.S. Investment Abroad, investment in non-bank CFCs of non-bank U.S. firms totaled $1,237 billion. Of this amount, U.S. equity amounted to $203 billion; U.S. debt, $47 billion; non-U.S. equity, $92 billion; non-U.S. debt, $567 billion; and retained earnings, $328 billion. Not only do foreign debt and retained earnings still account for a significant percentage of subsidiary financing but these 1989 figures also indicate that foreign debt, by itself, is an important source of investment funds.

Prior to 1986, U.S. rules required interest expenses to be allocated on an individual company basis based on the ratio of domestic to foreign assets. Since 1986, interest expense allocations have been determined on a consolidated basis. Froot and Hines (1995) explain that, without this change, a U.S. parent corporation could set up a U.S. subsidiary that controlled all the transnational's foreign assets. By

doing all the borrowing for the transnational and paying the borrowed funds to the subsidiary as equity, the parent could deduct all of its interest expenses against domestic source income. With the TRA and subsequent revisions, domestic interest expenses must now be allocated between domestic and foreign source income based on the ratio of domestic assets to foreign assets less foreign borrowing. Using 1986 and 1991 data, Froot and Hines (1995) show that not only did these rules increase the marginal cost of domestic debt financed investment for parents in excess credit positions, they also increased the relative return to domestic investment. Collins and Shackelford (1992) document a shift towards the use of preferred stock to finance subsidiaries.

The Horst and Feldstein data suggest a third effect - a decrease in the marginal cost of foreign debt. As one increases the proportion of foreign debt financing for a given level of FDI, the ratio of foreign assets less foreign borrowing to domestic assets falls and a U.S. parent can expense more of its domestic interest expenses against domestic source income. Unfortunately, data on the distribution of transnational debt is difficult to come by. Using a special data base describing the financial structure of a small number of large transnationals compiled by Price Waterhouse, Altshuler and Mintz (1995) find some support for a shift towards foreign debt from 1986 to 1991. First, for each 1% increase in the allocation of domestic interest expenses to foreign source income, the ratio of foreign debt to worldwide debt increased by 1.7%. Second, the post-1986 rules increased the effective tax rate on outbound U.S. FDI to Canada, Japan, and the U.K. from 7% to 10% while only increasing the effective tax rate on U.S. investment by 5%.

3.1.b *R&D Expense Allocation Rules*

A second type of expense for which cost shifting tax strategies can arise is R&D. Many countries offer some form of tax incentive to encourage R&D investments. The rationale is that R&D investment not only generates specific benefits to the investor but also generates spillover benefits to the economy at large. Because the spillovers do not accrue to individual investors, the aggregate level of R&D will be below the socially optimal level unless some type of Pigouvian subsidy is offered. Generally the subsidies take the form of a tax credit (e.g. France, Japan, and the US offer tax credits for marginal increases in R&D spending) or an enhanced deduction for expenses (e.g. Australia allows a deduction for 125% of R&D expenses). The specific policies for the countries covered in Table 1 are reported in column five. Of course, to the extent that some of the domestically undertaken R&D is targeted for application in another country, such subsidies end up promoting increased investment for which some of the spillover benefits accrue to foreigners. The stochastic link between R&D spending and actual product or production improvements makes tracing difficult and leaves countries with only

one active option - allocation formulas.

To the best of my knowledge, the U.S. is the only country that explicitly imposes allocation rules on R&D spending in an attempt to limit the subsidization of R&D to R&D with domestic applications. For economists the use of apportionment rules is interesting because, as with the interest allocation rules discussed above, the R&D apportionment rules only affect the marginal tax rate on R&D activity for firms in excess credit. Thus, changes in the apportionment formula creates natural experiments for assessing the tax sensitivity of R&D investment. According to Hines (1993), the U.S. tax rules on R&D expense apportionment changed frequently in the 1980s, in part because of unanticipated responses by transnationals gaming the rules. In 1977 when the first apportionment rule was codified, firms were required to allocate a portion of their domestic R&D expenses against foreign source income. In 1981, ostensibly out of concern for declining R&D investment in the U.S. relative to that in other countries, Congress introduced a 25% tax credit for domestic R&D expenses based upon moving three year averages and allowed for 100% apportionment against domestic source income.[11,12] The TRA required partial allocations again, but under more generous rules than in 1977, and reduced the value of the tax credits. Since 1986, the apportionment formulas have been modified numerous time - mainly due to unintended responses to the rules. Current rules require U.S. transnationals to allocate 50% of R&D expenses against domestic source income with the remainder either allocated against foreign source income or apportioned between both income sources based on relative sales or asset levels.

The response of U.S. transnationals to the changes in tax credit provisions and apportionment rules during the 1980s is documented in several papers by Hines. Hines (1993) reports an after-tax price elasticity of 1.2 to 1.6 for R&D expenses. Hines (1994b) reports that the TRA changes had little effect on the location of R&D abroad relative to in the U.S. in part because of unfavorable tax treatment for foreign R&D expenses. As a result, most R&D used by subsidiaries of U.S. firms is performed in the U.S. and licensed to the subsidiary. In 1989, subsidiaries of U.S. transnationals received only $54 million in royalty payments from their U.S. parents while making $9.8 billion in royalty payments to U.S. parents. Finally, Hines (1995) examines the role of withholding taxes on technology transfer since higher withholding taxes raise the cost of imported technologies. A withholding tax is a tax paid to a

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[11]It should be noted that, at about the same time, the Carter administration pushed through patent law reforms that reversed an almost 30 year deterioration in patent protection in U.S. courts.

[12]The use of moving average formulas creates incentives for transnationals to time R&D investment to take advantage of tax benefits.

host country when a subsidiary makes a dividend or royalty payment to its parent. It is intended to capture the income taxes that would have been paid had the dividend or royalty been received by a host citizen. He estimates an elasticity of royalty payments to the withholding rate of -0.4. This reduction in royalty payments occurs because the higher withholding tax both discourages the use of imported technologies and it reduces incentives for engaging in pre-tax profit shifting via the royalty rate.

3.2 *Transfer Pricing*

When one subsidiary transfers an asset or provides a service to another subsidiary of the same transnational, the separate legal identities of the subsidiaries require that a value be placed on the transfer. If a well-functioning market for the intermediate good exists, the appropriate value to place on the transfer is rather easy for tax authorities to determine. However, with transnationals the transferred assets are specialized enough that comparable products produced by firms not related to the transnational do not exist or they are intangible in nature, e.g. technical knowledge. Such features mean that accurate economic information on the asset's value will be difficult to find and that the transnational may have considerable discretion in setting its transfer price. When the transfer takes place between subsidiaries in different tax jurisdictions charging different marginal tax rates, one important objective the transnational may pursue is tax minimization. As with the last two examples, transfer pricing strategies create both real and financial effects.

Since the seminal work by Lawrence Copithorne (1971) and Horst (1971), considerable time and effort has been invested, by both researchers and governments, studying this potential for transnationals to use transfer prices to shift the apparent location of profits. The evidence of tax-induced transfer price behavior is not uniform across industries. Studies of Colombian affiliates of U.S. transnationals by W. Erwin Diewert (1985) and Lorraine Eden (1985) suggest markups ranging from 25% in the chemical industry to 155% in the pharmaceutical industry. Grubert and John Mutti (1991) also offer evidence of strategic transfer pricing using industry level data. Among their results they show that transfer prices are affected by tax differentials as well as other aspects of the commercial policies the transnational faces such as tariffs. However, Jean-Thomas Bernard and Robert Weiner (1990) do not find evidence of transfer pricing by U.S. transnationals in the petroleum industry despite the absence of spot markets for crude oil and significant industry concentration during the time period covered by their data (1973-1984). K. Hung Chan and Lynne Chow's (1997) study of transfer pricing regulation in the PRC also finds little evidence of tax-induced transfer pricing although they do find evidence of transfer price manipulations due to foreign exchange control and devaluation risk.

More recently, research using firm-level data by Grubert, Timothy Goodspeed, and Deborah

Swenson (1993) and David Harris, Randall Morck, Joel Slemrod, and Bernard Yeung (1993) report evidence consistent with tax-induced transfer pricing behavior. For example, Harris etal. find that U.S. transnationals with subsidiaries in low-tax countries have lower U.S. tax liabilities (i.e. low net domestic source income associated with foreign operations) per dollar of assets or sales than those with subsidiaries in high tax countries. This general result can be consistent with several explanations besides tax-induced transfer pricing including higher tax countries provide better investment opportunities for U.S. transnationals (their evidence suggests that this is only true for Japan), deferral (the economics of benefitting from deferral suggest the opposite of the observed pattern), debt-shifting (the levels of debt placement appear to be too small to explain differences in tax liabilities for the largest transnationals) and transitory macroeconomic conditions (again the evidence suggests that this may only be true of Japan). Overall their evidence suggests that while transnationals do not set up foreign operations to benefit from transfer pricing opportunities neither do they ignore these opportunities when they exist. It appears that the bulk of the transfer pricing distortions are generated by the largest U.S. transnationals. Harris etal. estimate that these transnationals end up reducing their U.S. tax liabilities from foreign operations by 52%. Finally, Grubert and Slemrod (1998) report that income shifting appears to be the primary reason for U.S. investment in Puerto Rico. Because of special rules related to the tax treatment of income from U.S. possessions, income earned in Puerto Rico is effectively exempt from U.S. taxes.

From the perspective of national or state governments, the economic impact of tax-motivated transfer pricing goes beyond lost tax revenues. It can also result in economic distortions in production decisions.[13] How obvious these distortions are depends on the type of transfer price regulation adopted. Currently the norm is to adopt procedures for identifying transfer price abuses that explicitly disregard the potentially significant distortions in production and investment they might create. Harris (1993) offers one indication that such distortions exist. He finds strong evidence of both income shifting and investment shifting behavior by U.S. transnationals in response to the TRA.

The issue of transfer pricing also arises between states or provinces and the method for addressing transfer price concerns can be very different. In the U.S., most states use apportionment formulas to allocate a firm's profits for the purpose of calculating state taxes. The most common apportionment formulas use a weighted average of relative amounts of sales, payroll, and property attributable to a firm's operations within each state. As one might expect, such rules distort a firm's

[13]Enforcement costs can also exceed tax revenues as Roger Gordon and Slemrod (1988) document in the case of U.S. taxes on capital income.

production and pricing decisions. The precise general equilibrium distortions are derived by Gordon and John Wilson (1986). Empirically, the location and level of inbound FDI is quite sensitive to variations in such rules. In his study of the distribution of inbound FDI for the U.S., Hines (1996) estimates that a 1% reduction in a state income tax rate could increase capital investment by 10%. Thus, the issue of transfer pricing cannot be viewed solely as a distributional issue. The incentives tax differentials create also produce real investment effects.

Reflecting the economic importance of transfer price regulations are several high profile government studies conducted over the last several decades including UNCTAD (1978), OECD (1984), and U.S. Treasury (1988). The last two studies form the basis for revised transfer price rules (OECD (1995) and U.S. Treasury (1994)). The impact of these rules (which are very similar) is due to the introduction of two ideas: a "best methods" rule recognizing that the most reliable method for evaluating a company's transfer prices will vary from industry to industry as well as across companies and across product lines (prior to the 1994 rules a more rigid assignment of procedures was mandated) and "advanced pricing agreements" (APAs) which give transnationals an opportunity to negotiate with the IRS over how best to calculate transfer prices before being audited.[14]

The "best method" provisions legally obligates the transnational to prove its method best approximates an arm's-length price, i.e., the price at which two independent firms would carry out a similar transaction. Certainly in competitive markets such a price would reflect true economic value. However, for many transactions, the market is anything but perfectly competitive and the extent to which the environment in which the transfers occur is imperfect may bear on the assessment of the value of a transfer. Several examples illustrate some of the problems that accompany arm's-length standards.

In imperfectly competitive markets both the targeted or tested firm and the firms providing comparable data are all likely to have some market power. Robert Halperin and Bin Srinidhi (1996) show that, when the tested and comparable firms compete in an oligopoly, transfer price rules that use comparable data can distort market prices. Vibhas Madan (1998) and Guttorm Schjelderup and Weichenrieder (1999) also demonstrate that arm's-length transfer price rules can interact with a country's trade policies and result in perverse outcomes.

It may also be inappropriate to compare data from unintegrated firms to judge the appropriateness of transfer prices of integrated firms. One motivation for a transnational to form is that

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[14]Many European countries remain reluctant to use APAs. Australia on the other hand has a treaty with the U.S. which allows for joint APAs.

vertical integration eliminates incentives for opportunistic behavior when efficient production requires investment in relationship specific investments. If a supplier needs to install highly specialized equipment to serve a customer, once the initial equipment investment is made the customer can seek to renegotiate prices in order to appropriate the rents from the specialized investment. Vertical integration eliminates the incentive for this type of behavior and as result also helps the integrated firm realize operating efficiencies it otherwise would not. Thus, vertically integrated firms can be expected to have a different cost structure than non-integrated entities. Yet arm's-length regulations sometimes require an integrated firm to justify its transfer prices by comparison with non-integrated firms. Harris and Richard Sansing (1998) demonstrate that, as a result, arm's-length prices can distort the investment decisions (both levels and distributions) of both divisions in a transnational.

3.3 *Categorizing income.*

Mutti and Grubert (1998) analyze the cost and benefits of a firm's selection of income sources. If a transnational chooses to produce its product at home and export it to the foreign market, foreign sales corporation rules, if available, would allow it to categorize some of its export income as foreign source. This would benefit the transnational if the parent has excess credits. However, the decision to export the product as opposed to producing it in the foreign country would subject the parent to tariff payments. Mutti and Grubert's calculations indicate that the benefits of the sourcing rules would outweigh the cost of the tariffs only if the firm's gross profit margins are high enough. Alternatively, the attractiveness of subsidiary production and the attendant royalty payments depends on the host country's withholding rate. For firms in excess credit, the benefits from royalty payments is most pronounced when royalties represent a significant proportion of foreign source income and withholding rates are low. The first condition arises when intangible assets comprise a large proportion of asset transfers to the subsidiary. Thus, Mutti and Grubert suggest that export production is most attractive for high margin goods while affiliate production is most attractive when intangibles represent a large component of production. For low margin goods with small intangible components, service income appears to be the best alternative.

4. *Why Tax Corporate Income?*

Given the numerous difficulties associated with designing corporate tax policy in an open economy, it is important to ask from a normative perspective: Should corporate income be taxed? In a large open economy, the use of corporate taxes to distort capital flows by influencing international rates of return on capital can create a beneficial "terms of trade" effect. What about in a small open economy? Are there additional economic rationales beyond market power for taxing corporate income? For closed economies, the seminal work of Peter Diamond and James Mirrlees (1971) shows that combinations of

income and commodity taxation are consistent with national welfare maximization and productive efficiency given either constant returns to scale or pure profit taxes. Since then the work of others (e.g. Alan Auerbach (1979), and Kåre Hagen and Vesa Kanniainen (1995)) suggests that features common to international investment, such as heterogenous capital or international differences in intertemporal marginal rates of substitution, may require some efficiency-welfare compromises that modify our understanding of optimal tax policies. In fact, by extending Diamond and Mirrlees' analysis to the case of small open economies with mobile capital and immobile labor, Gordon (1986) presents a strong argument against corporate income taxation. Not only does a positive corporate income tax rate result in inefficient levels of capital investment, the economic burden of the tax ultimately falls on labor income. It would be more efficient to simply tax labor income directly.

An important role for corporate income taxes arises in A. Lars Bovenberg and Gordon (1996) where informational asymmetries between domestic and foreign investors about the value of domestic investments in a small capital-importing country creates a lemons effect which, on the margin, discourages inbound foreign investment. Bovenberg and Gordon show that a corporate income tax coupled with a net subsidy to foreign investors corrects this distortion and equalizes foreign and domestic equilibrium rates of return.

Gordon and Jeffrey MacKie-Mason (1995) offer a second, and in my opinion, more fundamental reason for corporate income taxation: corporate taxes help limit the extent to which managers might substitute between wage and non-wage forms of compensation or analogously the extent to which tax differentials between corporate and personal income distort career path decisions. The following simple model illustrates this effect. Consider a competitive economy with free entry in which output is produced with labor via a constant returns to scale technology. Employees can be compensated in two ways: with wage income taxed at the personal rate τ^* and with alternative compensation taxed at the corporate rate t^*. If a fraction s of the worker's compensation w is taxed at the corporate rate then the after-tax wage is

$$w_n = w[(1-\tau^*)(1-s) + (1-t^*)s]. \tag{1}$$

To a firm, non-wage income is more costly than wage income. Denote this added cost by $b(s)$ where $b(0)=0$, $b'(\cdot) > 0$, and $b''(\cdot) > 0$. For a given share s, total wage costs are $c_w = w(1+b(s))$. Minimizing total wage costs associated with a given after-tax wage, w_n, requires the firm to substitute non-wage income for wage income as long as the higher cost of non-wage income can be offset by a sufficient reduction in the workers' total compensation. This substitution is possible only when an increase in s benefits workers through a lower marginal tax burden, i.e. when $\tau^* > t^*$. The optimal share of non-wage

income satisfies

$$b'(s) = (\tau^* - t^*)(1 + b(s))/(1 - \tau^* + s(\tau^* - t^*)) \quad (2)$$

meaning employers will prefer to use non-wage income when the personal tax rate is higher than the corporate tax rate.

Because firms earn zero profit in equilibrium, total equilibrium tax revenues equal

$$R = w[\tau^*(1-s) + t^*s] \quad (3)$$

where the total supply of labor is normalized to 1. The individual's indirect utility from any tax regime (τ^*,t^*) is $V(w_n)$ and the government's objective is to set tax rates to maximize utility subject to $R \geq R^*$, where R^* is a tax revenue level. For a given value of w_n, the cost of the non-wage income, $b(s)$, represents a deadweight loss. Notice that by setting $t^* = \tau^*$ the government can induce the firm to lower s to 0 and raise w to $w_n/(1-\tau^*)$. These changes reduce the deadweight loss and relax the revenue constraint. So although the model is that of a closed economy, corporate taxation can be viewed as a tool for eliminating socially inefficient compensation.

In an open economy, this same need for a corporate income tax persists but now tax differentials between countries can compromise its effectiveness. For instance, suppose that the firms in this previously-closed economy are subsidiaries of corporations located in another country and that the subsidiary output is sold to the parent corporations which uses it for final good production. As is common with transnational transactions, these intermediate inputs provided by the subsidiaries do not have close substitutes that freely trade. Yet, for tax purposes, the transnational must set an appropriate transfer price. If corporate profits are taxed at different rates in the two countries, a transnational can use its transfer price to shift income into the lower tax jurisdiction. For the higher tax country, reducing its corporate rate to reduce the transfer price distortions reintroduces the compensation distortions.

To demonstrate how this tension between compensation-shifting and profit-shifting via transfer prices arises, consider a modified version of a model developed by Gordon and MacKie-Mason (1995).[15] There are two countries and many similar transnationals. The parent corporation of each transnational produces a final good at a price q. For simplicity, each unit of the final good requires one unit of an

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[15]In a related paper that presupposes the use of corporate taxes, Andrea Haufler and Schjelderup (2000) show that when small open countries choose both the size of the tax base (by specifying the deductibility of investment costs) and the tax rate, first-best policies call for full deductibility of investment costs while, in an open economy, transfer pricing effects necessitate a partial deductibility policy.

intermediate good, X, which is produced by a subsidiary in the host country with a constant returns to scale technology.[16] Labor is the only input so unit cost is c_w. The transfer price is p^*. The home country corporate rate, t, is less than the host country corporate rate, t^*. This gives the transnational an incentive to set the transfer price below c_w in order to shift profits out of the host country.

If the intermediate good was freely traded in a competitive market, the equilibrium price would be c_w. With no trade in X between independent parties, the host government cannot easily observe c_w and instead uses an imperfect auditing procedure to evaluate each transnational's transfer price. If auditing identifies underpricing, a tax penalty is imposed by the host government on the subsidiary. Denote the expected value of this additional per unit tax liability by the convex function $\Gamma(t^*, c_w - p^*)$ where $\Gamma(\cdot,0)=0$, $\Gamma(\cdot, c_w - p^*) > 0$ if $p^* < c_w$, $\Gamma_1(\cdot,\cdot) > 0$ if $p^* < c_w$, and $\Gamma_2(\cdot,\cdot) > 0$ if $t^* > 0$. Thus, the expected penalty is strictly positive only if the transnational's transfer price is less than its host wage cost. Increases in the host tax rate increase the expected penalty for any given transfer price while increases in the transfer price are consistent with both a higher probability that the audit uncovers a manipulated transfer price and a larger penalty. Together these assumptions imply that the transnational's global post-tax profit is

$$\pi_n = (1-t)(q - p^*)X + (1-t^*)(p^* - c_w)X - \Gamma(t, c_w - p^*)X \tag{4}$$

and the host country's tax revenue from each unit of X is

$$w[\tau^*(1-s) + t^* s] - t^*(c_w - p^*). \tag{5}$$

For any given tax rates, t, t^*, and τ^*, each transnational chooses s, w, X and p^* to maximize (4) subject again to a given after-host-tax reservation wage. A firm's choice of s and w is separable from its choice of X and p^* as the latter two variables do not influence the firm's margins on the first two. Thus, (2) still defines the optimal value of s. If $t=t^*$, the first-order conditions imply $p^*=c_w$ and $q = c_w$. However, when $t^* > t$, the optimal transfer price implies $p^* < c_w$, and, because $\Gamma(\cdot,\cdot)$ is convex, zero profits imply

$$q = c_w + [(t^* - t)(p^* - c_w) + \Gamma]/(1-t) < c_w. \tag{6}$$

Comparing (5) with (3) also shows that increasing the corporate rate, t^*, to equal the labor tax rate, τ^*, eliminates the deadweight loss from income-shifting but increases the welfare losses from profit-shifting. Thus, for fixed values of τ^* and t such that $\tau^* > t$, transfer pricing opportunities limit the effectiveness of a corporate tax in addressing income-shifting distortions and vice versa. While the general equilibrium implications of this rent-shifting is not well understood, a variety of partial equilibrium effects have been

[16] This assumption results in multiple equilibria as the number of firms and X are indeterminate. However, all equilibria exhibit the same qualitative transfer pricing behavior.

studied. I will return to a discussion of these in Section 6. For the present discussion, it is hopefully clear that the ability of transnationals to shift resources across national borders places additional demands on a country's corporate tax structure.

5. *Two Basic Problems of Transnational Taxation*

Once one accepts the need for a corporate income tax in an open economy, two basic issues concerning the scope of a country's corporate tax policy arise. The first is, "What corporate income should be taxed?" For citizens, the typical options are tax worldwide income or tax only domestic income. For foreign investors, the income they earn in a host country is generally subject to host taxation although in some optimal tax models host countries are assumed to have the discretion to exempt such income. The second issue is, "Does the form of double taxation relief matter?" Both of these questions arise because operating in an open economy endows transnationals with financing and investment strategies that can help deflect the intended impact of national tax policies.[17] The answers to these two questions are not independent. Moreover, for the double taxation question, we will again see that the ability to use transfer prices for income shifting will be important.

5.1 *A basic model of transnational taxes*

Two frequently studied polar cases of transnational tax policies are the pure source and pure residence systems. Under the first system, a country taxes the returns to domestic investment regardless of the nationality of the investor. Under the second system, a country taxes the global income of its residents and does not tax the returns to domestic investment by foreign investors. A simplified version of a model due to Mintz and Henry Tulkens (1996) can be used to evaluate these, and other hybrid, systems.

Consider two economically small countries A and B. A representative individual (referred to as a and b) in each country makes an investment decision. Individual a is endowed with K units of capital which can be invested in either country and L units of immobile labor. Let κ equal the amount a invests in B so that K-κ is the amount a invests in A. Denote similar variables for b by use of an asterisk. Consistent with the tax competition models discussed in the next section as well as the early optimal taxation models of George MacDougall (1960) and Murray Kemp (1964), we only consider the possibility of one-way capital flows. Both capital and labor endowments are inelastically supplied, A is the capital-exporting or home country, and B is the capital-importing or host country. Thus, the total

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[17]Gordon's important (1986) study of taxation in an open economy explicitly ignores issues arising from transnational corporate structures.

invested in country A is K-κ and the total invested in country B is $K^* + \kappa$. Output is defined by the quasi-concave, constant returns to scale production functions, $f(\cdot,\cdot)$, in A, and $f^*(\cdot,\cdot)$ in B. Output and factor markets are assumed to be perfectly competitive.

This presents each country with two distinct capital income flows and scope for two possible capital income tax rates, t_{Aa} and t_{Ba}, where t_{ij} denotes the tax rate levied by A on capital income earned in country i by investor j. Using the same notational convention, B's relevant tax rates are t^*_{Bb} and t^*_{Ba}. National sovereignty implies that $t_{Bb} = t^*_{Aa} = 0$, that is, neither country has the ability to tax the domestic income of the other country's residents. Using the terminology of Mintz and Tulkens (1996), a pure source system of taxation in A means that investor a pays taxes to country A only on its domestic income or that $t_{Ba} = 0$. A pure residence system in A allows country A to tax investor a on its worldwide income or that $t_{Ba} > 0$. It is also possible under a residence system that $t_{Ba} \neq t_{Aa}$. With transnational investment, the distinction between source and residency principles becomes a little fuzzy. If a transnational based in A makes direct foreign investments through a subsidiary incorporated in B, the subsidiary is considered a legal resident of B. As such, income from the subsidiary is technically not earned by the parent in A until it is repatriated to the parent. Thus, a transnational in A could circumvent residence taxes on foreign income by leaving the income in B.[18] Finally, assume that each country sets its tax rates before a decides where to invests his or her capital. Because of the one-way capital flow assumption, all of b's capital is invested in B.

The issue of double taxation becomes relevant if a home country adopts residence-based taxes (pure or combined with some source taxation) and a host country adopts a source-based tax system.[19] Denote A's adjustment policy by the function $\alpha(t_{Ba}, t^*_{Ba})$. For investor a, its effective tax rate on investments in B is $T_{Ba} \equiv t_{Ba} + t^*_{Ba} - \alpha(t_{Ba}, t^*_{Ba})$. With this notation, the three generic double taxation rules can be defined: exemption, $\alpha(\cdot,\cdot)=t_{Ba}$, which effectively converts a residence system into a source system; deduction, $\alpha(\cdot,\cdot) = t_{Ba} t^*_{Ba}$, which treats B taxes as a cost of business and makes the after-tax return on a dollar of foreign investment income $(1 - t_{Ba})(1 - t^*_{Ba})$; and credit, $\alpha(\cdot,\cdot) = t^*_{Ba}$ if $t^*_{Ba} \leq t_{Ba}$ and $\alpha(\cdot,\cdot) = t_{Ba}$ if $t^*_{Ba} > t_{Ba}$, which makes the investor's effective tax rate on foreign investment income equal to

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[18] Active investment rules such as Subpart F rules in the US are designed to limit the use of this strategy.

[19] A further complication that, for the sake of simplicity, will be ignored is the role of withholding taxes which were briefly introduced in Section 3.

$\max\{t_{Ba}, t^*_{Ba}\}$.[20] In the first credit case a is said to be in an excess limit position while in the second credit case a is said to be in an excess credit position. Without the second part of the credit rule definition, a's net liability to A from its investments in B, $t_{Ba} - t^*_{Ba}$, could be negative.

In a static, non-strategic model with inelastic capital supply and no consumption, Koichi Hamada (1966) showed that for any given set of tax rates from a capital exporting country and a capital importing country, FDI flows are higher with either credits or exemptions than with deductions. This is because the after-tax return from a dollar of FDI with a deduction rule is $(1 - t_{Ba})(1 - t^*_{Ba})$ while with a credit or exemption rule it is either $1 - t_{Ba}$ or $1 - t^*_{Ba}$. Thus for any given set of tax rates, a deduction rule distorts the marginal return on FDI the most. From a national welfare perspective, a credit rule has been strongly criticized on the grounds that it allows a capital-importing country to effectively appropriate tax revenues from the capital-exporting country by setting its corporate income tax rate at or above the capital-exporting country's rate. Additionally, Peggy Musgrave (1969) has argued that a credit rule encourages too much outbound FDI. If a is the capital exporter and b inelastically supplies all of her capital for B production, excessive FDI is encouraged because a will invest domestically and abroad to equate after-tax rates of return,

$$(1 - t_{Aa})f_K(K - \kappa, L) = (1 - \max\{t_{Ba}, t^*_{Ba}\})f^*_K(K^* + \kappa, L^*).$$[21]

Alternatively, if country A's goal is to maximize national income, equal to output in A plus after-tax income from investments in B, the nationally optimal levels of domestic and foreign investment should

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[20]Which rule a transnational investor can or must use will often depend upon two characteristics of the foreign investment: control and corporate structure. First, if an investor does not own a significant percentage of shares in the foreign operations, the income is treated as portfolio income. Portfolio investment income and direct investment income are often subject to different tax rules. Second, foreign operations of transnationals can be set up either as a branch of parent operations or as a subsidiary. In the former case, the foreign office is considered an extension of the parent investor's domestic operations and its income is treated as domestic income of the parent regardless of its actual disposition (repatriation or reinvestment). In the latter case, the foreign office is a legally incorporated resident of the foreign country and as such has income that is not subject to taxation by the parent's home country until it is not actively reinvested or it is repatriated to the parent via a dividend, royalty, or interest payment. For simplicity, I will assume that all investment is direct and controlled and that foreign offices are subsidiaries. The latter assumption will not become relevant until the next section.

[21]Subscripts denote marginal products.

equate the after-tax foreign return with the pre-tax domestic return,

$$f_K(K - \kappa, L) = (1 - \max\{t_{Ba}, t_{Ba}^*\}) f_K^*(K^* + \kappa, L^*)$$

as t_{Aa} has only distributional effects. In general, *a*'s FDI choice will not maximize national income under credits but, as Musgrave shows, it will under deductions.

5.2 *Source versus residence taxation?*

Interest in studying the economic implications of source and residence systems is motivated by two facts: relative simplicity and capital-export neutrality. Capital-export neutrality of a single country's tax system arises if the effective tax rates on domestic and foreign investment do not distort the allocation of capital. If *a*'s capital is internationally mobile, then in equilibrium

$$(1 - t_{Aa}) f_K(K - \kappa, L) = (1 - t_{Ba} - t_{Ba}^* + \alpha(t_{Ba}, t_{Ba}^*)) f_K^*(K^* + \kappa, L^*). \quad (7)$$

Under a residence system with a full credit ($\alpha(\cdot, t_{Ba}^*) = t_{Ba}^*$) in *A*, (7) simplifies to

$$(1 - t_{Aa}) f_K(K - \kappa, L) = (1 - t_{Ba}) f_K^*(K^* + \kappa, L^*). \quad (8)$$

If $t_{Aa} = t_{Ba}$, then the capital supplied at those tax rates will be efficiently allocated in *A*. Under a source system, the same is true only if $t_{Aa} = 0$. However, under a residence system in *A* without full crediting (full crediting is not observed in practice), the capital flow, κ, that solves (7) for any arbitrary tax rates need not imply efficient capital flows. For example, with a deduction rule (7) becomes

$$(1 - t_{Aa}) f_K(K - \kappa, L) = (1 - t_{Ba})(1 - t_{Ba}^*) f_K^*(K^* + \kappa, L^*).$$

Now *A* can induce efficient capital flows only if $t_{Aa} > t_{Ba}$.

Another way to appreciate the differences between source and residence systems is to look at *a*'s effective home marginal tax rate on outbound foreign investment, T_{Ba}. With source taxation, $T_{Ba} = t_{Ba}^*$, and with residence taxation (and full crediting), $T_{Ba} = t_{Ba}$. Unless economic assumptions imply that $T_{Ba} = t_{Ba}^*$ is nationally optimal for *A*, source taxation restricts *A*'s ability to maximize national welfare.[22] Thus, pure source taxes appear to be (weakly) dominated by pure residence taxes.

The point of this discussion is that a country's choice of what transnational income to tax is not independent of its choice of a double taxation rule. Moreover, with the possibility of two-way capital flows, Assaf Razin and Efraim Sadka (1990) demonstrate that transnational capital investment not only increases the complexity of capital income taxation for individual countries it also introduces global conditions on taxes to eliminate arbitrage opportunities between countries. These global conditions may require some degree of tax coordination.

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[22]Mintz and Tulkens (1996) show that with two-way capital flows and additively separable production functions source taxation can be nationally optimal.

Whether such coordination can be achieved without distorting capital flows depends in large part on the tax-setting incentives transnational investment present each country. A simple comparison of the residence and source systems suggests countries may prefer residence systems. By taxing the worldwide income of one's residents, the economic burden of a tax increase is distributed globally and by not taxing the domestic investment income of foreigners, the supply of foreign capital is maximized. On the other hand, adopting source taxes results in a country internalizing any tax-induced economic distortions. In a model in which foreign-paid taxes are deducted, Razin and Sadka (1991) confirm that a residence system arises in a Nash equilibrium of a tax competition game between two countries.

In reality, most countries adopt tax policies that involve both residence and source taxes, and I would argue, they do so for reasons intimately associated with the corporate structure under which domestic and foreign investments occur. That is, so far in this section, no attention has been given to the manner in which investments are made. Once one does pay attention to these issues, the significance of tax competition or investment models with pure source or residence taxes is suspect.

The model I have just sketched out, which is representative of many of the models employed in the study of tax competition with mobile capital, is really a model of capital income tax competition and not corporate income tax competition. Yet the ability to construct the legal structure of one's investments can have important tax implications. Consider the following strategy (which is now neutralized by the tax laws in most countries). Suppose that *A* levies only residence taxes and that *B* does not tax corporate income. If *a* sets up a corporation in *B*, which I will call corporation β, any income from this investment will be taxable in *A* upon repatriation. Suppose also that β invests its capital in investments located in *A*. Since β is not a resident of *A*, it will pay no taxes to *A* on its income. Instead, from its *A* income β funds new investments and only pays a dividend to *a* if *a*'s direct domestic investments are inadequate to cover its consumption needs. In this case, the existence of a low-tax country like *B* creates an opportunity for *a* to reduce the taxes it pays on domestic investment through creative corporate structuring. Razin, Sadka, and Chi-Wa Yuen (1998) show that this same basic idea applies if, instead of manipulating corporate structure, an investor has several sources of investment capital other than equity, e.g. retained earnings and debt, and if the investor has strict preferences over the various sources (perhaps associated with internal risk differences such as moral hazard). In such a case, they show that a pure residence policy is no longer nationally optimal and hence that countries should think about using both source and residence taxes.

5.3 *Does the double taxation remedy matter?*

Despite the exogeneity of tax rates, the Hamada/Musgrave debate highlights the potentially

important interaction between tax rates and double tax rules. Yet Hans Werner Sinn (1984) and David Hartman (1985) dispute the Hamada/Musgrave conclusion that double tax rules necessarily have real economic effects by showing that the investment and dividend decisions of mature foreign subsidiaries, that is, subsidiaries that can finance new projects out of retained earnings, are unaffected by home country tax rates and double taxation rules as long as the parent company is allowed to defer home taxes on subsidiary profits until these profits are repatriated. Hartman uses a simple two-period model to illustrate his argument. Assume that a foreign subsidiary has $1 of post-host-tax profit. It can either pay out this dollar to its parent as a dividend now or reinvest the dollar and pay out the dollar plus the post-host-tax return later. Let t denote the rate at which foreign source income is taxed by the home government and let t^* denote the rate at which this income was taxed in the host country. For simplicity assume that $t > t^*$. With a credit for foreign paid taxes, the home tax liability on a dollar of foreign source income is calculated in three steps. First, the foreign taxes associated with this dollar of post-host-tax subsidiary profit is added back in - a step referred to as "grossing up." Second, a home tax liability is calculated on these grossed-up profits. In this case, the liability equals $t/(1-t^*)$ dollars. Third, a credit for taxes paid to the host country, $t^*/(1-t^*)$ dollars, reduces the parent's domestic tax liability to $(t-t^*)/(1-t^*)$ dollars and leaves post-home-tax profits of $(1-t)/(1-t^*)$ dollars. If the net return on home investments is r, repatriating the dollar of subsidiary profit now is worth $(1-t)(1+r)/(1-t^*)$ dollars to the parent. On the other hand, if the dollar of subsidiary profit is reinvested in the host country with a net return of r^* and then repatriated, the parent's after-home-tax return equals $(1-t)(1+r^*(1-t^*))/(1-t^*)$ dollars. Equating these two post-tax returns shows that only the net returns and the host tax rate will affect the subsidiary's dividend/investment policy because a credit rule results in both the profit from investing repatriated funds, $1+r$, and the profit from reinvesting in the host country, $1+r^*(1-t^*)$, being taxed proportionately. Present values calculations are not relevant since, in both cases, one has to wait one period to reap the benefits of the investment. Given the proportional impact of home taxes under credits, delaying repatriation does not confer any tax benefit. Under a deduction policy, the only part of this argument that changes is that now a dollar dividend from a foreign subsidiary yields $(1-t)$ dollars after home taxes. Thus, the choice of double taxation method also has no impact on dividend and investment policy.[23]

Theoretically the Hartman-Sinn result can be overturned by dynamic investment factors. Chad

[23]Note that this argument assumes that the home tax rate does not distort the equilibrium rate of returns, r and r^*.

Leechor and Mintz (1993) show that differences in the definition of taxable income (e.g. differences in allowable depreciation schedules) can make repatriation and investment decisions sensitive to home tax rates. For instance, a slower depreciation of invested capital in the home country serves as an additional tax on repatriated foreign income, the effect of which on an investor's marginal cost of FDI depends on both countries' tax rates and the home country's double tax rule. Altshuler and Paolo Fulghieri (1994) point out that in a dynamic environment, a firm can also time its investments to take advantage of changes in tax rates. For example, when the Tax Reform Act of 1986 (TRA) lowered corporate income tax rates in the U.S., the benefit of earning tax credits from repatriating foreign income was increased because it increased the number of countries from which foreign income could be repatriated without incurring additional U.S. tax. Anticipating this change in tax laws would have encouraged some U.S. transnationals to delay repatriation until after passage of the act. Finally, Hines (1994a) uses a dynamic model with subsidiary debt, royalty payments, and investment tax credits (which affects tax base definitions) to demonstrate the importance of the home country rate in calculating the after-tax cost of FDI capital.

Several empirical studies help us gauge the importance of these dynamic factors. Hines and Hubbard (1990) reports that in 1984 both home tax rates and the credit position of the parent division of the transnational influenced the level and form of repatriations. They found that US parents in excess credit positions accounted for 53% of dividends from subsidiaries while US parents in excess limit positions accounted for 63% of royalty payments and 58% of Subpart F income (passive investment income subject to immediate US taxation). They also found that parents with higher tax liability to asset ratios had significantly lower ratios of dividend plus Subpart F income to assets. Using 1986 data from U.S. returns, Altshuler and Newlon (1993) find a negative and highly significant relationship between the ratio of subsidiary dividends to subsidiary assets and the effective marginal tax rate on foreign source income: a 1% increase in the tax price of dividends reduces dividends by 1.5%. Additionally, Altshuler and Newlon (1993) identify a significant effect of a firm's expected future effective marginal tax rate on dividends associated with the likelihood of a parent switching from an excess credit position to an excess limit position or vice versa. This switching effect is shown to reinforce, rather than moderate, the direct tax rate effect. This is consistent with Harris (1993) who finds empirical evidence of both increased repatriations and increased FDI out of the US due to the TRA. However, when Altshuler, Newlon, and William Randolph (1995) decompose variations in the effective marginal tax rates on repatriations into permanent and transitory components they find that the impact of home tax policy is due only to transitory rate changes. While this last result lends more credence to the Hartman-Sinn theory, their

analysis fails to account for important variations in financing opportunities available to transnationals, as in Hines (1994a), and thus to potential linkages between national welfare and home and host tax policies. I return to this issue when I discuss tax competition models.

5.4 *A connection between double taxation rules and transfer pricing.*

Consistent with the analysis in Section 4, there is another component of transnational investment that circumscribes the Hartmann-Sinn result: transfer pricing. From the discussion of transfer pricing in Section 4, the extent to which a transnational might distort transfer prices from their underlying economic values depends on both the tax rate differential and expected penalties. If a transnational headquartered in *A* operates a subsidiary in *B*, it would face the following investment decision. A dollar of subsidiary profit can now be put to three uses: repatriation via a dividend, repatriation via strategic transfer pricing, and reinvestment in the subsidiary. The first option yields a return of $(1 - T_{Ba})(1+r)$. The after-tax return on reinvestment is more complicated to calculate because of the role of transfer pricing. Let $\rho(T_{Ba}, t^*_{Ba})$ denote the fraction of subsidiary profits the transnational would repatriate via its transfer pricing channel. A dollar reinvested in the subsidiary would then yield a return of

$$(1 - T_{Ba})(1 + (1-\rho)r^*) + (1 - t_{Ba})\rho r^*$$

as the transnational avoids paying host tax on the percent of the return repatriated via transfer pricing. By equating these two returns, one can prove a weaker version of the Hartmann-Sinn result: If the firm does not engage in strategic transfer pricing, the capital-exporting country's tax policy is irrelevant in determining the distribution of capital. However, when transnationals do manipulate transfer prices, both the home tax rate and its double tax policy can affect capital decisions, in this case because transnationals have the flexibility to fund new investments both with additional capital as well as with retained earnings. This result, due to Weichenrieder (1996b), nicely illustrates the fact that the flexibility enjoyed by transnationals not only makes both home and host policies very relevant in the capital allocation decisions of the transnational but also that this flexibility increases the strategic linkages between different components of a country's tax policies.[24] It is interesting to note that as the host or capital-importing country adopts practices or adjusts policies to limit the incentive for transnationals to manipulate their transfer prices it also reduces the influence of home tax policies on FDI decisions.

6. *Tax Competition*

From the Mintz-Tulkens model presented in Section 5, it is clear that one country's choice of tax

[24]Mintz and Thomas Tsiopoulos (1994) show that similar linkages exist when transnationals need to evaluate tax holiday offers.

policy can impose fiscal externalities on another country. With more elaborate financial strategies available to transnational investors, the complexity of the externalities increases. This suggests the importance of considering models of tax competition to assess when the interests of home and host countries align and when and how they conflict. It also becomes important to pay attention to the timing of tax policy decisions. For example, tax treaties that follow the OECD (1997) convention, stipulate policies like double tax rules while leaving signatories some latitude in setting tax rates. Thus, an alternative to analyzing tax competition incentives when governments choose all aspects of their tax policies simultaneously (such as Mintz and Tulkens (1996)), is to analyze dynamic models in which competition in tax rates is preceded by non-rate policy choices.

For most of the literature on transnational income tax competition, the policy focus has been on the choice a double tax rule. Recall that from a static perspective, the proponents of foreign tax credits (e.g. Hamada (1966)) point to the FDI enhancing properties of credits while the opponents (e.g. Musgrave (1969)) point to the fact that, from a national perspective, credits induce overinvestment in FDI. The seminal work of Eric Bond and Larry Samuelson (1989) indicates that the conflict between national income maximization and world income maximization may not be as transparent as the Hamada-Musgrave positions suggest because the same properties of foreign tax credit systems that support high levels of world income for a given set of tax rates also result in higher equilibrium tax rates.[25] This can be understood more easily by observing how credit and deduction methods of double taxation relief influence effective tax rates on FDI.

The model developed in Section 5 is essentially the Bond and Samuelson (1989) model. Both countries, *A* and *B*, are assumed to maximize national income. That, coupled with the inelastic supply of capital, imply that a home tax on domestic income has only distributional effects that have no impact on home welfare. For simplicity, this rate (t_{Aa}) is set to zero and we let t denote the home rate on foreign income, t_{Ba}. Similarly, since host citizens only earn domestic income, the sole relevant tax rate, t_{Bb}, is denoted by t^*. With these changes, (7) becomes

$$f_K(K - \kappa, L) = (1 - T_{Ba}) f_K^*(K^* + \kappa, L^*) \tag{9}$$

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[25]Feldstein and Hartman (1979) present an early attempt to understand the implications of non-cooperative tax competition and the choice of a double taxation rule. Their results on non-cooperative tax competition assumed that the capital importing country was small relative to the capital exporter, implying a Stackelberg framework, and required specific functional form assumptions on the aggregate production functions.

where now $T_{Ba} = t + t^* - \alpha(t,t^*)$. Remember, T_{Ba} equals t^* with exemptions, $t + t^* - tt^*$ with deductions and $\max\{t,t^*\}$ with credits. Given any pair of tax rates and any double tax rule for the home country, a factor market equilibrium can be described by the solution to (9), $\kappa(T_{Ba})$, the profit-maximizing level of aggregate FDI. Not surprisingly, $\kappa'(T_{Ba}) < 0$. Given this definition, home and host national income equals

$$Y(t,t^*) = f(K - \kappa(T_{Ba}),L) + (1 - t^*)f_K^*(K^* + \kappa(T_{Ba}),L^*)\kappa(T_{Ba}) \tag{10}$$

and

$$Y^*(t,t^*) = f^*(K^* + \kappa(T_{Ba}),L^*) - (1 - t^*)f_K^*(K^* + \kappa(T_{Ba}),L^*)\kappa(T_{Ba}). \tag{11}$$

For the home country, national income equals domestic output plus repatriated after-host-tax foreign profits. For the host country, national income equals domestic output less the after-host-tax profits home investors repatriate. Thus, the nature of tax competition here is somewhat different from that seen in models where both countries try to attract inbound capital. Reflecting the tension between home and host countries, *A* must balance lost home production against higher repatriated returns from its outbound FDI while *B* must balance increased output against decreased tax revenues from inbound FDI. In other words, the tax competition focused on in this section is between asymmetrically positioned countries, home and host, by virtue of transnational capital flows, instead of between symmetrically positioned host countries.

Consider the subgame perfect equilibria of a game in which the home country first specifies a double tax rule and then the home and host countries simultaneously set tax rates. Each choice of a double taxation rule has the potential to induce different equilibrium tax rates. The exemption subgame is easiest as it requires t=0 and allows the host country to choose the tax rate that maximizes $Y^*(0,t^*)$. Call this optimal rate t_e^*.

For both the deduction and credit subgames, notice that the host rate influences host income directly by changing the tax rate and indirectly through its effect on T_{Ba}, which in turn determines $\kappa(\cdot)$. This creates the standard tax-base versus tax-rate tradeoff. For *A*, its rate influences home income only through the effective rate, T_{Ba}. Unlike *B*, country *A* is only interested in the level of FDI. Differentiating (10) with respect to T_{Ba} shows

$$dY/dT_{Ba} = [-(1 - T_{Ba})f_K^* + (1 - t^*)f_K^* + (1 - t^*)f_{KK}^*\kappa]\kappa'(T_{Ba}). \tag{12}$$

The first term in the brackets is the value of lost home production when κ increases. The sum of the last two terms equals the marginal repatriated profits. The rate, T_{Ba}, is never smaller than t^* and if $T_{Ba}=t^*$, home national income is strictly increasing in T_{Ba}. Therefore, if *A* has the ability to influence T_{Ba}, it is always optimal for *A* to raise T_{Ba} above t^* in order to restrict outbound capital.

Under a deduction rule, an increase in t always increases T_{Ba} and the competing trade-offs of the home and host countries define unique equilibrium tax rates that are both positive and that imply positive FDI. The credit case is surprisingly quite different. For the home country, as long as t is less than t^*, small increases in t have no effect on the effective rate. But for $t \geq t^*$, $T_{Ba} = t$. Thus, at $t=t^*$, the above-mentioned incentives for A to raise the effective tax rate kick in. For the host country, when $t^* < t$, an increase in t^* has no impact on T_{Ba} and thus it increases the transnational's host taxes by the same amount it decreases home taxes. Raising t^* up to t has the effect of raising host tax revenues without lowering its tax base. Like the home country, the host can influence the effective tax rate and hence the level of FDI only when $t^* \geq t$. To the host country, this situation looks like the exemption case. B's incentive is then to set t^* as close to t_e^* as possible. Figure 1 illustrates the implications of this discussion. For the host country, its best response to any home rate is to set t^* equal to the larger of t and t_e^*. The result is the best response curve $BR^*(t)$. For the home country, its best response is to set t above t^* as long as κ is positive. A's best response is the curve $BR(t^*)$. The only equilibrium under credits given these two sets of incentives results in no FDI ($\kappa=0$).

[Figure 1 here]

Comparing all three subgames, home national income is highest under a deduction rule. The analysis also reveals that the promotion of double tax rules based on static national income interests can Pareto dominate the promotion of double tax rules based on global income interests. Both observations are surprising in light of the information in Table 1 noting that very few countries can be characterized as deduction countries. One way to interpret the results, using the terminology of cooperative game theory, is to note that many countries use the deduction method as a "threat point" by listing the deduction method as the one to be used in the absence of a tax treaty with the host country. In this regard, most tax treaties follow the 1997 OECD tax treaty convention of which the main provision proscribes the use of the deduction method (see also United Nations (1980)). But why would a home and host country sign a treaty that results in a Pareto inferior outcome? According to Ronald Davies (1999), the answer is related to the fact that most OECD countries experience two-way transnational capital flows and thus simultaneously face the trade-offs of both a home and a host country.[26] Now both countries must select double tax rules in an initial stage before competing in tax rates. The opposing effects a tax hike has on

[26]For actual statistics, see OECD (1998).

inbound and outbound FDI moderates incentives to raise tax rates too high. For countries with identical production technologies and endowments, proscribing the use of deductions results in a subgame perfect equilibrium in which both countries use a credit method and tax rates yield Pareto optimal capital allocations. With asymmetric countries, credit-exemption combinations can also arise in equilibrium and equilibrium tax rates may not be Pareto preferred to those arising in the absence of a treaty. Negotiating a treaty agreeable to both countries may require some coordination of tax rates which in turn may require some provisions for enforcement as in the literature on trade agreements. Maintaining the use of a deduction method in the event a treaty is abrogated may very well be part of effective treaty enforcement. More work needs to be done on this issue.

The results of Bond and Samuelson depend on three assumptions: inelastic domestic capital supplies (investors do not face intertemporal consumption/investment trade-offs), discriminatory taxes, and perfectly competitive output markets.[27] Relaxing the first assumption can, but need not, result in positive equilibrium FDI flows under credits. Thus, the supply of capital would need to be sufficiently elastic before a credit tax-competition equilibrium could dominate a deduction tax-competition equilibrium.

The second assumption allows the home country to tax domestic source income and foreign source income at different rates. Eckhard Janeba (1995) shows that with uniform tax rates (i.e. t_{Aa} and t_{Ba} must be equal to some common value t and move in tandem) and with inelastic capital and labor supplies, a higher tax rate can simultaneously yield more FDI and less domestic investment. This new trade-off has implications for the equilibrium performance of credit, deduction, and exemption rules. Using the same notation as above, let t denote the home country's tax rate on the returns from both foreign and domestic investment (t_{Aa} and t_{Ba}). The effective after-tax return from a dollar of FDI income relative to a dollar of domestic income can be calculated by dividing $(1-T_{Ba})$ by $(1-t)$. With a credit rule, this relative effective after-tax return equals $(1-\max\{t,t^*\})/(1-t)$; with a deduction rule it equals $(1-t^*)$, i.e. t serves as a pure profit tax; and with an exemption rule it equals $(1-t^*)/(1-t)$. Clearly, the home country's choice of tax rate under a deduction rule will not influence FDI flows. The same is true under a credit rule for $t > t^*$. When $t \leq t^*$, the effect of a change in t under a credit rule is identical to that under an exemption rule. In both cases, higher home tax rates encourage more FDI at the expense of domestic investment.

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[27]The may also be some interaction between trade and tax policies. For instance, Bond (1991) shows that the use of tax credits by a capital exporter can influence the tariff policies of a small capital-importing country.

For a given level of FDI, any change in domestic tax revenues is purely distributional and hence will not increase home national income. By lowering *t*, the home country encourages less FDI which increases home output and the return on FDI. Thus, home's optimal tax rate is zero. In equilibrium, then, there is no difference in the equilibrium levels of FDI and home and host income under the three different rules. This implies that the choice of a double taxation rule is irrelevant if domestic capital income and foreign capital income is taxed uniformly. While this seems like a common occurrence, Hines (1988) demonstrates how variations in components of a country's tax code, such as tax investment tax credits and depreciation rules, can allow a country to tax domestic and foreign income at different rates.[28]

The last assumption rules out the possibility of investment choices being made with an eye towards influencing output prices. Endowing home investors with market power in the host output market can create a new linkage between the home country's choice of a double taxation rule and host country tax incentives. In Janeba (1996), the host market is assumed to be imperfectly competitive as there is one host firm and one foreign controlled subsidiary.[29] Now a change in the home country's tax rate shifts the transnational's reaction function in a product market competition subgame and creates profit shifting effects reminiscent of those first pointed out by James Brander and Barbara Spencer (1985). If the firm competes in quantities and the home country offers a full tax credit, this profit-shifting can support a home rate less than the host rate. In yet another imperfect competition model, Janeba (1998) analyzes a source-tax competition game with two mobile transnationals. Mobility implies that both firms always locate all their production in the lower tax country. Tax competition in this setting eliminates source taxes since small changes in one's tax rate can attract a large amount of FDI. As in the

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[28]Gordon (1992) not only assumes uniform taxes in analyzing the equilibria of tax competition with a credit rule, he also endogenizes the capital supply decision of a representative agent. His analysis suggests that a pure-strategy equilibrium in tax rates may not exist. As such he adopts the Feldstein and Hartman (1979) assumption that the home country is a Stackelberg leader in tax rates and claims this assumption is descriptive of the global economy in the early post-World-War-II period with the U.S. playing the role of the dominant capital exporting country. Since the U.S. is now a capital importer, this model is presumably less relevant. Also, analysis under the deduction and exemption methods is not included.

[29]Unlike most models of transnational tax competition and inconsistent with standard legal definitions of controlled subsidiaries, Janeba assumes that subsidiary financing involves no parent equity.

prior paper, once residence taxation and tax credits are considered, the traditional Brander-Spencer results reemerge. Thus at a minimum, the introduction of imperfect competition can be seen to increase the sensitivity of capital and national income allocations to the choice of tax policies.

At this point it is perhaps worthwhile stepping back a moment in order to compare what we know of international tax policies with how they are described in tax competition models. Sections 2 and 3 hopefully conveyed the sense that national tax policies with respect to transnational investment are not only complex and multidimensional but that this complexity is a direct response to the many different dimensions along which a transnational can be organized both to promote higher pre-tax profits and higher post-tax profits. Moreover, the empirical evidence concerning how transnationals respond to variations in tax policy imply that the strategic linkages between the various standard components of international tax policy, e.g. double taxation rules, transfer price regulations, interest allocation rules, are important and discernable. On the other hand, the above tax competition papers, reflecting the core of the tax competition literature reasonably well, omit consideration of all but the most basic tax policy element - double taxation rules. This suggests that one of the more fruitful directions for tax competition research is to analyze the impact of the standard policy linkages on tax competition equilibria.

Only a few papers have begun to consider such issues. I will discuss two of them. One important tool transnationals have to manage income taxes on FDI not available in the above models is debt financing. Recall from Section 3, Feldstein's (1995) evidence on the significance of debt acquired by the subsidiary in its host country as well as the econometric studies by Altshuler and Mintz (1995) and Froot and Hines (1995) showing that changes in U.S. interest allocation rules increased the incentive for U.S. transnationals to use subsidiary debt. One suggestion made by Feldstein (1994) is that the availability of host debt financing can reduce the incentive for a home country to tax the returns from FDI under a credit rule and hence can mitigate the harmful effects of tax competition with foreign tax credits. Davies and Thomas Gresik (2000) show that while host debt financing can improve the equilibrium performance of foreign tax credits it also improves the equilibrium performance of foreign tax deductions. From the home country's perspective a credit rule is still weakly dominated by a deduction or an exemption rule.

More important than the specific welfare ranking of double tax rules, Davies and Gresik (2000) identify several new strategic effects that arise when subsidiary financing can include both equity and debt. Because borrowing is treated as a transfer of capital from local host firms to subsidiaries of home transnationals, how home and host investors respond to a change in either government's tax rate (given any double taxation rule) will depend upon the relative factor intensities between subsidiaries and host

firms. To capture the effect of capital transfers within the host country, consider the introduction of a third technology, f^s. While the production function f still represents home country production, f^* now denotes production in the host country by host investors and f^s denotes production in the host country by a subsidiary of a home transnational. If K^s denotes the amount of capital borrowed by the subsidiary from host sources, aggregate global post-tax transnational profit equals

$$\pi = f(K - \kappa, L) - wL + (1 - T_{Ba})(f^s(\kappa + K^s, L^s) - r^* K^s - w^* L^s) \tag{13}$$

where w and w^* are wage rates, r^* is the cost of borrowed host funds, and L^s is the amount of host labor employed by subsidiaries.[30] A final key assumption of the model is that the marginal cost of subsidiary borrowing increases with the subsidiary's debt-equity ratio. A simple way to capture this effect is to require the subsidiary to have at least some minimum level of collateral (i.e. equity) denoted by γ. Thus, $K^s \leq \gamma\kappa$.

For factor market equilibria is which the collateral constraint does not bind, $K^s < \gamma\kappa$, (13) implies

$$w^* = f_L^* = f_L^s,\ r^* = f_K^* = f_K^s, \text{ and } f_K = (1 - T_{Ba}) f_K^s. \tag{14}$$

With a binding collateral constraint, K^s and κ are now complements, and factor market equilibria satisfy

$$w^* = f_L^* = f_L^s,\ r^* = f_K^*, \text{ and } f_K = (1 - T_{Ba})((1+\gamma) f_K^s - \gamma f_K^*). \tag{15}$$

For the simpler first case, (14) implies $d\kappa/dT_{Ba} = f_K/(1 - T_{Ba}) f_{KK} < 0$ and

$$\frac{dK^s}{dT_{Ba}} = \frac{-f_K k^*}{(1 - T_{Ba}) f_{KK} (k^* - k^s)} \tag{16}$$

where $k^s = (\kappa + K^s)/L^s$ and $k^* = (K^* - K^s)/(L^* - L^s)$ are the subsidiary and host-firm capital-labor ratios. A similar expression exists with respect to L^s. The sign of (16) depends on the difference in the factor intensities of host and subsidiary firms. This ambiguity is due to the Tadeus Rybczynski (1955) effect which states that an increase in the supply of a factor will increase output in the sector that uses the factor more intensively. In this case, an increase in T_{Ba} causes κ to fall and lower the supply of capital in the host country. If subsidiary production is more capital intensive than host production, this decrease in κ will result in lower subsidiary output and less subsidiary borrowing. Analogous results arise in the binding case as well.

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[30] In practice subsidiary debt is but one form of debt financing. Because current tax laws discourage parent-debt financing and because extant tax competition models ignore debt financing altogether, Davies and Gresik (2000) focus on this sole source of transnational debt.

Since changes in tax rates induce a Rybczynski (1955) effect, the home country can use changes in its tax rate on FDI to effectively implement V. K. Ramaswami's (1968) national income improving strategy of restricting home capital exports and importing host capital and labor, without changing factor prices, in a manner that does not require the physical transfer of the host capital and labor. Changes in the effective tax rate on FDI can also strengthen or weaken the borrowing constraint and endogenously shift the economic relationship between subsidiary debt and parent equity from one of substitutes to one of complements or vice versa. This too depends on a Rybczynski effect. On a technical level, the conjunction of these three effects - Rybczynski on factor market equilibria, Ramaswami, and Rybczynski on the collateral constraint - introduces nonconvexities in the home country's preferences over tax rates, with credits and deductions, and results in a richer set of equilibria. The fact that one can characterize these equilibria in terms of well-known international trade concepts holds out hope for our ability to integrate more features of transnational taxation into tax competition models.

The second issue involves transfer pricing between divisions of a transnational located in different countries. As noted in earlier sections, done successfully, the transnational can shift profits between jurisdictions before they are taxed by either a home or host country. And, in the case of profit shifting out of the home country, transfer pricing can transform domestic source income eventually into foreign source income. (Recall the advantages of doing so when the parent company has excess credits). Both internal (managerial) and external (regulatory) factors can create scope for profit shifting via transfer prices. The latter case will be taken up in the next section.

From an internal management perspective, home office managers are often less well informed about local host country demand or labor conditions. Transfer prices provide one way for a parent division to align the incentives of host subsidiary managers with the transnational's goal of maximizing global after-tax profits. This means that seemingly low transfer prices may imply both a tax minimization strategy as well as a managerial incentive strategy. While the first strategy works against host country objectives, the second need not. Ramy Elitzur and Mintz (1996) introduce managerial transfer pricing motives into a corporate tax competition model.[31] While the authors do not isolate the significance of the managerial motive, they are able to show that, unlike in Mintz and Tulkens (1986), when the countries set their tax rates non-cooperatively, an increase in one country's tax rate unambiguously lowers the other's tax revenues. Because tax competition with internal transfer pricing motives creates negative fiscal externalities, tax harmonization in this context will unambiguously result

[31] At the same time, the authors abstract away from the usual double taxation issues.

in lower tax rates for both countries and higher tax revenues.[32]

7. *The Role of Information in Taxing Transnationals*

Transfer pricing as a response to government policies provides a good vehicle for a more detailed discussion of the role of information in taxing transnationals because it is an issue that arises precisely because transnationals have superior information about demand conditions and operating costs than do the governments with whom they interact. A central characteristic of most transfer price regulations is the arm's-length price which was introduced in Section 3. This is the price at which one would expect independent parties in a competitive market to transact. In the simplest cases, an external market for the transferred good exists and governments can use data from that market to identify the appropriate arm's-length price. For example, in a recent U.S. court case (U.S. Tax Court, 1999) in which the IRS was contesting the transfer price of a semiconductor chip purchased by COMPAQ from a subsidiary, market data on semiconductor chips showed that COMPAQ's transfer price satisfied the arm's-length legal standard. When the transfer involves highly proprietary products or non-tangibles such as managerial services, U.S. and OECD regulations elicit information from the transnational under review. How governments use this information will affect the incentives transnationals have to report the requested information accurately. From the models of Sections 4 and 5, we know that the specific regulations also have real effects. Because of these real effects, an arm's-length standard may not be welfare optimal for a country.

The following model will help explain normatively how an uninformed (or poorly informed) tax authority should manage the information it receives from a transnational.[33] To focus on the impact of private information, the literature has so far ignored issues related to double taxation rules and cost allocation rules. This simplification is maintained in the following discussion.

Suppose that the transnational produces an intermediate good at home and ships it to a subsidiary in a host country where it is converted into a final product and sold to host consumers. Let q denote both intermediate and final good production. The subsidiary is a monopolist in the host final good market and faces demand of $P(q)$. The intermediate good is produced at a constant marginal cost of c and sold to the

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[32]Sinn (1997) points out that a very important reason to promote cooperative tax policies is that presumably governments arose to deal with a variety of market failures. To the extent that tax competition strengthens the role of markets in the provision of government services, it re-emphasizes the sources of market failures.

[33]For details of this model, see Gresik and Douglas Nelson (1994) and Gresik (1999).

subsidiary at a price ρ. The host country has two tax instruments: a profit tax, t^*, and a lump-sum subsidy, S^*. For simplicity, assume that the home income tax rate is zero but that the transnational has a preference for where it locates profits denoted by i. If i is positive, the transnational prefers to locate profits at home and if i is negative, it prefers to locate profits in the host country. This variable can be thought of as a proxy for a number of economic factors including expropriation risk, exchange rate risk, capital controls, and location of shareholders. These assumptions yield a global post-tax profit for the transnational of

$$\Pi = (1 - t^*)(P(q)q - \rho q + S^*) + (1 + i)(\rho - c)q . \tag{17}$$

Thus, the first term in Π defines the after-tax profits of the subsidiary and the second term defines the parent's transfer price profits.

In regulating the transfer prices, the tax authority wishes to maximize the social welfare function

$$W = V(q) - P(q)q + t^*(P(q)q - \rho q + S^*) - S^* + \alpha^*(1 - t^*)(P(q)q - \rho q + S^*) \tag{18}$$

where $V(\cdot)$ denotes consumer surplus gross of revenues and α^* is the host government's welfare weight on firm profit, $0 \le \alpha^* \le 1$. That is, the host government is interested in maximizing a weighted sum of consumer surplus, net tax revenues, and subsidiary profit. Because an allocation in this model consists of a production level and a distribution of profits between home and host sources, in a normative analysis the regulator is assumed to have control over q, ρ, and S^*. Without the subsidy, which allows the host government to control the transnational's global profits in a non-distortionary manner, the distortions induced by regulating the transfer price would be even larger.

Using (17) to substitute S^* from (18) yields

$$W = V(q) - (1+i)(1-\alpha^*)cq - (1-\alpha^*)\Pi + [(1+i)(1-\alpha^*) - 1]\rho q . \tag{19}$$

Notice that the coefficient on transfer price revenues, ρq, is positive only if $\alpha^* < i/(1+i)$. When transfer price revenues increase, subsidiary profits, host tax revenues and the subsidy needed for any given Π all decrease. The net social benefit from transfer price revenues is positive only when the host government puts small enough weight on subsidiary profit. In light of the linearity of W with respect to ρ, two additional constraints are imposed. First, assume that transfer price profit cannot be negative. This is consistent with what Hugh Ault and David Bradford (1990) call a "commensurate with income standard." It is a typical home country policy that prevents host countries from earning tax revenues from parent operations unrelated to the subsidiary's product. Second, assume that subsidiary profit cannot be negative. In reality, negative profit would require additional capitalization from the parent and increases the opportunity cost of such funds.

If the government has complete information about the transnational's costs, it can use its subsidy

to extract any rents from the transnational, $\Pi=0$. If Π were driven below zero, the transnational could cease operating and guarantee itself zero profit. For $\alpha^* > i/(1+i)$, $\partial W/\partial \rho < 0$ which implies $\rho=c$. For $\alpha^* < i/(1+i)$, $\partial W/\partial \rho > 0$ which implies $\rho q = P(q) + S^*$. With (17) this implies

$$\Pi = (1+i)(\rho - c)q/(1-t^*). \tag{20}$$

Since $\Pi=0$, this case also requires $\rho=c$. Thus, regardless of the values of α^* and i, the optimal transfer price meets an arm's-length standard.

Now suppose the government does not know c but only has probabilistic beliefs about its value. Denote these beliefs by the distribution $F(c)$ with support $[c_0,c_1]$. Again for normative purposes, it is sufficient to focus on the allocations the tax authority can realize. This can be done by having the regulator specify a value of q, ρ, and S^* for every possible value of c. That is, the regulator begins by announcing a triplet of schedules $(q(r),\rho(r),S^*(r))$ where the variable r is used instead of c to distinguish the transnational's report of its cost from its actual cost. This additional notation leads us to rewrite (17) as

$$\Pi(r,c) = (1 - t^*)(P(q(r))q(r) - \rho(r)q(r) + S^*(r)) + (1 + i)(\rho(r) - c)q(r). \tag{21}$$

Now the transnational's objective is to choose a profit-maximizing cost report. At this point, it is convenient to invoke the Revelation Principle which allows us to restrict attention to regulations (q,ρ,S^*) for which the transnational's optimal report is truthful. Applying the Envelope Theorem then to (21) implies that $d\Pi(c,c)/dc = -(1+i)q(c)$ and that $q'(c) \le 0$. Thus, truthful reporting requires that firms reporting higher costs produce less and earn strictly lower global profits than lower cost firms. Alternatively, the first condition implies

$$\Pi(c,c) = \Pi(c_1,c_1) + (1 + i)\int_{s=c}^{c_1} q(s)ds. \tag{22}$$

If under the regulations, the highest cost transnational earns zero profit, all other cost types will earn strictly positive profit referred to as an information rent. That is, inferior government information places an upper bound on the surplus a host country can extract from a transnational. With (20), it also means that it is optimal for a host government to allow a transfer price above actual cost when $\alpha^* < i/(1+i)$. Although the transnational is guaranteed an information rent because of its superior cost information, the host country has some discretion in how that rent is earned. When the host country does not value subsidiary profits very much, the welfare costs of having the transnational earn its rents in the form of transfer price profit are lower than the welfare costs of having the transnational earn its rents in the form of subsidiary profit.

In practice, governments do not directly set production levels for transnationals. Rather, the transnational chooses its production quantities and cost reports given the rules under which its transfer prices may be set by national authorities. What the above analysis identifies are the second-best or information-constrained allocations that might arise from any given set of policies. Completing the analysis requires the derivation of actual and credible policies that in the equilibrium of a game between the national authorities and the transnational these second-best allocations arise.

A nice example of this type of exercise is found in a paper by Petter Osmundsen, Hagen, and Schjelderup (1998). Instead of focusing on transfer pricing, the authors look at the issue of capital mobility in which the benefit of locating a transnational's investments outside a country is private information to the firm. In this case, a capital investment of K in a host country yields revenues of $R(K)$ and has economic costs of $C(K,\theta)$. θ is the firm's mobility parameter. Higher values of θ denote more profitable non-host investments and hence a higher opportunity cost of host investment. Both C_θ and $C_{K\theta}$ are taken to be positive so that a higher mobility parameter also reflects higher marginal opportunity costs of host investment. Abstracting away from double tax issues, profits from host investment are

$$\pi(K,\theta) = R(K) - C(K,\theta) - T^*(\theta) \tag{23}$$

where $T^*(\cdot)$ equals host taxes. Because immobile (low θ) firms have lower opportunity costs of host investment (i.e. poorer non-host investment opportunities), Revelation Principle calculations similar to those above imply that $d\pi(K(\theta),\theta)/d\theta = -C_\theta(K(\theta),\theta) < 0$ and $K'(\theta) < 0$. These conditions mean less mobile firms earn higher information rents and are encouraged to invest more capital in host investments.[34] Together these conditions discourage immobile firms from claiming to be mobile.

Denote the optimal host policies by $(\hat{K}(\theta),\hat{T}^*(\theta))$. Under mild technical conditions $\hat{K}(\theta)$ will be strictly decreasing and thus invertible. Direct implementation of these policies requires the host government to ask the transnational how mobile it is and then require a firm of type θ to invest $\hat{K}(\theta)$ in capital and pay a tax of $\hat{T}^*(\theta)$. A more practical, but indirect, method of implementation would be to announce a non-linear tax schedule $\sigma^*(K)$ and to let the transnational choose its investment level. As

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[34]These counterintuitive results arise because host investment opportunities are uncorrelated with a firm's non-host opportunities. Thus, both firms with good outside investments and poor outside investments are equally capable of generating host revenues, $R(\cdot)$. Introducing type dependent host revenues, say $R_\theta > 0$, introduces countervailing incentives. A strong enough revenue effect would reverse the information rent and investment rankings. The important contribution of this paper however is not the derivation of the optimal host allocation but rather the forthcoming implementation result.

long as $\sigma^* = (\hat{T}^* \circ \hat{K}^{-1})(K)$, a transnational with mobility type θ will choose to invest $\hat{K}(\theta)$ in capital and will pay $\hat{T}^*(\theta)$ in taxes. This equivalence has been coined the "taxation principle" by Jean-Charles Rochet (1986). Osmundsen, Hagen, and Schjelderup show that the appropriate tax policy σ* can be written as $t^*[R(K) - \delta(K)K - e(K)]$ where $e(\cdot)$ is a tax base exemption and $\delta(\cdot)$ is a (non-linear) depreciation schedule, two common elements of most commercial tax codes.

Returning now to the regulation of transfer prices, suppose that a host country effectively implements its second-best (incentive-constrained) policies. When $\alpha^* > i/(1+i)$, one result will be reduced home tax revenues as the optimal host regulations eliminate transfer price profits. Although in the simple model described above the home rate was set to zero, in general profits shifted out of the host country would be subject to some home taxation. Even when $\alpha^* < i/(1+i)$ and the optimal host regulations call for positive transfer price profits, these transfer price profits could be smaller than those the transnational would generate under less than optimal host policies. In either case the home government can be expected to offer the transnational countervailing incentives that encourage the transnational to misreport its cost information to the host country, thereby creating larger rents for the firm and larger home tax revenues. Once both governments are allowed to actively regulate the transnational, a problem of "common agency" is created. While in principle all tax competition models account for this type of interaction, the addition of private information raises a number of new and challenging theoretical problems.

Common agency models span two main dimensions. First, one can distinguish between agency models with moral hazard (unobservable actions) or adverse selection (unobservable information).[35] In this paper, I focus only on adverse selection models. Second, to use terminology introduced by Douglas Bernheim and Michael Whinston (1986b), one should also distinguish between *intrinsic* and *delegated* common agency problems. Intrinsic common agency refers to the case in which the agent's (e.g. transnational's) only options are to deal with all its principals (e.g. governments) or none of them. Delegated common agency refers to the case in which the agent can choose to deal with any subset of

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[35]Bernheim and Whinston (1986a,b) provide general solutions to common agency models with moral hazard, much of which (e.g. menu auctions) has been used recently to study the political economy of trade agreements (e.g. Gene Grossman and Elhanan Helpman (1994)). General analyses of common agency models with adverse selection have been provided by Jean-Jacques Laffont and Jean Tirole (1991), David Martimort (1992), Lars Stole (1992), James Peck (1996), Bond and Gresik (1997), Martimort and Stole (1997), Larry Epstein and Michael Peters (1999), and Peters (1999).

principals. Both possibilities are relevant to the study of transnationals and tax competition.

One important issue involves assessing the welfare implications of tax competition or transfer pricing competition in which the policies through which home and host countries compete is endogenous. For technical reasons, that are beyond the scope of this paper, there are significant problems in using the Revelation Principle to conduct this type of normative common agency analysis.[36] Recently, Martimort and Stole (1999) have shown that it is possible to focus attention on competition in non-linear tax schedules when the agent's preferences are quasi-linear, a condition generally satisfied by global, after-tax transnational profits. So far, there are only a recent few papers tackling this sort of analysis.[37] Because equilibria of non-linear tax games are characterized by systems of differential equations, robust welfare results have not yet been obtained.

The alternative to a normative analysis is to exogenously set the form of the policies countries use to compete for transnational investment and tax revenues and derive the equilibrium policies. This type of positive analysis helps identify the broader tax competition issues that arise when private information is present. The remaining discussion will focus on such positive results.

Bond and Gresik (1996) consider a model similar to that in Gresik and Nelson (1994). There is a transnational that produces an intermediate good at home at constant marginal cost, c. The good is shipped to a subsidiary in a host country where it is transformed in a 1-1 ratio into a final product (at zero cost) and sold to host consumers represented by the downward sloping demand curve $P(q)$. The subsidiary is again assumed to be a monopolist in the host country so that q simultaneously denotes intermediate good and final good production. The two governments regulate the transnational by setting a unit tax on the intermediate good flow, t and t^*, and a lump sum subsidy, S and S^*. These choices are made simultaneously after which the transnational chooses q to maximize its profits,

$$P(q)q - (t + t^* + c)q + S + S^* . \tag{23}$$

This yields an output level $Q(t+t^*+c, S+S^*)$, and an indirect profit function for the transnational, $\pi(t+t^*+c, S+S^*)$. The home country is assumed to maximize the sum of net tax revenues and weighted profit (with welfare weight α and $0 \leq \alpha \leq 1$),

$$W = tQ - S + \alpha\pi \tag{24}$$

while the host country is assumed to maximize the sum of net consumer surplus and net tax revenues,

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[36]The interested reader is referred to Peck (1996), Epstein and Peters (1997), Martimort and Stole (1997), Martimort and Stole (1999), and Peters (1999).

[37]See Giacomo Calzolari (2000) and Trond Olsen and Osmundsen (2000).

$$W^* = V(Q) - P(Q)Q + t^*Q - S^* \tag{25}$$

as all the owners of the firm are assumed to be home residents.

With complete information, any positive production equilibrium results in efficient production, $P(Q)=c$, and no rents, $\pi=0$. The home country does not use its tax to distort the firm's production decision, $t=0$. Instead, inefficient monopoly production is eliminated by a host production subsidy, i.e. $t^* < 0$. Now suppose neither country knows the value of c and that the range of possible values is $[c_0,c_1]$. As with the above two examples, if the countries act as a single principal by cooperatively setting their taxes, the optimal policies will involve zero profit for the transnational with cost c_1 and positive profits for firms with lower values of c. In addition, the induced output level will be first-best only for the transnational with cost c_0. Output levels for firms with higher costs will be distorted downward reflecting the higher social marginal cost of production due to the presence of information rents.

What happens if the countries set their tax schedules non-cooperatively? The game now involves both countries setting tax policies, $(t(r),S(r))$ for the home country and $(t^*(r^*),S^*(r^*))$ for the host country. Given these policies the transnational then reports cost r to the home country and r^* to the host country, r and r^* need not be the same, and produces $Q(t(r)+t^*(r^*)+c,S(r)+S^*(r^*))$. Bond and Gresik (1996) derive equilibria in which $r=r^*=c$, that is, in which the transnational reports its cost truthfully to both governments. Applying the Envelope Theorem to (24), truthtelling implies

$$d\pi(t(c) + t^*(c) + c,S(c) + S^*(c))/dc = -Q(t(c) + t^*(c) + c,S(c) + S^*(c)) < 0. \tag{26}$$

Thus, the transnational will continue to earn an information rent in equilibrium as long as its cost is less than c_1 and the magnitude of this rent is increasing in output. This last fact means each country can limit the rents the transnational must earn or alternatively each country can increase the rents it extracts from the transnational by inducing lower firm output. This is done by setting a positive unit tax. Given the rents implied by (26), (23) also implies that

$$S + S^* = \pi - P(Q)Q + (t + t^* + c)Q. \tag{27}$$

Substituting (27) into (24) and (25) yields

$$W = P(Q)Q - (t^* + c)Q - S^* + (\alpha - 1)\pi \tag{28}$$

and

$$W^* = V(Q) - (t + c)Q + S - \pi. \tag{29}$$

The presence of each country's tax rate in the welfare function of the other identifies a negative

externality associated with tax competition.[38] The existence of this externality means that equilibrium welfare levels are lower for the two governments relative to the cooperative tax-setting case. Thus, tax competition with incomplete information introduces another factor limiting the ability of countries to extract transnational rents. Surprisingly, the transnational is also made worse off due to higher equilibrium unit taxes that arise when each country raises its unit tax to extract rents without taking account of the impact on the other country.

As Stole (1992) points out, these welfare implications are sensitive to both the nature of the tax competition and the nature of the private information. Claudio Mezzetti (1997) examines the case in which the transnational's private information measures the profitability of investment in one country relative to that in another. If neither country knows the investment opportunities available in the other, tax competition for the transnational's investments creates a positive externality because the results of the competition allow each country to update its beliefs about the return to investments abroad. In order to benefit the most from the competition for its investments, the transnational needs to persuade one country that the benefit of attracting its capital is high so that that country is willing to offer generous inducements. But this tells that country the relative value of investment elsewhere is likely to be low. Low levels of interest by other countries means the first country can offer less generous inducements. One alternative to competing for the investments of a common agent (i.e. a transnational) would be for the countries to negotiate with independent (but ex ante identical) agents (i.e. domestic firms). Despite the countervailing incentives present in the common agency competition, Mezzetti concludes that the benefits associated with learning the investment preferences of other countries makes competition for transnational investment preferable to each country trying to promote only domestic investment .

Mezzetti's (1997) results suggest that there is potential value in governments sharing information. To the extent that competition is socially harmful and the governments are similarly uninformed, coordination may be a desirable goal. Bond and Gresik (1998) consider the more likely case in which the governments are differentially uninformed. Using the same basic model employed in Bond and Gresik (1996), the home government knows the value of c while the host government does not. The countries still compete by simultaneously choosing tax schedules: the home tax schedules depending on the

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[38]In general, it will also be the case that tax competition creates an information externality as changes in one country's tax schedule can alter the reporting incentives the transnational faces with the other country. Because the unit taxes are perfect substitutes in this model, such an externality does not exist.

transnational's true cost and the host tax schedules depending on the transnational's reported cost. In the absence of shared information, the usual global efficiency losses arise because each country's tax policies still impose negative externalities on the other. What happens if the host country elicits information about the transnational from the home country instead of from the transnational? Now when the countries specify tax schedules, the host country's depends on a cost report it knows will be coming from the home country. Since the countries still have an adversarial relationship, the host country must consider the possibility that the home country will misreport its information. To give the home country truthful reporting incentives, the host country must internalize the impact of its taxes on home welfare. Normally internalizing the external costs one imposes on another results in higher aggregate welfare. In our common agency context, the need for the host country to account for the costs its taxes impose in the home country encourages more aggressive tax competition by the home country. The result can be tax rates that, at best, are welfare equivalent to those that arise in the no-information-sharing game and can actually be worse for both countries. More research needs to be done to better understand this phenomenon.

Finally, one issue that has not yet been raised concerns the objectives of individual countries in promoting FDI versus domestic investment.[39] While in many cases, FDI is more profitable than domestic investments, much of the prior discussion suggests that it can be hard for host countries to share in these profits. In fact, new FDI may not only yield returns that accrue primarily to foreigners, it may also disadvantage domestic investment. Together these potential negative consequences force elected officials to trade off national efficiency gains against equity concerns. How these two forces balance must depend on who owns the transnational. Olsen and Osmundsen (1998) analyze a tax competition game between two countries, each of whom plays host to a subsidiary of a single transnational. When a large percentage of the transnational's owners reside in one country, that country is less interested in extracting the transnational's rents. It is also quite interested in attracting transnational investment. This last incentive imposes a negative externality on the other country which will result in inefficient taxes. Equilibrium transnational profit and the combined equilibrium welfare of the countries are highest when ownership is equally divided as this ownership division balances the cost of the tax competition externality against the benefit of reduced rent extraction.

8. *Concluding Comments*

Three key factors have been identified as contributing to the struggle governments experience

[39]These two options were exogenous in Mezzetti (1997).

with attempts to simultaneously attract transnational investment and effectively tax its returns: differential tax treatment of domestic-source and foreign-source income, tax competition, and inferior information about transnational operations. While the latter two factors are not unique to transnational firms, the ability of a firm to adapt by shifting production across jurisdictions, by altering investment flows, by developing new tax minimization strategies, and/or by using its private information to strategic advantage is enhanced by transnational investment. In many cases, this adaptability has prompted increasingly complex national policies. It remains to be seen whether these more complex policies have been effective or whether they have just encouraged more ingenious circumvention strategies. Since most existing tax competition models assume away many of the interesting dimensions along which transnationals can adapt (and governments can respond), closing the gap between the literature on transnational behavior and the literature of FDI competition appears to offer a wealth of new research opportunities. One particularly promising area involves the introduction of dynamic behavior.

A nice example by Altshuler and Grubert (1996) highlights both the innovativeness of transnationals as well as the potential importance of dynamic effects. Recall that a central feature of many countries' tax policies is the ability to defer taxes on foreign source earnings until repatriation. This encourages transnationals to reinvest foreign source earnings abroad to avoid U.S. taxes. In the TRA, Subpart F requirements limited this option by making earnings on passive investments immediately taxable. For transnationals with subsidiaries in high-tax host countries, Subpart F requirements present no real constraints because earnings from these subsidiaries generate excess credits and hence no additional U.S. tax liability upon repatriation. For transnationals with subsidiaries in low-tax host countries, the Subpart F restrictions effectively accelerate the rate at which foreign source earnings generate U.S. tax liabilities. With subsidiaries in both high- and low-tax countries, transnationals can use this differential treatment to their advantage by using the following "triangular investment" strategy. Initial investments in both locations are made to equate the after-host-tax returns with the after-tax U.S. return. Once the low-tax subsidiary begins to generate earnings in excess of those needed for its new (active) investments, it invests these excess earnings in the high-tax subsidiary. The high-tax subsidiary then repatriates all of its earnings and enough of its initial equity investment (by buying back the parent's shares) to maintain after-tax rates of return. Because repatriations from this subsidiary generate excess credits, they incur no additional U.S. tax; nor do the equity repayments.[40]

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[40]Private communication with one of the authors revealed that, at the time this paper was first written, U.S. Treasury officials were unaware of the profitability of this strategy.

This example is also intended to illustrate the fact that models of tax competition with transnationals must eventually allow for dynamic behavior if they are to have any chance of capturing the effects of issues like repatriation and the timing of investments. At the level of modeling transnational behavior, Altshuler and Grubert (1996) illustrates the importance of repatriation in a dynamic setting while Newlon (1987), Hines (1994a), and Weichenrieder (1996a) address dynamic issues caused by both deferral and the timing of investments.[41] In tax competition models, such dynamic concerns have been largely unaddressed.

[41] In addition, many of the empirical studies cited in Section 3 attempt to capture the dynamic behavior of transnationals.

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Country	Double Taxation: Dividend Income	Distribution of Parent Costs	Parent Interest Deductions	Domestic R&D Subsidies	Foreign Sales Corporations
Australia	Exemption	Allocation	Tracing	Deduction	No
Canada	Exemption	Tracing	Share	Credit	No
France	Exemption	Allocation	Share	MIC	No
Germany	Exemption	---	Share	---	No
Italy	Credit	Tracing	Share	---	No
Japan	Credit	Allocation	Tracing	MIC	No
Netherlands	Exemption	Tracing	Tracing	Deduction	No
Norway	Credit	Allocation	Allocation	---	No
Sweden	Exemption	---	Share	---	No
UK	Credit	---	---	---	No
US	Credit	Allocation	Allocation	MIC	Yes

Table 1: Transnational Income Tax Policies[42]

[42]Most countries have separate double tax rules for different classes of foreign income. Since transnationals can usually structure intrafirm transactions to earn the most favorable tax treatment, the tax treatment pertaining to dividend income is listed. Information about parent interest deductions comes from Brian Arnold (1994). Information on cost distribution rules and R&D subsidies come from Price-Waterhouse (1995) and Coopers and Lybrand (1998). MIC denotes "marginal investment credit." Blank cells denote the lack of an explicit policy.

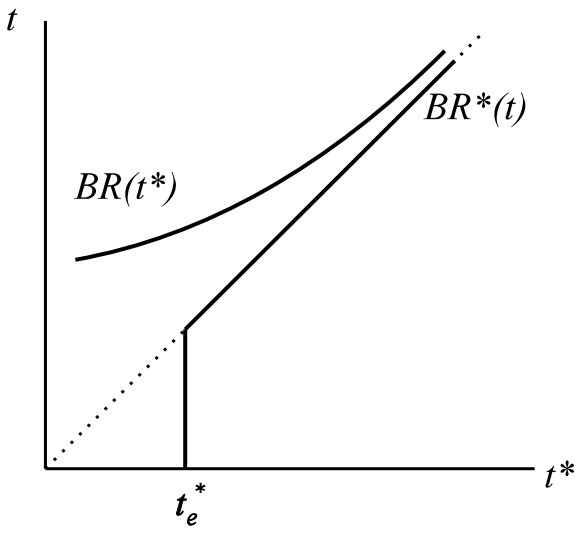

Figure 1